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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT PAPER

EGYPT: Cairo Sewerage

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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

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Cairo Sewerage

8. ESTIMATED FY OF PROJECT COMPLETION

FY 811

9. ESTIMATED DATE OF OBLIGATION

A INITIAL FY 78 B QUARTER 4
C FINAL FY 78 Enter 1, 2, 3, or 4

10. ESTIMATED COSTS \$000 OR EQUIVALENT \$1 -

A. FUNDING SOURCE	FIRST FY 78			LIFE OF PROJECT		
	B. EX	C. G	D. TOTAL	E. EX	F. G	G. TOTAL
AID APPROPRIATED TOTAL	25,000		25,000	25,000		25,000
GRANT	25,000		25,000	25,000		25,000
LOAN						
OTHER						
HOST COUNTRY		45,000	45,000		45,000	45,000
OTHER DONOR ST. U.K.	2,500		2,500	2,500		2,500
TOTALS	27,500	45,000	72,500	27,500	45,000	72,500

11. PROPOSED BUDGET APPROPRIATED FUNDS \$000

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH CODE		E. 1ST FY 78		H. 2ND FY 79		K. 3RD FY 80	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
SA	720	541		25,000					
TOTALS				25,000					

12. IN-DEPTH EVALUATION SCHEDULED

A. APPROPRIATION	N. 4TH FY 81		O. 5TH FY		LIFE OF PROJECT	
	C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN
SA					25,000	
TOTALS					25,000	

13. DATA CHANGE INDICATOR: WERE CHANGES MADE IN THE PID FACESHEET DATA BLOCKS (C, D, H, I, J, K, L, M, O, P, Q, R, S, OR N) OF THE FACESHEET DATA BLOCK (2)? IF YES, ATTACH CHANGED PID FACESHEET

1 YES
2 NO

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Sellig A. Taubenblatt

TITLE: Director, NE/PD

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EGYPT: CAIRO SEWERAGE

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EGYPT: CAIRO SEWERAGE

SUMMARY AND RECOMMENDATIONS

1. Grantee: The Government of the Arab Republic of Egypt (GOE).
2. Beneficiary/Executing Entity: The General Organization for Sewerage and Sanitary **Drainage** (GOSSD).
3. Grant Amount: \$ 25.0 million.
4. Project Description: (a) Repair and rehabilitation of the Greater Cairo Sewerage System; (b) Training of operation and maintenance staff; (c) Review of past studies and a definitive plan for the implementation of an expansion of the Sewerage System to serve the needs through the year 1990.
5. Project Purpose: To correct serious inadequacies in the existing sewerage system which are causing public health problems in Greater Cairo.
6. Total Project Cost: The total project cost is estimated to be \$ 27.5 Million and LE 31.5 Million (equivalent to \$ 45.0 Million at the current exchange rate). The GOE will finance all Egyptian currency costs. The Government of the United Kingdom will finance the equivalent of \$ 2.5 Million of the foreign exchange cost. This proposed A.I.D. grant will finance the remaining \$ 25.0 Million.
7. Environmental Considerations: Have been addressed.
8. Grant Application: The GOE has requested a grant of \$ 100 Million over a three year period, of which \$25.0 Million would be authorized in fiscal year 1978 and the remainder in FY 79/80. The GOE's application is contained in Annex A to the paper.
9. Mission Views: USAID/Cairo has recommended that this grant be authorized. The principal officer's certification pursuant to Section 611 (e) of the Foreign Assistance Act is included as Annex D to this paper.

EGYPT: CAIRO SEWERAGE

SUMMARY AND RECOMMENDATIONS

10. Statutory Criteria: Satisfied. See Annex B.
11. Recommendation: That a grant in the amount of \$ 25.0 Million be authorized on terms and conditions as set forth in the draft Grant Authorization included as Annex C to this paper.
12. Project Committee: USAID/Egypt: Chairperson - Robert N. Bakley
Sanitary Engineer - Jack Snead
Capital Development - Keith Brown
Officer
Economist - Thomas Morrison
Counsel - James Phippard

AID/Washington: Chairperson - Thomas A. Sterner
Project Officer - Ron Redman
Engineer - Wally F. Bowles
Desk Officer - Craig G. Buck
Counsel - Gary Bisson

I. INTRODUCTION

1.01. Under a program instituted by the Government of the Arab Republic of Egypt (GOE) to improve and expand its wastewater facilities in five major cities, a master plan for Cairo's wastewater system was prepared by a joint venture of two British engineering firms, John Taylor and Sons and Binnie and Partners (Taylor-Binnie). A.I.D. financing was not involved in the preparation of that study. A.I.D. is, however, financing the foreign exchange cost of feasibility studies and master planning of water and wastewater facilities in Alexandria, Port Said, Ismailia and Suez. In addition, A.I.D. is financing the foreign exchange cost of water system improvements for Cairo and for design and construction of sewerage facilities in Alexandria. A study of Egypt's water and wastewater management and tariff structure is also presently under way and financed by A.I.D.

1.02. Work on the Greater Cairo Wastewater Plan started in January 1977 and was completed in April 1978. The foreign exchange cost of study was financed by the Arab Fund. The studies concluded that because of the tremendous backlog of work which had accumulated over the last 25 years, much of the city is not adequately served nor does the existing system have sufficient capacity to handle the wastes now collected. Sewers are surcharged to the point where the wastes frequently overflow and pond in many sections of the city. Little, if any, of the wastes collected are treated and large emergency by-pass canals carrying raw sewage traverse the city. As a result, the present situation represents a serious health hazard to the population. To correct the situation, Taylor-Binnie recommended, in their master plan, a massive investment program totaling more than \$623 million (both FX and local currency) consisting of 31 top priority projects. These works would be completed between 1983 and 1985.

1.03. Taylor-Binnie's contract for the master plan required the GOE to contract with Taylor-Binnie for the implementation of this investment program--design, engineering and construction supervision. Negotiations, however, were never concluded between the GOE and Taylor-Binnie since the GOE did not have adequate FX resources to fund either the Taylor-Binnie contract or the investment program.

1.04. In January 1978, the then Deputy Prime Minister for Economy/ Finance requested U.S. assistance in financing the rehabilitation, improvement and expansion of the Cairo wastewater system. In response, A.I.D. agreed to grant \$500,000 for a pilot sewer cleaning and training program, similar to that which was being implemented, successfully, in the city of Alexandria.

1.05. Concurrent with the agreement to finance the pilot sewer cleaning and training program, USAID made a careful review of the Taylor-Binnie master plan and concluded that it was deficient in the following respects:

- a. Taylor-Binnie's contract excluded a review of the possible rehabilitation of the existing collection system. Therefore the master plan considered the existing flows as the maximum that could be carried by the system.
- b. Taylor-Binnie's plan did not appear to address economically all technical alternatives for two critical items--a deep collection tunnel and the disposal of treated sewerage. Also, the population densities projected by Taylor-Binnie are questionable, which, of course, affects design standards.
- c. The Taylor-Binnie investment plan was not staged. Therefore, it was not possible to proceed with sequential construction through incremental financing.

1.06. USAID also concluded that the existing system needed to be immediately repaired and rehabilitated since Cairo could not tolerate a deferment of an improvement in the sewage problem until the early 1980's, the earliest that relief would begin to be provided by the Taylor-Binnie plan. Further, it was concluded that the General Organization for Sewerage and Sanitary Drainage (GOSSD), the organization responsible for the Cairo wastewater system, was not capable of effecting the repair and rehabilitation of the Cairo system without outside assistance.

1.07 Accordingly, A.I.D. adjusted its FY 78 budget to provide for the financing of \$25 million for a project consisting of the following elements:

- a. Rehabilitation, repair and minor modification of the existing trunk sewers, collectors, and pump stations to enable the conveyance system to be operated at its full capacity.
- b. Training of technical personnel of GOSSD so that the renovated and expanded system will be operated effectively.
- c. Review of certain of the conclusions drawn in the master plan and a staged program for the implementation of the master plan.

1.08 We also amended the proposed budgets for FY 79 and FY 80 to include an additional \$75 million in financing for Cairo sewerage. It was envisioned that this financing would be used for the services of a U.S. engineering firm who would assist GOSSD in the overall management of the entire program, and for financing of part of the expansion. Financing would be sought by the GOE for other elements.

1.09 The Commerce Business Daily Notice requesting pre-qualification material from firms interested in providing the engineering services for the full project--FY 78 through FY 80--was published on March 29, 1978. Terms of Reference were prepared and mailed to the six firms short-listed, from the 25 firms that responded, on June 4, 1978. Proposals were received from five firms (or joint ventures) on August 29, 1978. A copy of the Terms of Reference is attached as Annex E to this paper.

1.10 In mid June 1978 the British Government acting through its Ministry of Overseas Development (ODM) expressed interest in participating with A.I.D. in the Cairo Sewerage project. Specifically, ODM stated that it was prepared to consider providing 50 million pound sterling for this project, subject to its review of the overall project and agreement with A.I.D. on an implementation plan. In subsequent meeting with ODM in Cairo in July and August 1978 we were informed that a condition of ODM's participation in this project was that Taylor-Binnie, the British consulting firms, be involved in the project. An agreement was reached among all parties (ODM, GOSSD, the Ministry of Housing, and USAID) that the U.S. engineering firm, selected by GOSSD pursuant to the previously discussed CBD notice, be required to associate with Taylor-Binnie and that the services of the joint venture firms be expanded to include final design and construction supervising of Taylor-Binnie investment plan. Based on this Agreement, the British Government officially informed the GOE of its proposed participation in this project. A copy of the British Government's letter is shown in Annex F. The short-listed U.S. engineering firms have been informed of this development and each has welcomed the opportunity to associate with Taylor-Binnie in the full project.

1.11 In September 1978 we again met with ODM to discuss implementation procedures. By that time ODM had had an opportunity to review the Taylor-Binnie study. ODM agreed with A.I.D. that additional work was required before either organization could seek funding approval. It was agreed, therefore, that the contract with the joint ventured consulting engineering firms be in two parts. Part One would be the review of certain technical alternatives (as described above), definitive cost estimates, implementation schedule, sourcing of equipment between the U.S. and the U.K., etc. The estimated cost of the work is \$5.0 million. Upon review and approval

of a final engineering report resulting from Part One, both organizations would seek approval of additional funding to implement the program upon approval. The contract with the joint ventured consulting engineering firms would be amended to include the implementation of the program.

1.12 The estimated cost of Phase One is \$5.0 million. ODM will seek Board approval in November for one-half of this amount. A.I.D. will finance the other half for this project.

1.13 Concurrent with the work described above (which will be called the Review-Study Phase) A.I.D. will commence with the repair and rehabilitation of the existing System and training as was originally planned. The estimated cost of this work is \$22.5 million.

1.14 This project paper is therefore written for \$25 million for the project elements described in para 1.07. It describes the existing Cairo Sewerage System, its condition, and how we intend to repair it. A cost estimate and financial plan is provided for this project as is an environmental assessment. Upon review and approval of the review/study report we will seek additional funds of \$75 million in FY 79 or FY 80.

II. BACKGROUND

A. Cairo

2.01 Cairo is located on both banks of the River Nile at the start of the Delta about 200 kilometers south of the Nile's discharge into the Mediterranean Sea, as shown on Figure 2.1. Cairo is the Capital of the Arab Republic of Egypt and one of the most important cities in the Arab World. The beginnings of Cairo reach back to Roman times when a small city named Babylon was founded at what is now the southern limit of east bank Cairo. In the ninth century, when Egypt was conquered by the Arabs, the old city of Fustat, as Babylon was now named, was expanded northward along the east bank. Expansion has continued towards the north and east through today. In fact, current and projected expansion is still progressing in that direction. West bank Cairo consists of Giza and its northern environs. The present city is located about 80 percent on the east bank.

2.02 From the southern extremity to the northern limit the difference in ground elevation of the city is about six meters. The city is bounded on the east by a sharp scarp called Mokattam. Heliopolis and Nasr City, which are two developing areas are somewhat higher in elevation than the greater portion of the Project Area. The city is bounded on the west by the Pyramids plateau.

2.03 The total present urban area of Greater Cairo is about 240 km². The current population of Greater Cairo is over 8 million, with a projected year 2000 population of 14 million as indicated in Table 2.1. Some districts within the Project Area have population densities in excess of 1200 per hectare.

Table 2.1

Year	Population (millions)*			
	Greater Cairo	Project Area		
		Urban	Rural	Total
1976	8.00	6.45	0.19	6.64
1980	8.95	7.13	0.21	7.34
1985	10.50	8.26	0.23	8.49
1990	12.30	9.77	0.25	10.02
2000	17.00	13.92	0.30	14.22

* Excludes persons working abroad.

2.04 The climate of Cairo consists of a moderate winter and a hot summer. Mean air temperatures range from 28°C in July to 14°C in January. Humidity is in the range of 40 to 60 percent. Rainfall is minimal, averaging 27 mm per year and occurs between November and April only.

2.05 The area in and about Cairo consists mostly of river deposited material such as silt, sand and gravel with some clay present. The eastern areas of the Project are on rock, primarily limestone and sandstone. Groundwater within the flat areas of the valley is generally 2 to 3 meters below the surface.

B. Existing Sewerage System

2.06 At the present time it is estimated that 80 percent urban Cairo is sewered and that 65 percent of the population is connected. The system is operated as a combined facility for wastewater and drainage.

2.07 The entire system can be divided into four principal zones. These areas are designated: (1) Southern (2) Northern (3) Central and Eastern (4) Western, and are indicated on Figure 2.2.

(1) Southern Zone:

Area - 40 Km²

Auxiliary Pumping Facilities - 26 ejector stations (pneumatic)
17 pump stations

All flow is ultimately directed to a 1.2 m siphon under the Nile and delivered to the west bank.

(2) Northern Zone:

Area - 25 Km²

Auxiliary Pumping Facilities - 21 ejector stations (pneumatic)
13 pump stations

All flow is ultimately directed to the Souk El Samak pump station from where it is delivered to the Kossous primary treatment plant with effluent discharged into the Kossous Drain.

(3) Central and Eastern Zones:

Area - 105 Km²

Auxiliary Pumping Facilities - 35 ejector stations (pneumatic)
22 pump stations

All flow is conveyed to the four major collectors which discharge to two major pump stations. Collector No. 1 and collector Duplicate No. 1 both discharge to Ein Shams pump station which pumps to the Gabal El Asfar treatment works. Collectors Nos. 2 & 3 discharge to the Ameria pump station which also pumps to Gabal Asfar except for emergency situations when it pumps to the Kossous drain near the Kossous primary treatment plant.

(4) Western Zone:

Area - 28 Km²

Auxiliary pumping facilities - 19 pump stations

All flow ultimately reaches the Zeneim Treatment plant.

2.08 The present East Bank Cairo sewerage system has its origins in the work of Mr. Charles Carkeet James who in 1906 developed a plan which was constructed and put into operation in 1914. The system was designed to serve 650,000 people which was the projected 1932 population of East Bank Cairo. At that time, all of Cairo was situated on the East Bank.

2.09 Since the construction of those initial works, which included collector No. 1, Ein Shams pump station and the Gabal Al Asfar treatment plant, additions have been superimposed without benefit of a comprehensive planning effort. All subsequent additions have been a reaction to inadequacies and lack of capacity in the original (1914) system. Collector No. 2 and the Ameria pump station were constructed between 1925 and 1929.

2.10 A commission was established in the mid-fifties to prepare a Master Plan for sewerage facilities for Cairo for the remainder of the century. This report (Cairo Sewerage Commission, "Report on the Sewerage, Sewage Treatment and Disposal of the City of Cairo", 1958) was never implemented.

2.11 In the early sixties, the situation in Cairo had deteriorated to the degree that emergency steps were necessary. It was in the mid-sixties that the so-called "One Hundred Day Scheme" was enacted. Part of this effort included the Taweel-Souk El Samak system which was intended to relieve the northern zone and part of the central zone.

2.12 No major systems improvements have been made on the East Bank of the Project area since that time up to the current projects now underway.

2.13 The present West Bank Cairo sewerage system did not begin to evolve until the late 1930's. The initial works were put on line in 1939 and comprised a gravity system discharging into the Giza Pump Station pumped to a treatment plant located at Abu Roash about 16 Km west of the Nile.

2.14 In 1970 an activated sludge plant was constructed at Zeneim to treat 220,000 cmd of west bank flow which includes flow diverted across the Nile through a siphon delivering sewage from the south zone of Cairo.

2.15 As part of the previously mentioned "One Hundred Day Scheme", the Gamaa Pump Station was constructed and pumped to a new primary treatment plant, Nahya, located near by the Zeneim treatment plant which was not completed at that time.

2.16 Currently work is ongoing to expand Zeneim to 330,000 cmd. Work is moving slowly and is poorly designed. At present, west bank flows plus diverted south zone flow is pumped to Zeneim and Nahya for treatment. Effluent is discharged to the Nahya Drain which goes into the Muheit Drain which eventually discharges into the Rosetta Branch of the Nile. Raw sludge is pumped to drying beds at the partially abandoned Abu Roash treatment works.

C. Current Problems

2.17 The current sewerage situation in Cairo is extremely serious. Some of the largest districts which have the highest population densities in the city have raw sewage ponded in the streets. As many as a million people are affected.

2.18 Current efforts by GOSSD to alleviate these conditions are ineffective because of the lack of proper equipment, training and serious shortcomings in the collection and conveyance system.

2.19 Since the original system was constructed in 1914, several major additions were made without benefit of broad planning. Furthermore, a multitude of relief-cross connections were installed. The final result has been a conglomeration of works which nobody truly understands. Preliminary observations indicate a capacity for greater than that presently being utilized, provided significant operational changes are instituted, the major collectors are cleaned and some moderate capital improvements are undertaken.

2.20 The above observations are directed only towards the collection and conveyance elements of the system. The existing east bank treatment works are for all practical purposes, totally ineffective at this time. One plant, Gabal El Asfar, is of very limited capacity and thus has no effect on the waste discharge from it. The other plant, Kossous, has the potential, with modest improvements for effective primary treatment and for expansion to secondary treatment. The current mode of operation is such that no meaningful treatment is occurring.

2.21 The capacity of west bank treatment plants are also very limited, given their present method of operation and physical condition. The Nahya plant is totally without effect because of severe equipment shortcomings. The Zeneim activated sludge plant is

potentially capable of effective operation, but there is a need for a considerable amount of long-delayed maintenance work and operational changes.

2.22 Another major factor in the current situation is the high degree of siltation within the major collector pipes. The hydraulic capacity of these conduits is less than half and in some cases less than 25 percent of the capacity of the conduit if free of debris. Efforts have underway to remove the silt-sand-debris, but because of lack of proper direction, equipment and trained personnel, it has been ineffective. A pilot program is underway which is intended to test alternative cleaning methods, establish priorities between alternative types of rehabilitation efforts, optimize use of equipment on hand, identify needed additional equipment, begin the training of crews, and initiate improved operational methods. This pilot program is funded by a \$500,000 grant from AIP and is directed by Camp, Dresser and McKee, a U.S. Consultant working closely with the GOSSD staff.

D. The Taylor-Binnie Master Plan

2.23 The current rapid growth of Greater ^{Cairo} necessitates a substantial expansion of the sewage system. For the planning of this expansion the Government of Egypt contracted with John Taylor and Sons and Binnie and Partners (Taylor-Binnie), two British consulting engineering firms. Financing of the foreign exchange cost of Taylor-Binnie's contract was provided by the Arab Fund. Taylor-Binnie commenced work in January 1977 and completed their study in April 1978. Their report recommends a master plan for the expansion of the system to be implemented in two phases. Phase one would provide for all Cairo's sewage needs through the year 1990. Phase two provides a framework for the expansion of the system to provide for needs through the year 2000. The estimated cost of the Phase one expansion is approximately \$600 million of which about \$250 million is in foreign exchange.

2.24 As explained in para 1.05 Taylor-Binnie's Phase One expansion was deficient in certain respects. Through this project those deficiencies will be reviewed and corrected, which possibly will reduce the total cost of the proposed Phase One expansion.

E. Ongoing Activities

2.28 GOSSD has engaged Camp, Dresser, and McKee Inc. to develop and assist in implementation of a pilot program to clean detritus from the collectors of the project area. As part of this pilot program,

certain operational changes at the major pump stations will be developed to enhance the pilot sewer cleaning operations. Furthermore, advice as to type and number of sewer cleaning equipment will be furnished based on experience during the pilot cleaning work. The contract was signed in April 1978 and work will be completed in March 1979. The intent is that the Rehabilitation Phase of the Services will be an expanded continuation of the current pilot program.

2.29 GOSSD has underway several major construction projects which will provide additional sewerage facilities and/or improve operation of the existing works. The Table 2.2 is a list of these projects indicating the costs for implementation.

TABLE 2.2

CAPITAL COST OF CURRENT GOSSD PROJECTS

<u>Description</u>	<u>1978</u>	<u>After 1978</u>
Ismailia Canal Crossing	2,100	-
New Ein Shams Pumping Station	1,500	-
New Pumping Main to Gabal Al Asfar from Ameria	6,000	9,000
Sawakel Canal Sewer	250	-
New sewer to Nadi el Seid Pumping Station	200	-
El Ahrum Scheme	2,000	-
Parts of South Cairo Sewerage	350	-
Shoubra el Kheima (see also Table 6.4.1)	5,350	8,000
New Standby Generators	400	-
Rehabilitation and repairs to gravity sewers and Pumping Stations	10,000	20,000

Note: Amounts are in LE x 1,000



ABU HOASH STW

GABAL EL ASFAH STW

EIN SHAMS P S

SOUK EL SAMAR P S

KOSSOUS STW AMERHA P S

WESTERN ZONE

NORTHERN ZONE

CENTRAL AND EASTERN ZONE

ZEMIN STW

EL YAWIL P S

HAIFYA STW

GIZA P S

EL LAHIE P S

GAMAA P S

EL DAYOUHA P S

SOUTHERN ZONE

MOKATTAM ESCARPMENT

LEGEND

- PROJECT AREA BOUNDARY
- [Hatched Box] SEWAGE TREATMENT WORKS
- (O) MAJOR PUMP STATIONS
- COLLECTORS

CAIRO PROJECT AREA AND MAJOR FACILITIES

III. THE PROJECT

A. Summary of Problem

3.01 Section II outlines the seriousness of the wastewater problems in Cairo. Simply put, the existing facilities are completely inadequate to handle the volume of sewage now being generated by Cairo's eight million inhabitants. Sewage is frequently found overflowing from surcharged sewers and raw sewage canals or ditches traverse many parts of the City. There is no question but what this condition represents a potentially explosive health hazard, not only to the metropolitan area, but to the country as a whole.

3.02 Secondly, the existing collection and conveyance system has fallen into a bad state of disrepair and is impacting on the environment of the entire city. Treatment facilities, where they exist, are grossly overloaded so that no meaningful treatment is provided for the approximately 1.2 million cubic meters per day of wastewater generated.

3.03 Third, there are large areas of the city which are presently not sewered or inhabitants not connected to the system. The living conditions in these areas, usually the poorest and most heavily populated areas, are intolerable by any standard. However, before wastewater from these areas can be added, the system must be able to handle these additional flows. Assistance to relieve and correct these conditions is urgently needed.

B. Project Purpose and Goal

3.04 The project purpose is to return Cairo's existing sewerage system to its design efficiency and to provide a detailed plan for the expansion of the system. The project goal is to improve the living conditions of the eight million or so inhabitants of Greater Cairo.

C. Project Description

3.05 The project consists of three main elements:

(1) Rehabilitation, repair and minor modification of existing trunk and collector sewers any pump stations to enable the existing system to be operated at full capacity, repair and rehabilitation of certain sewerage treatment plants and the preparation of as built drawings of all major works.

(2) Training of technical personnel of GOSSD so that the renovated system will be operated effectively.

(3) Review of certain conclusions of the recently completed Cairo sewerage master plan and the refining of this plan to allow for its prompt implementation.

3.06 The Scope of Work for the engineering services is contained in Annex F. A.I.D. will finance the foreign exchange cost of elements (1) and (2) and on-half of element (3). The British Government will finance one-half of the foreign exchange cost of element (3). The Government of Egypt will finance all local currency costs.

IV. TECHNICAL ANALYSIS

A. General

4.01 As was described in Sections II and III, the current situation, particularly in East Cairo, is extremely critical. Large areas of highly congested districts have sewage ponding in the streets. The current problems did not originate overnight, rather they have been the result of insufficient capital improvements, poor operation and maintenance practices and a burgeoning population. During the past two decades, funds for maintenance have been virtually non-existent. Equipment has broken down and repairs were not possible because of the lack of spare parts.

4.02 A major contributing factor to the current problems is the practice of operating the pump stations in such a way so as to submerge the incoming collector sewers. This creates quiescent conditions in the collection system which will in turn enhance settling of suspended solids especially sand and some organics. The result is build-up in the collectors of large deposits of sand and silt. This build-up varies from 25 percent to 40 percent of the total sewer diameter in most of the main collectors. The ability to convey sewage is reduced from one-third to a half of the capacity of that which could occur if the pipe were free of these deposits. The sewage of Cairo has a content of settleable solids particularly sand, many times that of sewages found in most U.S. cities. This is because sand is being swept and washed into storm drain inlets (the Cairo system is combined) especially from unpaved streets, the heavy use of sand for scouring pots and pans (a traditional household method of cleaning cooking utensils) and probable heavy infiltration through bad joints in the smaller collector pipes. As a result, it is estimated that the major collectors and trunk sewers have collected some 400,000 cm of detritus which needs removing.

4.03 Efforts to free the sewers of this material have been continuous averaging approximately 150 cm per week, but without significant effect. Lack of trained personnel to operate cleaning equipment, the current surcharged state of the system, and dependence on outdated and inefficient methods all contribute to the situation. Also, the motivation of the personnel involved in the cleaning operations is poor.

4.04 Although treatment plants exist on both banks of the Nile, the effective treatment of the wastewater delivered to these plants is minimal. Flows from the East bank are ultimately discharged into the Belbase Drain and then to Lake Mansalla, (see Figure 2.2). Those from the West bank are discharged to the Rosetta branch of the Nile via the Muheit Drain. It should be noted that the City of Alexandria draws its

water supply from the Rosetta branch. The only attempt at secondary treatment is where 220,000 cmd of the West bank flows (including a small quantity from the East bank) is conveyed to the Zenelin Sewage Treatment Plant. However, current operation of this facility is such that an effluent far below secondary quality is produced. This plant is currently under expansion and when completed will handle 330,000 cmd. All plants on the East bank (Kossous and Gabal El Asfar) are designed to provide only primary treatment. The Kossous plant is being operated in such a way that no meaningful treatment is taking place and the Gabal El Asfar plant is hopelessly under capacity. GOSSD presently has under construction a primary plant to treat 600,000 cmd in the vicinity of the existing Gabal El Asfar works, but the design of this facility needs many modifications if the intended treatment potential is to be realized.

4.05 Preliminary investigations into the existing Cairo Sewerage System indicates a great deal of under-utilized capacity exists provided some hydraulic and equipment modifications are made, a major sewer cleaning program is undertaken and certain operational changes take place. It is reasonable to expect that if these improvements take place, they will eliminate most of the immediate sewage removal and conveyance problems. This would provide the time needed to construct additional or larger capacity facilities. The recommendations in the Taylor-Binnie report do not provide for this interim solution, but suggests starting the new and expanded facilities immediately. This could take 7 to 8 years to complete. Not only will the current problems continue during that period, but they will increase significantly, perhaps into a major public health crisis.

The proposed project rehabilitation improvements will have the greatest impact in the collection and conveyance of sewage to discharge points well away from most of the populated areas of the city. Construction of additional treatment works in most cases, will require several years of study-design-construction time before they become operational. An exception is the primary treatment plant at Kossous which could be upgraded under the rehabilitation phase of this project. Because of time constraints, only a few of the required expansion facilities for treatment can be operational until after 1984. These new treatment works are included as part of this Project. Each improvement or expansion to the collection or conveyance system will be so planned that it can be operated without dependence on other new facilities for the removal of sewage from the populated areas. Then, if construction of the treatment plants or additional conveyance works should be delayed or cancelled, the benefits realized by the improvements to the existing collection and conveyance facilities would not be diminished in any way.

4.07 Another benefit which would result from this Project is the training of skilled personnel to operate the existing facilities more effectively. This will go a long way towards preventing the system from lapsing back into its present state of disrepair and poor utilization. This training would also be undiminished should construction of

proposed first stage expansion facilities be delayed.

B. Immediate Needs

4.08 The most pressing immediate need is to clean the collector and sub-collector sewers. The four main collectors now serving the East bank are filled with sand and silt plus some organic matter from 25 to 40 percent of their height. The carrying capacity is thereby reduced by one half to a third of what would be available if they were cleaned. The three main West bank collectors are not in as poor a shape, but significant capacity will be gained by cleaning them. Also, the sub-collectors on both banks appear to be heavily filled with deposits and the main causes of overflowing sewers.

4.09 In April of 1978, GOSSD utilizing a \$500,000 grant from USAID, embarked on a pilot program to clean selected sewers on the East bank. The program is being directed by Camp Dresser & McKee Inc. (CDM), an American consultant engineering firm currently engaged in a similar program of cleaning of sewers in Alexandria as the first part of a sewerage improvement program for that city. The purpose of the pilot program is to determine the best methods and types of equipment needed for the cleaning of Cairo's sewers especially the large diameter collectors. The training of GOSSD's staff to properly operate and maintain the sewer cleaning equipment both existing and to be purchased is a major part of this program. This pilot program will also determine the need to employ foreign and/or local contractors and to what extent for a major cleaning program planned as part of the project described herein.

4.10 It is planned, that when a section of sewers has been cleaned and thoroughly inspected using TV cameras, actual entrance to the line (size permitting) for visual inspection will be made. These inspections will reveal those sections which are in need of repair and/or modification. It is estimated that some 400 km of major repairs will be necessary in several of the East bank collectors and trunk sewers. This repair work is especially important because most of Cairo has a high groundwater table and sandy soil, creating difficult construction conditions for the installation of sewers. With present construction practice of using mortar joints, it is anticipated that a great deal of improperly laid sewer lines will be found particularly for the smaller size pipes such as sub-trunks and laterals. This permits the infiltration of ground water into the sewers and appreciably adds to the quantity of flows to be handled.

4.11 All detailed design work for the needed modifications for sewer construction work will be done by the engineering consultant providing the advisory services to GOSSD during construction. This will supplement the planned training program and help improve the capability of GOSSD's staff in the proper construction methods needed for sewers.

It will also increase their design skills through actual on-the-job experience. Whenever possible, sewer repair work will be done by GOSSD's crews and only the more difficult or large quantities will be handled by local contractors.

4.12 Another benefit from the rehabilitation of the sewers will be the opportunity to perform gaugings to establish accurate flow parameters based on actual field measurements. Because of the surcharged conditions existing in most of the sewers, such measurements have been impossible. These tests will be done as part of the Training Phase of the proposed engineering services, and all data used in the Review-Study Phase work will be progressing concurrently.

4.13 It has been the general consensus of several experts that the wastewater flows reported in the Taylor-Binnie Master Plan are in all probability high. The flow measurements described above will be valuable in calculating existing and projecting future flows. This will permit a more realistic estimate of the capacity of the existing system and the development of a more cost effective staged expansion program for the future.

4.14 The immediate benefit resulting from the sewer cleaning program and certainly the most important, will be the elimination of the current problem of sewage ponding in the streets of populated areas.

4.15 Another important need is to rehabilitate the existing pump stations. As was pointed out earlier, the primary cause of sediment build-up in the sewers is the current practice of operating these pump with the incoming sewers submerged. This causes quiescent flow conditions which promotes the sedimentation of deposits in the sewers. Unless this practice is halted, grit and other solids in the sewage will cause the sewers again to fill with this material shortly after the cleaning work has been completed. Another important reason for changing this current operating practice is to permit the cleaning and inspection of the sewers. This is particularly important in surcharged downstream sections of the main collectors.

4.16 Before rehabilitation work on any of the pump stations can be undertaken, there is the need for "as built" drawings and assembly of all key equipment data such as pump curves, etc. GOSSD has very little of this data on file, and it is needed for evaluation and establishing an optimum program for operation of these facilities.

4.17 Development of the above information, supplemented by field tests on the equipment, will permit a thorough hydraulic and operational analysis of the pump stations. This will permit recommendations for needed immediate changes that can be made with only mini-

mal equipment changes or modifications, i.e., removal of hydraulic obstructions which impede flow and those changes involving capital expenditures such as structural changes or the installation of new equipment.

4.18 Instruction manuals for use on a day by day basis by operators needs to be made, and any operational changes closely supervised. Without this guidance, there is little hope of implementing any significant improvements in existing conditions.

4.19 When rehabilitated, the pump stations will provide additional capacity for pumping wastewaters to either treatment plants or discharge points. It will also provide information and data needed in the planning of an expansion program.

4.20 Because of the flat terrain in the Cairo area, the existing system requires a large number of small auxiliary pump stations. These consist of 82 pneumatic ejectors and 71 centrifugal pump stations all scattered throughout the system. Some of these stations have been partially abandoned because of inoperative equipment while some have had submersible pumps installed as a temporary solution. Most, if not all, of these stations are in need of repair or replacement. This project will evaluate and develop recommendations for replacement, repair and/or abandonment. The review-study phase of the project will provide a plan for expanding the collection system which will attempt to eliminate as many of these small stations as economically possible. This would eliminate some maintenance problems and reduce operating costs.

4.21 Three additional items need to be addressed. The first is an evaluation with recommendations for changes in the organizational makeup of GOSSD-Cairo, especially those involving operation and maintenance of the collection-conveyance systems are concerned. Currently, an AID-financed management-tariff study is underway for all of the country's water and sewage utilities. However, the specific management changes referred to here are under this part of the project and will be limited to specific and related improvements needed in day-to-day operations.

4.22 The second item needed will be a review of the current sewer use ordinances with recommendations on immediate enforcement techniques. The people of Cairo are currently putting large amounts of solid wastes and other materials into the sewers. This current practice is a source of continual operational troubles and should be discontinued if operational problems are to be minimized. The review-study phase will address alternative solutions for disposal of these materials.

4.23 The third additional item will be the establishment of a bench mark grid throughout the system. A reliable grid for vertical control does not exist at this time and such a system is vital to any work on this wastewater system.

C. Short Term Needs

4.24 A common criticism of GOSSD is that they do not effectively operate or maintain the existing system. The construction of new or expanded facilities without correcting this problem would be unrealistic. The solution is a comprehensive training program emphasizing the practical "nuts and bolts" approach as opposed to an academic approach. The training program envisioned will be directed towards various levels of personnel from chief operators to maintenance crews. Use of the existing GOSSD facilities, such as pump stations or treatment plants as teaching aids, will have the advantage of acquainting the staff with actual working problems in an environment which they work. Training films and lectures from U.S. agencies such as the Water Pollution Control Federation and the U.S. Environmental Protection Agency will be used to broaden exposure to current practices and techniques.

4.25 An important adjunct to this training will be the establishment of a system of operator grades by certification through examination. This will provide a system for staff evaluation and an incentive ladder to create an atmosphere for promotion through learning. Promotion will be based on ability rather than by the present seniority system which creates apathy.

4.26 It is expected that some of this trained staff will be used during the engineering design phase of the Project and especially during the construction and start-up phases. This will provide valuable insight and experience in the need for good operation and maintenance procedures plus provide the O&M staff an opportunity to review proposed facilities to express their concerns regarding the lack of adequate provisions or access by the designer to carry out needed O&M functions properly. Every opportunity to integrate the trainees into the on-going phases of the project work will be taken.

4.27 The key areas to be given special attention during the training are as follows:

Sewer and Force Main Maintenance
Pump Station Operation and Maintenance
Treatment Plant Operation and Maintenance
Functional Design of Sewers and Appurtenances

Functional Design of Pump Systems
Operation of Wastewater Laboratory
Maintenance of Service Equipment
Safety Procedures
Record Keeping

4.28 Another part of the O&M training work which in reality is a separate task will be the pilot studies. These studies will involve establishment of qualitative parameters for the wastewaters such as BOD, suspended solids, COD, etc. Performance of these analyses will effectively complement the classroom training for laboratory personnel and operations control. Additional lab work will be undertaken, based on field sampling, to establish criteria needed to determine the assimilative capacity of the River Nile and other potential wastewater receiving bodies. Bench scale tests will be run and the results confirmed by full scale operation at the existing plants, insofar as existing facilities will allow. The results will be used to determine the optimum treatment processes for the new facilities. Trainees will be utilized to the maximum extent possible in these tests to improve their understanding of the basic processes and operational parameters.

4.29 The gauging and sampling in the newly cleaned sewers will also be part of this training program.

D. Long Term Needs

4.30 The development of the Cairo sewerage system had been without the benefit of any meaningful broad planning except when the original system was built in 1914. The projected rapid growth of the city demanded that a detailed staged plan for expansion be developed without delay. The Taylor-Binnie "Greater Cairo Wastewater Project" Master Plan was prepared to meet this need.

4.31 Subject to a review of a few assumptions the Taylor-Binnie study provides a well thought through plan for the expansion of the sewerage system to handle Cairo's needs through the year 1990 - the First-Stage Expansion. We have not reviewed in detail Taylor-Binnie's Second-Stage Expansion - the investments needed for the period 1990 to 2000 - since it is not germane to this proposed project, and obviously will be adjusted many times to account for changes that will occur during the next decade.

4.32 The elements of the Taylor-Binnie plan that need to be reviewed prior to implementation are the wastewater flows that can be obtained from the existing system if that system is rehabilitated, the technical/economic alternatives to the construction of the deep tunnel collector, and the discharge of treated sewerage into the Nile River. These items will be analyzed in the review-study phase of this project.

4.33 Regarding the discharge of sewerage into the Nile, Egypt has a law (No. 93) which forbids any discharge of sewage or drainage into the Nile regardless of whether or not it is treated or technically acceptable (the text of the law is included as Annex G). Compliance with this law puts several constraints on options available for the ultimate disposal of Cairo's wastewaters. The viability of this law needs to be examined in light of modern technology. This project will investigate this matter, including field testing of a section of the Nile to develop an oxygen sag relationship and environmental parameters.

E. The First Stage Expansion

4.34 The First Stage Expansion developed by Taylor-Binnie will fulfill Cairo's wastewater collection and disposal needs through the year 1990. The salient features of the plan are described briefly hereinafter.

West Bank

4.35 On the West Bank of the Nile, a new collector system will be provided in the Northern part of the area. This system will comprise two main sections; one to be constructed in Dokki and Agouza to relieve the overloaded conditions in the existing sewers; the other section to serve the presently unsewered and expanding district of Embaba. The two systems will join to the West of the Cairo-Aswan railway line and from this point, a joint conveyance system will be constructed to the new sewage treatment works which will be established at Abu Rawash.

4.36 The projected route of the first urban metro line is along Sharia Tahrir. This will form an effective barrier between the Northern and central sewerage systems on the West Bank. The drainage boundaries of the central system have been adjusted so that the flow from the area served by this system in the year 2000, together with the flows from Boulac el Dakrour and the flows transferred from the Eastbank through the Nile siphon, will match the treatment capacity of the Zenein treatment works. No major new sewers will be required to augment the central system.

4.37 On completion of the present extensions, the Zenein treatment works will have a capacity of 330,000 cmd. Further extensions to the works are not recommended and, in order not to exceed the available capacity, present flows from the southern part of Giza and projected flows from the scheme now under construction in El Ahram will be redirected through a new collector and conveyance system direct to Abu Rawash treatment works; this system will also accept pumped flows from villages outside the Project Area to the south of Giza. The main collector will be routed westwards from El Ahram pumping station until it meets the Muheit drain. At this point it will turn northwards and continue alongside the drain as a conveyance culvert to a screw lift

station, located to the northwest at Nahya Village, where the flows will be lifted and delivered through culvert to the works.

4.38 The flows from the two islands in the Nile, Zamalek and Roda will be carried to the West bank for treatment. Sewage from Zamalek will be delivered from two pumping stations into the Dokki collector system and that from Roda will be carried to the West bank via the existing siphon.

4.39 Two works will provide treatment for all West Bank flows; the extended works at Zenein, which will provide secondary treatment for 330,000 cmd, and the new works at Abu Kawash, which will be extended in stages to provide secondary treatment for an ultimate design flow of 750,000 cmd. The primary treatment works at Nahya will be taken out of commission.

4.40 The recommended strategy, if feasible, includes the re-use of effluent for agricultural purposes if the review study phase of the project confirms that the reclamation area proposed by GOE is suitable for early development. However, at best, it will be a number of years before this area could absorb the whole West bank flow and so the first phase of sewerage development allows for the construction of oxidation ponds at Abu Rawash to give final treatment to 440,000 cmd (175,000 cmd from the Abu Rawash works and 270,000 cmd from Zenein). As a temporary measure, the good quality effluent from these ponds will discharge to the Muheit drain and thence to the Rosetta Branch of the River Nile, the maximum flow occurring in 1984. After this date, discharges to the Nile will diminish as effluent is used for irrigation.

East Bank

4.41 On the East Bank of the River Nile, the overloaded central collector system will be relieved by a major new collector which will be constructed. This collector will probably have branches into Waily, Rod El Farag, Boulac and Kasr el Nil and will also be connected to the existing collectors (Nos. 2 and 3). It is intended that, as soon as the new collector is operational, the majority of the flows from the existing collectors will be directed into it. This will enable the existing collectors to be repaired before being put back into services to operate in conjunction with the new deep collector system. The central collector system will discharge to Ameria pumping station and in addition to the flow from the central zone, will receive the discharge from the following surrounding districts; part of Sahel, Shoubra, parts of Shourabeya and Hadayek el Koba, Waily, parts of Nasr City, Gamalia, and from Masr el Kadima and Khalifa.

4.42 At Ameria, the existing complex will be expanded by the construction of a new addition to the existing pumphouses to serve the new collector. Two of the existing pumphouses will be upgraded to pump flows from the old collectors to a new treatment works to be established at a high site at Gabal el Asfar. The new pumphouse additions will lift the discharge from the new collector to a culvert which will take the flow by gravity to Manaiya and thence via a new lift station to a new treatment works to be established at a low site at Gabal el Asfar. The facility of interchange of flows arriving at high and low level at Ameria between the conveyance systems to the two treatment works sites will be provided. Flows from Matareya and parts of Heliopolis will gravitate to the culvert on the conveyance system to the low level treatment works site.

4.43 Maadi is the most southernly zone on the East bank. The existing pumping station in this area will be retained and it will be supplemented in 1990 by a new station, which will serve the newly developed areas to the East. The new station will pump direct to the head of the siphon, while the existing station will continue to discharge to Dayoura pumping station. At Dayoura the facility will be provided to pass the flow either to the siphon or to the new collector thus enabling a flow of up to 150,000 cmd to be passed through the siphon.

4.44 A separate collector system will serve Shoubra el Kheima and parts of Sahel on the northern fringes of the City. The Sahel drainage zone is sized to match the capacity of the pumping main which passes under the Ismailia Canal and which is presently under construction. This main will carry 150,000 cmd from Sahel into the Shoubra el Kheima collector system. Shoubra el Kheima will have a main North-South collector with four East-West branches. The main collector will lead to a pumping station located in the North-West of the zone, which will pump the sewage eastwards under the Ismailia Canal and into the conveyance system between Ameria pumping station and the Gabal el Asfar low level treatment works site.

4.45 The remaining drainage zones forming the continuous urban area all lie on relatively high ground in the districts of Mokattam, Nasr City and Heliopolis on the eastern and north-eastern fringes of the City. Where possible, the flows from these areas have been taken north-eastwards by gravity through a new collector system to a new conveyance culvert routed on the alignment of the Emergency Canal to the high level works site at Gabal el Asfar. The topography of the area does not allow the drainage zones on the lower slopes of Nasr City to gravitate to the Emergency Canal and these areas will drain eastwards to the new collector system.

4.46 The parts of Heliopolis which lie on the north of Nasr City will be provided with a new collector system discharging into the conveyance culvert on the route between Ameria and the low level site at Gabal el Asfar. The northern area of Heliopolis has been sized to match the pumping capacity at Ein Shams when the current extensions have been completed. The existing collectors discharging

to the station will be reinforced and the flows to the station will be taken to the high level works at Gabal el Asfar, either through pumping mains in existence and under construction or via a short length of pumping main and the gravity culvert that will be constructed along the line of the Emergency Canal.

4.47 Finally, the separate area of El Aboure will be drained by gravity to the high level site at Gabal el Asfar.

4.48 Two works will provide treatment for all East bank flows: the Gabal el Asfar high level site will provide secondary treatment for 1,250,000 cmd in the year 2000 and the Gabal el Asfar low level site will provide secondary treatment for 2,500,000 cmd. Transfer capability between the two conveyance systems at Ameria pumping station will enable optimum use to be made of the treatment facilities at the two works as the facilities are extended during the next 20 year period.

4.49 The recommended strategy for the East bank is similar to that for the West Bank in that it includes for the re-use of effluent for agricultural purposes if the review-study phase of the project confirms that the reclamation area proposed by GOE is suitable for early development. In addition, private and government companies have informed GOSSD that they require effluent for the reclamation of desert land that they have acquired. If the development of these areas goes ahead, it will be a number of years before the whole effluent discharge could be absorbed for irrigation. Until this time, effluent will be discharged to the Belbase/Bahr el Bakar drain system which leads to Lake Mansala. Should reclamation not proceed, the Belbase and Bahr el Bakar drains, suitably widened, could continue to receive treated effluent discharge in the long term.

F. Cost Estimates

4.50 Table 4.1 below summarizes the project costs. Tables 4.2 and 4.3 provide a more detailed analysis of the cost elements. All estimates were prepared on the basis of July 1978 prices. For foreign exchange costs, these are the costs appearing in the July 1978 Engineering News Record, modified for local conditions. For local construction such as collectors, sewers and pump stations, list information developed by Taylor-Binnie were used.

TABLE 4.1
SUMMARY OF PROJECT COSTS
(000)

<u>Element</u>	<u>FX</u>	<u>LE</u>
Engineering Services: ^{1/}		
Review-study phase	5,000	2,100
Rehabilitation and Training: ^{2/}		
Services, construction and equipment	<u>17,000</u>	<u>17,000</u>
Sub-Total	22,000	19,100
Contingency ^{3/}	2,200	1,900
Escalation ^{4/}	<u>3,300</u>	<u>10,500</u>
Total	<u>27,500</u>	<u>31,500</u>

1/ Detailed estimate on Table 4.2.

2/ Detailed estimate on Table 4.3.

3/ At ten percent of project cost.

4/ At 7½ percent for FX and 25 percent for LE.

TABLE 4.2

ESTIMATED COSTS OF ENGINEERING SERVICES
FOR
REVIEW-STUDY PHASES

Item	<u>U.S. Dollar</u>	<u>Egyptian LE</u>
1. Salaries of Expatriates \$2500/month x 420 mm	1,050,000	-0-
2. Overhead @ 140%	1,470,000	-0-
3. Oversea. Diff. 20% 350 mm x \$2500/mm 0.2	175,000	-0-
4. Home Office Support 78 mm x \$3000/mon	234,000	-0-
5. Overhead 150%	351,000	-0-
6. Special Consultants	<u>100,000</u>	<u>-0-</u>
Sub-Total	3,380,000	-0-
7. Egyptian Assoc. 1250 mm x LE 800	-0-	1,000,000
8. Air Travel 80 trips x \$1,600 RR	128,000	25,000
9. Personnel Costs (Per Diem, Storage, Visa, Med. Exam. etc.)	175,000	632,000
10. Commodities	378,600	75,000
11. Office Costs (Egypt)	280,000	250,000
12. Other Direct Costs	260,000	118,000
13. Fixed Fee 498 mm x \$800	<u>398,400</u>	<u>-0-</u>
Total Costs	\$5,000,000	LE 2,100,000

TABLE 4.3
REHABILITATION CONSTRUCTION COST
(including engineering services and training)

<u>ITEM</u>	<u>\$ COST</u>	<u>L.E. COST</u>
Upgrading of Existing Kossous Primary Treatment Plant	1,500,000	2,000,000
Upgrading of Existing Ameria Pump Station	1,000,000	1,000,000
Upgrading of Existing Souk El Samak Pump Station	500,000	500,000
Upgrading of Existing Giza Pump Station	500,000	450,000
Upgrading of Existing Gamaa Pump Station	300,000	500,000
Upgrading of Existing Taweel Pump Station	300,000	300,000
Upgrading of Existing Major Force Mains	500,000	1,500,000
Upgrading and Replacement of Existing Auxiliary Pumping Facilities including Force Mains	700,000	1,000,000
New Sewer Cleaning Equipment:	6,000,000	500,000
Sewer Cleaning Contractor	5,000,000	5,500,000
New Maintenance Equipment	300,000	-
Repairs to Main Collectors	200,000	1,500,000
Repairs to Sub Collectors	100,000	1,250,000
Repairs to Trunks and Laterals	100,000	1,000,000
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GRAND TOTAL	17,000,000	17,000,000

V. ENVIRONMENTAL ANALYSIS

A. Introduction

5.01 An Initial Environmental Examination (IEE) for this project recommending that Environment Assessment be prepared was approved by the USAID/Cairo on January 30, 1978 and forwarded to AID/W for its action. On February 21, 1978, AID/W approved the threshold decision recommended by the Mission. The IEE is attached as Annex H. This project represents the first of a series of planned activities to be undertaken by the GOE to provide the Greater Cairo Area with a wastewater disposal system which will adequately serve its population and industry. There is little question that the existing system is cause for serious environmental concerns. It is a heavily overloaded system where raw wastes frequently overflow sewers and flood many populated areas, and when collected, are discharged untreated into receiving waters such as the Nile River and Lake Mansala. In the first phases, this project is aimed at finding temporary solutions to the adverse conditions described throughout this paper to be followed by the construction of the first stage expansion works to correct many of the overloaded conditions.

5.02 While the following analysis does not attempt to satisfy all the conditions of an Environmental Assessment, it does give a concise description of the major environmental advantages and disadvantages of the project. It is planned that a full Environmental Assessment, taking into account various alternative solutions, will be prepared by the consulting engineering firm employed on this project during the Review-Study Phase of the work. See the proposed Scope of Work, Annex E. The completed supplemental Environmental Assessment will be submitted to AID/W within 12 months after start of the initial project work and prior to the start of any construction work.

5.03 This procedure, while out of sequence with the requirements of Regulation 16, is necessary because the initial studies for this project were not financed by AID, and no environmental assessment was required from the U.S. firm conducting that work. However, the following discussion of environmental concerns will serve as an interim analysis until the supplemental assessment is completed.

B. Existing Conditions

5.04 At the present time, approximately 66 percent of the urban population of the city is served by sewers. In general terms, the system fulfills its function in that it enables the sewage to be removed from these areas. But the system is overloaded, and there is local intermittent flooding with raw sewage, both in the center of the city and in other residential districts.

5.05 The conditions in developed areas which are presently unsewered are most unsanitary. There appears to be little in the way of organized sanitary services and the inhabitants have been forced to make their own arrangements. Consequently, septic tanks often overflow into open drains and, in some localities, night soil and sewage waters are deposited in the streets together with domestic refuse.

5.06 The location of the various sewage treatment works are shown on Figure 5.1, Abu Rawash and Gabal el Asfar are situated well outside the urban area, but Zenein, Nahya and Kossous all have residential areas immediately adjacent to them. Apart from a comparatively small amount of sewage or effluent which is utilized for irrigation, the whole of the sewage flow from the City, much of it still in a raw state, is discharged to the main irrigation drains. Figure 5.1 also shows the location of these main drains in the immediate proximity of Cairo; Figure 5.2 gives similar detail between Cairo and the Mediterranean coast.

5.07 The Muheit drain on the western side of the city accepts primary effluent from the Nahya works and poor quality effluent from the Zenein works before discharging into the Rosetta Branch of the River Nile at a point approximately 10 km downstream of the Delta Barrage.

5.08 The Belbase drain, which runs northeastwards along the line of the Ismailia Canal, receives the bulk of the wastewater from the eastern side of the city, the flow in the drain receiving dilution from normal irrigation drainage at various points. The Belbase and Qualyub (irrigation) drains meet near Zagazig, at which point water from the Qualyub drain can be pumped to the Tora Canal for reuse in irrigation. The remaining flow from the Qualyub, together with the Belbase flow is combined from this point in the Bair el Bakar drain, which continues to run north and east until it discharges into Lake Mansala, a brackish enclosed lake on the Mediterranean coast.

5.09 The Kossous drain carries primary effluent from the Kossous works and the pumped discharge of untreated sewage from Ameria and for several kilometers of its length immediately downstream of the Kossous works, it passes through a densely populated urban area. There are also communities at a number of points along the length of the main drains.

5.10 The current practice of disposing of large quantities of raw sewage and partially treated effluent to the drains constitutes not only a potential danger to public health but is also thoroughly objectionable from amenity and ecological points of view. The consequential anaerobic conditions in these drains causes dark coloration of the water and gives rise to obnoxious odors.

5.11 Before the Belbase drain receives the discharge from the Kossous drain, the water in the Belbase is of good quality with aquatic plants

and a small fish population typical of an agricultural drain. But after it discharges from the system it is barely aerobic and smells offensively. Abu Zabaal, a village some 1.2 km north of the junction between the Gabal el Asfar and the Belbase drains suffers from the odor rising from the Belbase drain; the flow in the drain at this point has the appearance of raw sewage, with large quantities of matter floating on the surface. Several of the houses in this locality use shallow wells, some within 20m of the edge of the drain, for the extraction of potable water. The general sanitary conditions in this village are very poor.

5.12 The Bahr el Bakar drain remains barely aerobic throughout its length and smells offensively. Near the Mansala discharge, the recently reclaimed land is irrigated by small drains from the main drain. The water at this point has an unpleasant appearance rather than smell and apparently is able to support small fish. There are considerable amounts of weeds in both the main drain and the side drains and the area of Lake Mansala in the vicinity of the point of discharge is badly affected by an accumulation of water weeds, particularly water hyacinth. No data are available on the fisheries in the area, but it is known that Lake Mansala produces about 22,000 tons of fish per annum (about 180 kg per hectare). This yield is less than half the yield from other Delta lakes.

5.13 The discharge from the Muheit drain into the Rosetta Branch of the River Nile is clearly distinguishable by the difference in color between the river water and the drain discharge. The discoloration persists for several kilometers and floating material of sewage origin has been observed 10 km downstream of the point of entry. Dissolved oxygen readings show a substantial reduction in the oxygen content between the values upstream and downstream of the discharge point. Local fishermen report that fish catches are adversely affected for a few kilometers downstream.

5.14 A significant amount of industrial effluent is currently discharged to a number of open drains without treatment. The flow in these drains is partially lost by seepage into the underground aquifer with the remainder discharging into main irrigation drains. Some chemical compounds in these discharges are not biodegradable and seepage may cause accumulations of such constituents in the aquifer.

5.15 The discharge of primary treated effluent to the main agricultural drains was a deliberate act on the part of the Government during the mid-1960's when urgent action was needed to relieve the increased sewage flows removed from the City for which capacity was not available in the existing treatment works at Gabal el Asfar and Abu Rawash.

5.16 Earlier than this, it had become necessary to pump significant quantities of sewage from Ameria into an open channel system leading

to Gabal el Asfar where raw sewage, following settlement in shallow earth lagoons, was distributed over an extensive orchard area. In 1959, a second channel was added to permit further quantities of crude sewage to be disposed of in this manner. The orchard area at Gabal el Asfar is now heavily overdosed with sewage and is waterlogged in many places. As a result, the growth of the trees and other crops is adversely affected and, in summer, the area has an offensive smell and supports the breeding of many flies and mosquitoes.

5.17 Continuation of the present methods of disposal can only lead to a further serious deterioration in the environment. The risks to the public health of the community, both in and downstream of the city area, are considerable.

5.18 The dangers inherent in the present conditions cannot be too highly stressed. There is a compelling need for improvement and extension of the wastewater facilities, not only to remedy past neglect, but also to make adequate provision for the large increases in population, water use and consequential sewage flows in the future.

5.19 The implementation of the project outlined in this paper will lead to a progressive correction of the problems discussed above. The scale of the project envisaged, is large by any standards. However, conditions in the city will continue to deteriorate unless action is taken at once.

Construction and Land Use Impacts

5.20 Effects of construction upon the environment are proportional to the type, intensity and duration of the construction work and the extent and significance of the affected environmental resources.

5.21 Construction activities pertaining to the rehabilitation and repair of the existing sewage collection system and the treatment plants will not cause a permanent change in present land usage, because the system is principally underground. Those elements of the system above ground, i.e., pump stations, and treatment plants, if being reconstructed, will be treated architecturally to be esthetically compatible with the urban neighborhood.

5.22 Construction of new treatment plant facilities and pumping stations will be limited to the sites of the existing facilities in most cases. This will reduce the significance of or eliminate the need for additional land resources and thus the direct adverse effects. In most cases, plant sites are located in sparsely populated areas on the outskirts of the city. The building of solid, high security fences around the planned construction sites virtually eliminates any further aesthetic intrusion from the existing or proposed facilities on the surrounding areas.

5.23 The primary environmental problems associated with the repair and reconstruction of old sewers and manholes and the construction of new sewers are the continuation of service during the work and the traffic problems that inevitably result when streets are torn up. The latter problem is particularly troublesome in Cairo, because so many of the side streets are narrow and the main streets heavily congested. Continuity of services can be provided by means of temporary bypasses or the use of tank trucks to haul wastewaters to downstream manholes.

5.24 The project will require that sewer cleaning, repair and construction work take place both in city streets and at existing pump station sites. The cleaning operations will be conducted primarily at night, because this is the time of lowest wastewater flow. This will minimize any disruption of commercial activity or traffic. The solids, sludge and debris removed from the sewers will be trucked away for safe burial on a daily basis. The consultant services will include identification of suitable traffic detours, disposal sites, and appropriate equipment needed.

5.25 The maintenance of open trenches will be limited in both time and distance to minimize erosion, safety, dust and silt runoff problems.

5.26 To the extent necessary, underpinning will be provided to prevent damage from trenching on nearby structures. Trench sheeting will be provided to protect roads and other surface features against collapse and to protect workmen.

5.27 After completion of underground work, backfilling, compaction and repairing or resurfacing of streets and roads will be made, so there will be no residual effect from the excavation work.

5.28 A major purpose of the proposed work is to ensure the proper functioning of the existing facilities or new facilities, to eliminate extensive ponding of sewage which now occurs in many parts of the city. At present, this has detrimental aesthetic and health effect on approximately 1 million residents of Cairo. This detrimental effect will initially be reduced by the project rehabilitation work. It will be eliminated after bringing-on-line of the first stage expansion works to be designed and constructed by the project.

5.29 The net effect of the project on land use will, therefore, be beneficial with few if any permanent harmful effects. The additional land resources to be used for construction of new facilities will be small.

C. Water Quality

5.30 The disposal of wastewaters whether treated or not into the River Nile is presently prohibited by law in Egypt. However, it occurs.

Raw sewage and effluent from the Cairo West Bank System is presently discharged into the Rosetta Branch of the Nile. The Rosetta Branch supplies irrigation water for agricultural use in the delta, water for fisheries in Lake Maryut and is the source of the potable water supply for cities such as Alexandria. The Kossous and Belbase Drains pollute Lake Mansalla with untreated sewage from the east bank system. Lake Mansalla is a major source of seafood in Egypt.

5.31 One of the objectives of the review-study phase of the project is to determine whether and to what extent discharges of treated wastewater to the River Nile would: (i) be physically feasible without significant impact to downstream users of the river, (ii) be economical, (iii) require legislative or administrative action and (iv) be environmentally acceptable. Resolution of this question and provisions for control of pollution of receiving waters, including the Rosetta Branch, the Kossous and Belbase Drains and Lake Mansalla, will be a major objective of this project.

5.32 The short-term improvement to the wastewater collection and treatment system that will be achieved by the proposed cleaning-rehabilitation work will create no additional pollutional effects on any receiving waters. The first stage expansion plans will develop a feasible solution for improving and controlling the quality of the receiving water. This will provide a basis for rational decision-making by the GOE as to the optimum wastewater quality that can be discharged and long-term effects on water quality.

5.33 Summarizing, the proposed cleaning and rehabilitation work will, to the extent of existing system hydraulic capacity, tend to increase the sewage flows from the city and further pollute receiving waters. However, this work will also reduce the serious health and social problems caused by overflowing sewers and the ponding of new sewage in heavily populated areas of the city. The pollution of receiving waters will be corrected by the first stage expansion work which closely follows the rehabilitation work.

D. Atmosphere

5.34 There will be some benefits realized from reducing odor problems caused by the ponding of septic sewage and inadequately or poorly operated pump stations and sewage treatment plants. The project provides for the rehabilitation and operator training for these facilities, including reduction and control of the odor problems at the Abu Rawash, Kossous and Gabal el Asfar treatment facilities.

5.35 Minor and temporary air pollution will be caused by some of the construction activities. This will consist primarily of exhaust emissions and construction dust. However, these emissions will be negligible when compared with ambient conditions. To minimize these

effects, construction contractors will be required, and GOSSD has agreed that work done by force account, to:

- a. Keep construction equipment well tuned.
- b. Service filters, blowers and injectors on gasoline and diesel engines to minimize emissions.
- c. Remove all construction debris to approved dump sites and burning of refuse will not be permitted.
- d. To the extent that they are available, use of low sulphur fuels to minimize engine emissions of sulphur oxides.

5.36 The impact of odor problems from operation of existing facilities and construction activities on air quality will be minor in relation to normal ambient levels caused by heavy vehicular traffic, on-going private and public construction work, uncollected garbage, industrial emissions, and from wind-blown desert dust. However, the air pollution problems caused by the sewage system and construction should be temporary, lasting in varying degrees only until the end of the project work.

E. Natural Resources

5.37 Cement, aggregate and labor will be utilized in the rehabilitation, repair and expansion phases of the project work along with imported steel and other materials in the form of equipment. The cost and quantities of resources to be so used will be small compared to those required to achieve the same benefits by other means, i.e., the construction of new works rather than utilizing existing ones.

5.38 For the new expansion works, the utilization of local resources and construction materials will be evaluated in relation to the intended benefits.

5.39 Lake Mansalla is a valuable fishing and amenity resource which is presently polluted by toxic wastes and sewage conveyed from Cairo through the Belbase Drain. Protection of this resource will be one of the objectives of the project.

5.40 The Nile River is Egypt's most valuable water resource. Below Cairo it provides water for irrigation, domestic water supply and industrial uses. In the Delta, the Rosetta Branch of the Nile supplies drinking water to a large number of people especially the city of Alexandria (permanent population 2.5 million). It is essential that the full utility of this resource be preserved and will be a basic objective of the project. Not only will further pollution of this resource be corrected, but the reuse of wastewaters be studied to minimize the loss of valuable water resources.

F. Health

5.41 Despite the fact that Cairo enjoys one of the better water supply systems in the Middle East, its environmental health and sanitation problems are among the worst. Within the Middle East, Cairo experiences higher enteric disease rates than other large populated areas. And from Ministry of Health Records, as reported in the WHO/World Bank 1977, Sector Study, from 1970-1974, Cairo had a typhoid-paratyphoid attack rate more than ten percent higher than most other major cities, an infestious hepatitis rate more than twice as great, and a substantially higher dysentery attack rate.

5.42 Large improvements to the water supply system of Cairo are at present being planned and implemented. The full potential health and social benefits from improved water supplies will require that adequate means be provided for the collection, treatment and disposal of the resulting increased wastewater flows generated. This project directly addresses this problem.

5.43 In addition, the direct exposure of the inhabitants of Cairo to human wastes plus the indirect exposure through vectors such as flies, rodents and other vermin all have a close relationship to the existing high level of gastro-enteritic disease transmission in Cairo.

5.44 By limiting these problems, or preventing the further deterioration of the present insanitary conditions, the project will have a very positive beneficial effect on the health and well being of the population.

5.45 Also, during construction, provisions will be taken to ensure that construction contractors take suitable measures to provide for health, safety and protection of their workers and of the public by providing suitable toilet facilities, protective clothing, traffic control, trench support and other relevant means. Facility designs and criteria to be developed and enforced by the Consultant will provide for land railings, conformity with relevant electrical codes, washing and changing facilities, and other suitable measures to protect the health and safety of operating personnel.

G. General

5.46 Some late Islamic remains may be encountered in the excavations needed during construction. However, the significance of these archaeological discoveries would be diminished by the presence of better preserved remains of the same period in other parts of the city. Because all excavations are rather shallow, the quantity of excavation small (24,000 cu m) and the excavations in recent (less than 700 years) fill, the chances appear remote that any archaeological finds of importance will be uncovered. However, the project will require all contractors to use suitable care during excavations and to promptly notify the proper GOE authorities should any sites be uncovered.

H. Summary

5.47 The project will have minimal adverse or permanent effect on the basic aspects of the human environment such as air, water, land, flora and fauna. Environmental risks resulting from any changes in recommendations to be developed under the project will be evaluated in the course of studying alternatives and developing recommendations. Every precaution will be made to minimize these environmental effects during the final design of the proposed first stage expansion facilities.

5.48 Any deterioration of the Nile water quality which could result in the long term from possible discharge of treated effluents to the Nile (and such a recommendation will not necessarily result from this project), would be limited to a level acceptable for downstream users. Public health and aesthetic acceptability will be a fundamental requirement of the project and will not assume that the recommended disposal schemes deal with all actual and potential contaminants having a health significance. Protection of the downstream users of waters within the boundaries of Egypt will take care of any questions concerning potential effects on international waters.

5.49 Regarding other effects, such as land use, air pollution, the project will have no significant permanent adverse impacts on the environment. In addition, the net socio-economic and cultural effects of the project will be positive (see discussion of Part VIII, Social Analysis).

FINANCIAL ANALYSIS

A. Present Financial Condition

6.01 Table 6-1 below summarizes the operating and capital costs of GOSSD Cairo for the years 1971 through 1977 and the projected costs for 1978.

TABLE 6-1

CAPITAL AND OPERATING COSTS

(in actual thousands of Egyptian Pounds)

<u>Year</u>	<u>Operating</u>	<u>Capital</u>	<u>Total</u>
1971	2453	1797	4250
1972	2785	2378	5163
1973	2844	2485	5329
1974	3124	2809	5933
1975	3478	2662	6140
1976	3853	2871	6724
1977	4375	3152	7527
1978	4595	3074	7669

6.02 During the period 1971/1978 operating costs increased from LE 2,453,000 to LE 4,375,000, an increase of 78 percent, and are expected to increase to LE 4,595,000 in 1978, an increase of 19 percent over 1976. Personnel costs (salaries, allowances and benefits) constitute about 78 percent of total operating costs. This category increased by 35 percent during the 7 year period, but is expected to increase by only 5 percent in 1978.

6.03 Capital costs were LE 1,797,000 in 1971 and LE 3,152,000 in 1977, an increase of 75.4 percent, and is expected to increase to LE 3,074,000.

6.04 With the exception of charges made to new customers for sewer connections, all revenue is received from the GOE budget. Up until 1962, GOSSD charged industrial customers LE .003 per cubic meter of wastewater discharged (based on the metered use of water). In 1962 this charge was dropped in conformance with Government policy. We were informed that even when there was a charge for sewer service, little revenue was collected because the sewer charge was not billed with the water charge, and separate collections were difficult.

6.05 Sewer connection fees are received from two types of customers. The first category is the customer who specifically requests a sewer connection. About 150 such connections have been made a year since 1973. The average cost per connection was LE 25 in 1973 and LE 78 in 1977, an increase of 212 percent. The customer pays in advance for the installation based on an estimate, which is then adjusted to the actual costs upon completion of the work. Customers in low rent housing are charged 90 percent of cost; GOSSD absorbs the remainder.

6.06 The second category are those customers who are connected to the system as GOSSD sewers new areas. GOSSD has averaged about 4350 such connections a year during the past two years. The average cost in 1977 was LE 78 per connection. As of December 31, 1977, GOSSD was owed LE 173,000 for such connections.

B. Projected Financial Condition

6.07 GOSSD's present financial statements consist only of listing of cash receipts and disbursements. Budgets are prepared annually and contain operating costs, the capital cost of on-going work, and new work GOSSD plans to undertake in that fiscal year. Occasionally GOSSD does not receive enough funds to cover its on-going capital program. Usually, the contractor continues his work and is paid in subsequent years.

C. Financial Plan

6.08 The cost of this project is shown in Section IV-Technical Analysis. These costs will be funded as follows:

6.09 The GOE recognizes the problem of not charging for sewerage service. It intends to institute a charge for this service and to organize the Sewage Authority (or authorities) into a financially viable public utility. To this end it has commissioned a comprehensive study of the organization, management and tariff structure of Egypt's Water and Sewerage organizations. A contract for this study was entered into between the Ministry of Housing and Reconstruction (MOHR) and a joint-venture consisting of Black & Veatch International and A. T. Kearny, Inc. two U. S. consulting firms. Interim reports are due on March 31, 1979 and draft final reports on June 30, 1979. The timing of these reports fits well with the project schedule. We expect to receive the report on the review-study

of Taylor-Bennie's phase one expansion in August 1979. We will, therefore, be able to incorporate acceptable conditions and covenants resulting from the management and tariff study into the project agreements (both A.I.D.'s and O.D.M.'s) funding the expansion program.

B. Financial Plan

6.10 The project financial plan is as follows:

TABLE 6-2
Financial Plan
(000)

	<u>FX</u>	<u>LE</u>
Capital Costs: (See Table 4-1)	<u>\$ 27,500</u>	<u>\$ 31,500</u>
Sources:		
A.I.D. Grant	25,000	
O D.M. Grant	2,500 ^{1/}	
GOSSD Budget	<u>-</u>	<u>31,500</u>
	<u>\$ 27,500</u>	<u>\$ 31,500</u>

1/ The O.D.M. Grant will be in British Sterling equivalent.

VII. ECONOMIC ANALYSIS

A. General

7.01 The economic justification of most development projects rests on a comparison of the quantifiable economic benefits with costs. However, for sewer improvement projects, the primary benefits include medical and hospitalization cost savings attributable to reduced water related infection, and improved hygiene as a result of improved sewage and waste disposal. Similarly, there are consequential gains in productive man-days. As is typically the case for such projects, statistics do not exist that would permit a quantification of these benefits for this project. In addition, since customers are not charged for sewage services in Egypt, actual payments can not be used as an indicator of the value of these benefits.

7.02 Further justification can be developed based on the fact that tourism is one of Egypt's major sources of revenue, and Cairo is the gateway to Egypt. The current situation involving sewage ponded in certain streets, if allowed to worsen, will have a severe effect on Cairo's ability to serve as a tourist focal point. Establishment of lost revenues caused by Cairo being undesirable for tourism is difficult to quantify, however, the loss could be significant. Cairo needs a good utilities infrastructure in order to maintain and, certainly to expand, its ability to host tourists. A sound sewerage system along with a sound water system are the two most basic components. Efforts are now underway to improve and expand the water system. Similar efforts with the sewerage system are also needed to avoid a steadily worsening situation which will occur as a result of added water supply and increasing population.

B. Least Cost Analysis

7.03 This project will rehabilitate and expand the existing sewerage system. In addition, a training program will develop personnel to operate the existing and expanded sewerage facilities in the most efficient manner possible, thus lessening operation and maintenance costs. The methods to be used in carrying out these activities are technically the least cost method available. Given the inappropriateness of carrying out a standard economic project assessment, as discussed above, the justification for individual project activities is based on these least cost assessments.

VIII. SOCIAL ANALYSIS

A. General

8.01 Egypt's health and sanitation problems are among the worst in the Middle East. Of the ten greatest causes of death in Egypt, five, including the greatest killer, infantile diarrhea, are water-borne. Improvement in water supply and sewerage would virtually eradicate at least three of the diseases.

TABLE 8-1
ENTERIC DISEASE RATES IN CAIRO
(1970-74 inclusive)

	<u>Typhoid & Paratyphoid</u>	<u>Infectious Hepatitis</u>	<u>Dysentery*</u>
1970	4,367	3202	24
1971	5,840	2779	32
1972	5,531	2856	27
1973	5,857	2454	38
1974	6,332 (112/100,000)	2836 (50/100,000)	27 (.5/100,000)

Population mid 1974 - 5,640,000

* Believed to be severely under-reported

Source: Ministry of Health, General Department of Statistics and Evaluation

8.02 The current conditions of sewage ponding in the streets of some of the most crowded districts of Cairo (over 1200 persons per hectare) can only predict even higher incidence of the above diseases. The population of Cairo in 1977 was approaching 8 million. If the current sewage conditions are not corrected, the problems of enteric and other diseases will reach catastrophic proportions within a short time. The potential for a major outbreak of serious disease is ever-present in Cairo and increasing daily.

8.03 This project can improve and certainly halt worsening of these conditions by elimination of wastewater from the streets. The later

phases of the Project will provide adequate treatment for the waste-waters prior to discharge to canals and drains. The current condition of these canals and drains is deplorable. Although these water courses do not pass through highly populous areas, they do, nevertheless, pass through numerous small villages and towns which draw water from them. Such conditions can only lead to serious public health problems beyond the limits of Cairo.

8.04 All of the west bank flow, which is given inadequate treatment due to the poor operation of the Zeneim Treatment Plant, is discharged into the Rosetta Branch of the River Nile which in turn is the source of water supply for the city of Alexandria.

B. Target Group

8.05 Without equivocation, it can be said that the target population of this project includes some of the most disadvantaged people in Egypt. It has been common over the last decade or two to consider urban dwellers, no matter how poor, to be somehow better off than their rural counterparts. In most developing countries this concept may be valid. In Egypt, however, a special set of circumstances points to a reverse condition. After the disturbances of January 1977, a number of prominent sociologists commented on the trends in Egypt over the last decade which have eroded the standard of living of the urban dwellers while the rural population has experienced an increase in relative prosperity. The eroding of the urban standard of living has resulted from the continuing rise in the cost of living without a commensurate increase in real income for the urban poor. To some extent, this situation has been ameliorated by subsidies for basic consumer goods which have benefited the urban poor and middle class. Even with this system in place, however, the prosperity of urban areas has declined relative to the rural areas.

8.06 Living conditions in the rural areas have improved as a result of small increases paid by the government for primary farm products, and to a lesser extent from the benefits which have resulted from rural development programs carried out over the previous years.

8.07 For the urban dweller, this loss of real income combined with the inability of the government to meet investment needs in basic urban services, has led to a class of citizens whose living conditions have been deteriorating at a noticeable rate.

8.08 The most immediate impact of this project will be on the type of people described above. The current sewage ponding problems are occurring in their districts, not the relatively affluent districts. This project will prevent expansion of ponding into other areas not yet affected, but surely on the verge of becoming affected.

8.09 There is no question that the long term effects of this project and the induced cultural changes will have significant impact. The changes in the standard of living may bring about substantial changes in community cohesion and life styles. The project will help improve Cairo to fullfill its role as capital of Egypt and one of the most important cities in the Arab World.

IX. IMPLEMENTATION

A. Contracting Procedures

1. Consulting Engineer

9.01 The selection of the U.S. consulting engineering firm commenced on March 29, 1978 with a notice in the Commerce Business Daily requesting interested firms to submit prequalification material to GOSSD for the project as described in Section III. Five firms (actually each was either a joint venture or a consortium of U.S. firms) were short-listed and Request for Proposals sent to each on June 1, 1978. Technical proposals were received on August 1, 1978. On September 11, 1978 each firm was informed of the requirement to associate with Taylor-Binnie for the full engineering services and were given until September 25, 1978 to amend/revise its proposal. Selection of the U.S. firm is expected to be completed by GOSSD, on October 15, 1978. A slightly amended scope of work is now being prepared by USAID/Cairo, ODM and GOSSD, and will be given to the selected U.S. firm and Taylor-Binnie. The firms will then be given 30 days to submit a cost proposal and an implementation plan, including a delineation of work between the U.S. and U.K. Contract negotiations will commence on December 1, 1978 and should be completed by December 21, 1978. The firm will commence work on January 15, 1978.

2. Equipment and Materials

9.02 Procurement of all goods and materials financed by A.I.D. will be of U.S. source and origin. Procurement procedures will be in accordance with Handbook 11, Host Country Contracting.

B. Schedule

9.03 Upon mobilization by the consulting engineer, work on the repair and rehabilitation of the existing system and the review/study of the Taylor-Binnie Master Plan will commence simultaneously. The training element will commence approximately three months after mobilization and will continue for approximately 15 months.

9.04 Repair and rehabilitation work will be completed within 24 months. The review/study of the Taylor-Binnie Master Plan will be completed in nine months.

9.05 A detailed CPM/PERT Schedule showing the interrelationship of each task, etc. is contained in the project file.

C. Control and Monitoring Measures

9.06 A Supervisory Committee consisting of the Chairman of GOSSD, a member from USAID, and a member from ODM will be established. Their function will be to review all major activities and to decide major project issues. GOSSD will form a permanent full-time project committee with responsibility to make day-to-day project decisions.

9.07 The consulting engineer will prepare monthly, quarterly, and special reports which will be provided to USAID and ODM. USAID monitoring will be performed by a sanitary engineer and a Capital Development Officer.

D. Terminal Dates

9.08 The terminal date for meeting conditions precedent to disbursement will be December 31, 1978, approximately 90 days from the execution of the Grant Agreement. The Terminal Date for requesting letters of commitment will be June 30, 1980. The Project Assistance completion date will be December 31, 1980. The Terminal disbursement date will be September 30, 1981.

E. Evaluation

9.09 The primary purpose of the project is to rehabilitate the existing Greater Cairo Sewerage System. On this primary purpose, project evaluation will be made at the end of each year. Through our present involvement in the Cairo Sewer Cleaning Program, adequate benchmarks exist on the capacity of flows through the existing system. Evaluation, therefore, will focus on how much additional capacity is being handled by the renovated system; and whether that increased capacity was achieved through capital or technical assistance inputs.

9.10 The project will also define, with precision the Taylor-Binnie master plan. Interim and final reports will be prepared by the consulting engineer, and said reports will be evaluated by the project committee consisting of personnel of GOSSD, ODM, and A.I.D.

X. RECOMMENDATION, CONDITIONS,
AND COVENANTS

A. Recommendation

10.01 Subject to the conditions and covenants listed below, we recommend that a grant of \$25.0 million be authorized to the Government of Egypt (GOE) for the Cairo Sewerage Project described in the Project Paper. We are further recommending that the GOE be allowed to pass on these funds as a grant to the General Organization for Sewerage and Sanitary Drainage (GOSSD) primarily because at this time GOSSD receives no revenue for the service it provides. The GOE has stated that it plans to rationalize tariffs. At this time, all indications are that it will substantially increase water rates and include in the water rates, a charge for sewerage. Industrial firms will probably be billed for wastewater separately, depending on the nature of the disposal waste. We, therefore, believe it prudent to await the results of the Management and Tariff Study prior to discussing with the Government the tariff problem. Action taken without adequate knowledge, and considering the whole sector problem, could be counterproductive, since some tariffs will need to be progressive, other regressive, and some nominal, if at all. We are, however, including a covenant which requires the Government to discuss with A.I.D. the recommendations resulting from the study and, as previously mentioned, we will include specific conditions and covenants in the agreement for the expansion of the sewerage system, which we plan to jointly fund with the British Government.

B. Conditions Precedent to Disbursement

10.02 Conditions Precedent to Disbursement of the grant funds (CPs) will be segregated into three categories, one of a general nature, one for all disbursements other than for the engineering consultant, and the third specific to each rehabilitation activity. The segregation into categories will allow the individual rehabilitation activities to proceed at their own pace, while still retaining control of un-subobligated funds.

1. Conditions Precedent to First Disbursement of Grant Funds

Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish A.I.D. in form and substance satisfactory to A.I.D.:

- * (a) A statement of the names of the persons holding or acting in the offices of the Grantee specified in the Grant Agreement, and of any additional representatives, together with a specimen signature of each person specified in such a statement.
- * (b) An executed contract acceptable to A.I.D. for the engineering consulting services for the Project with a firm acceptable to A.I.D.
- * (c) A copy of the Grant Agreement for the Project executed between the United Kingdom Ministry of Overseas Development ("ODM") and the Grantee, together with evidence that the conditions to effectiveness of such Grant Agreement have been met.
- (d) Evidence of the establishment of a Project Steering Committee with membership of GOSSD, ODM and USAID.
- (e) Topographical maps of Cairo at a scale of 1:5000 with one meter contours, based on the aerial photographs taken by the Societe Nouvelle Francaise de Sterotopographic and the Institut Francais Geographique National.
- (f) Such other information and documentation as A.I.D. may reasonably require.

2. Additional Condition Precedent

Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made for any purpose other than to finance the engineering consultant services referred to in Section 10.02.1, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D. evidence that GOSSD has assembled and catalogued all as built drawings.

3. Additional Condition Precedent--Disbursement of Grant Funds for Commodities or Services for Rehabilitation Activities

* Prior to any disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for commodities or services for a specific rehabilitation activity, the Grantee will, except as

* CPs and Covenants to be included in the authorization are marked with an asterisk.

the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., a detailed facility rehabilitation plan for such activity.

C. Covenants

10.03 The Grant Agreement will contain A.I.D. Standard Covenants. In addition, the following covenants will be included:

- (a) The Grantee agrees to provide or cause to be provided for the Project all funds, in addition to the Grant, and all other resources required to carry out the Project effectively and in a timely manner.
- (b) Continuing Consultation

The Parties will cooperate to assure that the purpose of this Agreement will be accomplished. To this end, the Parties shall from time to time, at the request of any party, exchange views on the progress of the Project, the performance of any consultants, contractors or suppliers engaged on the Project, and other matters relating to the Project. The Grantee and GOSSD shall specifically review and discuss with A.I.D. the recommendations of the management and tariff consultant under contract with the former Ministry of Housing and Reconstruction and shall implement those recommendations agreed to after such discussions.

*CPs and Covenants to be included in the authorization are marked with an asterisk.

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INCOMING
TELEGRAM

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ANNEX A-1

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TO SECSTATE WASHDC IMMEDIATE 3919

UNCLAS CAIRO 21282

AIDAC

E. O. 11652: N/A
SUBJECT: FY 78 PROJECT - CAIRO SEWAGE

1. SUBJECT GRANT APPLICATION RECEIVED BY MISSION VIA LETTER DATED SEPT. 16, 1978, FROM GAMAL EL NAZER, DEPUTY CHAIRMAN FOR INVESTMENT AUTHORITY, IN CHARGE OF AMERICAN AIDS TO EGYPT, TO DIRECTOR BROWN. LETTER TEXT FOLLOWS: QUOTE ON FEBRUARY 7, 1978, THE GENERAL ORGANIZATION FOR SEWERAGE AND SANITARY DRAINAGE FORWARDED A REQUEST TO THE AGENCY FOR INTERNATIONAL DEVELOPMENT FOR IMMEDIATE ASSISTANCE IN IMPROVING THE CAIRO WASTEWATER SYSTEM. SEVERAL STUDIES UNDERTAKEN ON THE SYSTEM HAD INDICATED THE SERIOUS NATURE OF THE PROBLEM AND THE NEED FOR A MAJOR INVESTMENT IN THIS AREA TO AVERT FURTHER DETERIORATION AND TO OVERCOME THE MOUNTING PROBLEMS ASSOCIATED WITH EVER-INCREASING DEMAND.

- THE GOVERNMENT OF THE ARAB REPUBLIC OF EGYPT PLACES GREAT IMPORTANCE IN ENHANCING THE QUALITY OF LIFE OF OUR CITIZENS AND TO THIS END WE HAVE STRESSED THE URGENT NEED TO REDRESS THIS PROBLEM. IN RESPONSE TO OUR REQUEST, A. I. D. IS PRESENTLY PROVIDING SPECIALIZED SEWER CLEANING ADVISORY ASSISTANCE. WE ARE NOW READY TO MOVE FORWARD ON MAJOR SYSTEM IMPROVEMENTS AND THEREFORE REQUEST THAT A. I. D. MAKE AVAILABLE A GRANT OF U. S. DOLLARS TO COVER FOREIGN EXCHANGE EXPENSES. THE LEVEL OF THE GRANT WE ARE REQUESTING FROM YOUR GOVERNMENT FOR FISCAL YEAR 1978 WOULD BE \$25 MILLION, WITH A TOTAL FUNDING LEVEL OF \$100 MILLION OVER SEVERAL YEARS. UNQUOTE.

2. REQUEST CONFIRMATION OF RECEIPT BY NE/PD. MATTHEWS

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C.M.G.T.
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AID HANDBOOK 3, App 6C	TRANS. MEMO NO. 3:11	EFFECTIVE DATE November 10, 1976	PAGE NO. 6C(2)-1
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Cairo Sewage:
Project No. 263-0091

ANNEX B

6C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?

(a) An Advice of Program Change was submitted for this project on March 17, 1978.

(b) The intended obligation is within the level of funds appropriated for Egypt for FY78.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

(a) Yes.

(b) Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

No further legislative action is necessary to implement the project other than usual ratification of the Agreement by the Peoples' Assembly.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

Yes.

5. FAA Sec. 611(a). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

Yes. See Annex D.

A.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion: whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?

Project is being implemented as part of a multi-lateral effort- with the U.K.

Egypt is not a newly independent country.

7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The project provides wastewater service to areas not served or inadequately served. It will not have any significant impact on items (a) through (f).

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

All A.I.D. proceeds will be used for services, equipment and materials of U.S. source, origin, and nationality.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

The agreement will so provide, in the event such funds become available. See 10. below.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

No U.S.-owned foreign is available for release for this project.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

Not applicable

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

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b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

- (1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;
- (2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;
- (3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;
- (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:
 - (a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;
 - (b) to help alleviate energy problems;
 - (c) research into, and evaluation of, economic development processes and techniques;
 - (d) reconstruction after natural or manmade disaster;
 - (e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;
 - (f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

Not applicable

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(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 209(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

Not applicable

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

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g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(5). Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?

h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

Not applicable

2. Development Assistance Project Criteria
(Loans only)

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?

e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Project Criteria Solely for Security Supporting Assistance

FAA Sec. 531. How will this assistance support promote economic or political stability?

4. Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the CAS) in its annual review of national development activities?

This project provides wastewater sewage service to areas now not served or inadequately served. Much of the area is occupied by the urban poor. Consequently, the project will improve the quality of life and promote economic and political stability in the City.

Not applicable.

5C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by explicit provision where certain uses of funds are permitted, but other uses not).

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?
Procurement of goods and services shall be pursuant to established AID regulations.
2. FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him?
Yes.
3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?
Yes.
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?
There will be no such procurement.
5. FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?
Consideration will be given to the use of excess property where practical.
6. MMA Sec. 901(b). (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on private owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.
Yes.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized,
Technical assistance will be provided, to the fullest extent practicable from private business or a contract basis.

A7

are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport. Fair Competitive Practices Act, 1974

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?

Yes.

Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?

Yes.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

Yes.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million?

Not applicable.

Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?

Not applicable.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?

Not applicable.

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.?

The Agreement will so stipulate.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?

Financing is not permitted to be used for such purposes.

C.

5. Will arrangements preclude use of financing:

a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions?

Yes.

b. FAA Sec. 620(a). to compensate owners for expropriated nationalized property?

Yes.

c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?

Yes.

d. FAA Sec. 662. for CIA activities?

e. App. Sec. 103. to pay pensions, etc. for military personnel?

Yes.

f. App. Sec. 106. to pay U.N. assessments?

Yes.

g. App. Sec. 107. to carry out provisions of FAA Sections 209(d) and 231(h)? (transfer to multilateral organization for lending).

Yes.

h. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress?

Yes.

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON

ANNEX C
1 of 3

A.I.D. GRANT 263-0091

Deputy
THE/ADMINISTRATOR

PROJECT AUTHORIZATION
AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

Name of Country: Arab Republic
of Egypt

Name of Project: Cairo Sewerage

Number of Project: 263-0091

Pursuant to Part II, Chapter 4, Section 532 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to the Arab Republic of Egypt (the "Cooperating Country") of not to exceed Twenty-Five Million United States Dollars (\$25,000,000), (the "Authorized Amount") to help in financing certain foreign exchange costs of goods and services required for the project as described in the following paragraph.

The project consists of assistance to the Government of the Arab Republic of Egypt to repair and to plan the expansion of Cairo's wastewater collection and disposal system. The project is divided into the following three elements:

1. Rehabilitation, repair and minor modification of the existing trunk sewers, collectors and pump stations to enable the existing conveyance system to be operated at full capacity.
2. Review of the conclusions drawn in the Master Plan and develop a staged program for implementing the Master Plan.
3. Training of technical personnel of the General Organization for Sewage and Sanitary Drainage (GOSSD) so that the rehabilitated and expanded system can be operated effectively.

The entire amount of the A.I.D. financing herein authorized for the project will be obligated when the Project Agreement is executed.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Goods and services financed by A.I.D. under the project shall have their source, origin and nationality in the United States except as A.I.D. may otherwise agree in writing.

b. Conditions Precedent to Initial Disbursement of Grant Funds

Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish A.I.D. in form and substance satisfactory to A.I.D.:

- (1) A statement of the names of the persons holding or acting in the offices of the Grantee specified in the Grant Agreement, and of any additional representatives, together with a specimen signature of each person specified in such a statement.
- (2) An executed contract acceptable to A.I.D. for the engineering consulting services for the Project with a firm acceptable to A.I.D.
- (3) A copy of the Grant Agreement for the Project executed between the United Kingdom Ministry of Overseas Development ("ODM") and the Grantee, together with evidence that the conditions to effectiveness of such Grant Agreement have been met.
- (4) Evidence of the establishment of a Project Steering Committee with membership of GOSSD, ODM and USAID.

c. Additional Condition Precedent--Disbursement of Grant Funds for Commodities or Services for Rehabilitation Activities

Prior to any disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for commodities or services for a specific rehabilitation activity, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D. evidence that a detailed facility rehabilitation plan for such activity, acceptable to A.I.D., has been submitted to GOSSD by its consultant and approved by GOSSD.

d. The Grant Agreement will contain A.I.D. Standard Covenants. In addition, the following covenants will be included:



UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

CAIRO, EGYPT

ANNEX D

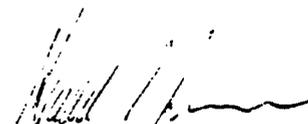
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CERTIFICATION PURSUANT TO SECTION

611(e) OF FAA 1961 AS AMENDED

I, Donald S. Brown, Director, the Principal Officer of the Agency for International Development in Egypt, having taken into account, among other things, the maintenance and utilization of projects in Egypt previously financed or assisted by the United States, do hereby certify that in my judgment Egypt has both the financial capability and the human resources to effectively install, maintain and utilize the capital assistance to be provided for the Cairo Sewerage Project.

This judgment is based upon general considerations discussed in the capital assistance paper to which this certification is to be attached.



Donald S. Brown
Director

Date

ARAB REPUBLIC OF EGYPT
GENERAL ORGANIZATION FOR SEWERAGE AND SANITARY DRAINAGE

REQUEST FOR TECHNICAL PROPOSALS
AND TERMS OF REFERENCE FOR
ENGINEERING SERVICES FOR
REHABILITATION AND EXPANSION
OF THE CAIRO
SEWAGE DISPOSAL SYSTEM

RFQ 72
JUN 72
M. P. 1

JUNE 1978

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ABBREVIATIONS AND DEFINITIONS

ORGANIZATIONS

GOSSD	General Organization for Sewerage and Sanitary Drainage
GOGCWS	General Organization Greater Cairo Water Supply
MOH	Ministry of Housing
USAID	United States Agency for International Development/Cairo

PROJECT

The work proposed by GOSSD under these Terms of Reference as defined in Section 3, Scope of Services.

SERVICES

The engineering work required by GOSSD under these Terms of Reference.

CONSULTANT

The consulting engineering firm selected to provide the SERVICES.

1. GENERAL INFORMATION

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GENERAL INFORMATION

1.1 Introduction

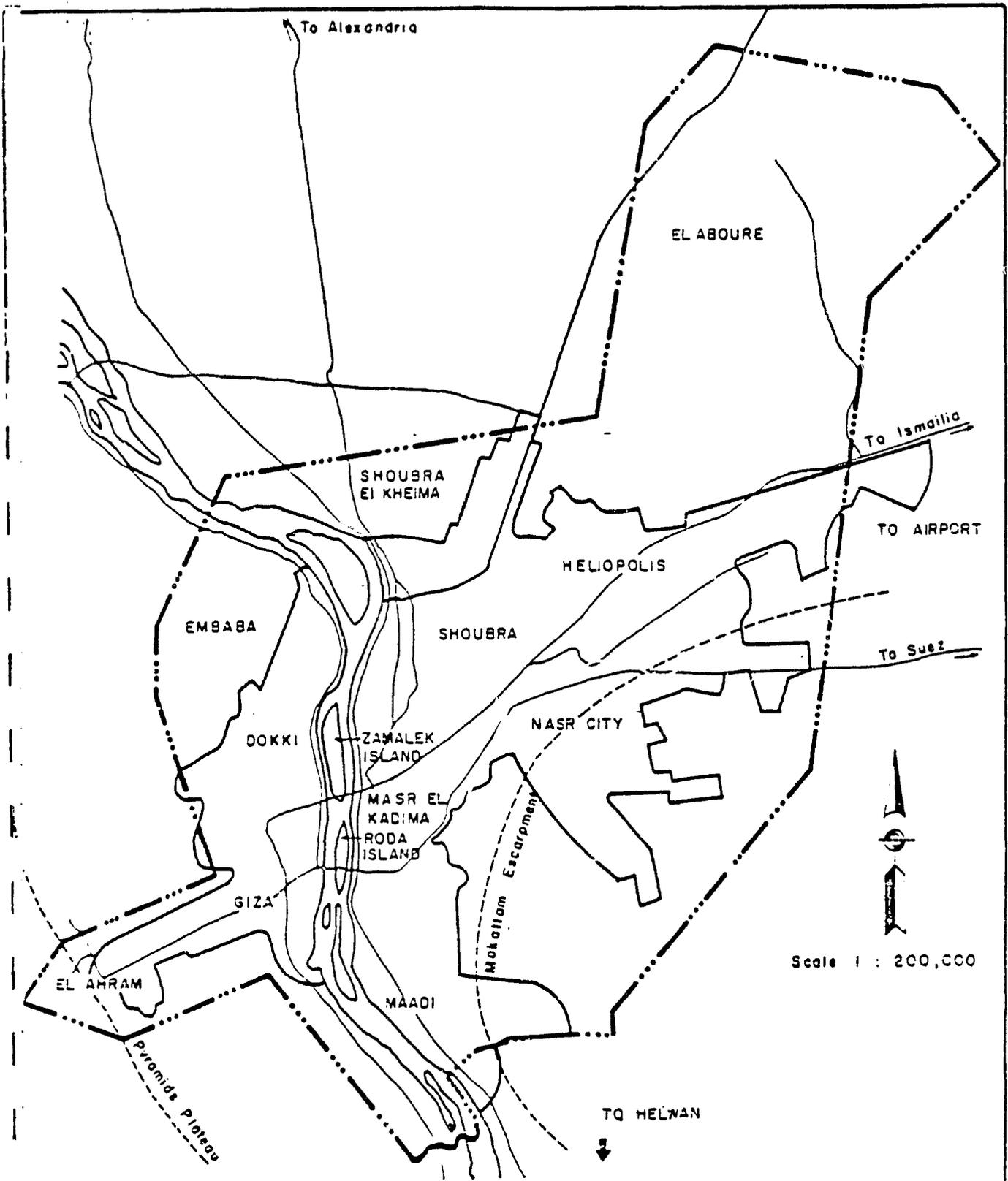
These Terms of Reference define the SERVICES to be provided by the CONSULTANT who will be selected to assist in implementing a PROJECT involving rehabilitation (including associated designs) of the existing sewerage works, training of staff to operate and maintain both the existing sewerage works and future expansions, review of previous studies to develop a staged expansion of the existing sewerage works, and provision of management of the detailed design and construction. The SERVICES to be provided by the CONSULTANT differ slightly from those described in the request for prequalification in the Commerce Business Daily, in that the preparation of detailed designs and contract documents for first stage construction are now omitted from the SERVICES and will be provided by others. Overall management of design-construction has been added. Furthermore, they differ in that all of Greater Cairo (excluding Helwan) is now included in the PROJECT.

The PROJECT includes sewerage facilities for Greater Cairo located on both banks of the River Nile (see Figure 1.1). The area involved currently has a population of more than 8 million and has been projected to grow to over 14 million by the year 2000.

The SERVICES comprise four phases: (a) Rehabilitation Phase, (b) Training Phase, (c) Review-Study Phase and (d) Design-Construction Management Phase.

GOSSD intends that the SERVICES described in these Terms of Reference be undertaken without delay and completed as expeditiously as possible in order to achieve the earliest possible alleviation of the current serious public health problems.

Proposers are free to comment on the scope and the approach and to suggest changes or additions to the Terms of Reference, having regard to the achievement of the PROJECT objectives, for consideration by GOSSD. However, any such comments or suggestions shall be made in a separate section of the proposal.



LEGEND

- · · · — PROJECT AREA BOUNDARY
- PRESENT URBAN AREA BOUNDARY

GREATER CAIRO

1.2' Objectives

The immediate objective of the PROJECT is to put the existing collection and conveyance facilities into proper operating condition. The program will include improvement of pump stations, a cleaning program to remove sand from the collection and conveyance system, and execution of repairs and modifications to the system. The Review-Study phase of the SERVICES will address the treatment needs and develop a staged program to provide needed facilities.

An intermediate objective of the PROJECT is to introduce improved operational and maintenance procedures for the existing facilities and for those which will result from the Review-Study phase of the PROJECT. A by-product of the training program will be wastewater treatment design criteria based on pilot studies, for use in the Review-Study phase of the PROJECT.

A longer term objective of the PROJECT is to develop a staged construction program for additional works including treatment and ultimate disposal of the wastewater together with functional designs, cost estimates and feasibility studies of facilities to be constructed in the first stage. It is intended that maximum utilization of the existing facilities will be given full consideration in this phase of the work, and that maximization of early benefits and deferment of major capital expenditures will be considered as objectives. Low capital cost interim solutions, consistent with the ultimate expansion program, should be given every consideration in this PROJECT. Detailed design of these works (except as needed in the Rehabilitation phase) is not included as part of the SERVICES.

The CONSULTANT will prepare functional designs and terms of reference for all first stage expansion facilities for use in engaging engineering firms to perform detailed design. Further, the CONSULTANT will provide design-construction management throughout the design-construction phase and start up of these facilities.

1.3 Responsible Agency

The General Organization for Sewerage and Sanitary Drainage (GOSSD) is responsible for planning, designing and supervising the construction of

wastewater systems throughout all of Egypt and for the operation and maintenance of the wastewater systems in Alexandria, Cairo and Helwan.

GOSSD at present employs about 12,000 people. Wastewater discharges are governed by Law No. 92 of 1966, which is essentially a sewer use ordinance. All connections to systems operated by GOSSD must be approved by GOSSD. Industrial wastes discharged to the system must meet certain discharge requirements.

Customers are not charged for use of wastewater systems and GOSSD does no billing or collecting, except for connection charges. All financing of the capital and operating costs of wastewater systems is by the Central Government. Budgets for those systems operated by municipalities under the Governorates (i.e., all systems other than Greater Cairo and Alexandria) are included within the budgets for the Governorates. There are wastewater systems (with treatment) in nineteen cities including Greater Cairo, Alexandria and the three Canal Cities, and discussions of and/or planning for systems in about a dozen more cities. An additional twelve wastewater systems exist in the major Delta towns. However, these have no treatment facilities.

Facilities planning and design are by GOSSD. GOSSD has its own design staff, and outside consulting engineers are used when needed. Typically, contractors awarded construction jobs provide the final structural designs.

1.4 General Conditions

It is intended that the following provisions will be incorporated into the agreement to be entered into by GOSSD with the selected CONSULTANT.

- 1.4.1 The CONSULTANT shall provide all equipment, personnel, materials, supplies and supporting services necessary for the efficient and timely performance of the SERVICES.
- 1.4.2 The CONSULTANT shall provide qualified personnel, approved by GOSSD, and shall be solely responsible for the management and coordination with GOSSD of all aspects of the SERVICES.
- 1.4.3 To the extent such reference material is applicable to the SERVICES, the CONSULTANT shall be guided by the following:

- a. AID Handbook 11: Country Contracting, Chapter 1, "Procurement of Professional and Technical Services", 31 March 1975.
- b. AID Handbook 11: Country Contracting, Chapter 4, "Cost Principles for Borrower/Grantee Contracts", 13 August 1975.

- 1.4.4 The CONSULTANT shall review and make optimum use of all planning data previously developed.
- 1.4.5 An important extra benefit, in the performance of the SERVICES, will be the opportunity for Egyptian engineers and technicians, both from the public and private sectors, to work for and with the CONSULTANT to participate in all facets of the SERVICES, and to become fully cognizant of the analyses, evaluations and recommendations related to the PROJECT. The CONSULTANT shall insure that such extra benefits are realized to the maximum extent feasible.
- 1.4.6 The majority of key personnel comprising the CONSULTANT'S team shall be drawn from the permanent staff of the CONSULTANT or the CONSULTANT'S parent organization.
- 1.4.7 In addition to the direct supervision provided by the resident staff in Egypt, the CONSULTANT'S home office shall provide overall management and support for its field supervisory staff to include, but not necessarily be limited to:
 - a. Recommendation of all key personnel assigned to the resident staff.
 - b. General administration and review of the CONSULTANT'S SERVICES.
 - c. Assistance in procurement matters where necessary.
 - d. Provision of or assistance in obtaining specialized services which may be required.

2. BACKGROUND INFORMATION

2. BACKGROUND INFORMATION

2.1 Egypt

The total area of the Arab Republic of Egypt is 1,002,000 km² of which only about 55,000 km² is inhabited. Population growth has been rapid, total population rising from 15,921,000 in 1937 to 38,229,180 at the November 1976 Census, of which 1,425,000 were abroad at the Census date. The population is currently growing at about 2.3% per year and is expected to reach 60 to 65 million by the year 2000. Agriculture provides the largest single source of employment (46.9% in 1973) but industry is increasing its share from 11.1% in 1968/9 to 12.8% in 1973. Services are the second most important sector from an employment point of view with 10.3% in 1973. Gross Domestic Product is about US\$ 300 per person per year at present.

Egypt is characterized by a generally subtropical climate. Apart from the narrow coastal strip around Alexandria, there is nearly total absence of predictable, usable rainfall. Some rain does occur in the Delta in the form of winter showers.

The most important unit of local government is the governorate. There are 25 governorates in Egypt of which four are classified as urban governorates and four as frontier governorates. Cairo is one of the urban governorates. The remaining seventeen governorates are each sub-divided into districts. Districts may contain varying numbers of towns and villages.

Each governorate is headed by a Governor who is directly appointed by the President of the Republic. The Governor is the local chief of all the civil staff in the circuit of the governorate. (Local Government Law No. 52 of 1975). Heads of districts and towns are appointed by the Minister of Local Governments, those of villages by the Governor. All units of local government also have elected local councils which have certain budgetary, planning, and rulemaking powers.

Egypt has recently been divided into eight regions for purposes of economic development planning. It is not intended that the boundaries of these regions should have an effect on the operation of public utilities or the provision of water service in the Governorates.

2.2 Cairo

Cairo is located on both banks of the River Nile at the start of the Delta about 200 kilometers south of the Nile's discharge into the Mediterranean Sea, as shown on Figure 2.1. Cairo is the capital of the Arab Republic of Egypt and the most important city in the Arab World. The beginnings of Cairo reach back to Roman times when a small city named Babylon was founded at what is now the southern limit of the East Bank of Cairo. In the seventh century, when Egypt was conquered by the Arabs, the old city of Fustat, as Babylon was then named, was expanded northward along the east bank. Expansion has continued towards the north and east through today. In fact, current and projected expansion is still progressing in that direction. West bank Cairo consists of Gizeh and its northern environs. The present city is located about 80 percent on the east bank.

From the southern extremity to the northern limit the difference in ground elevation of the city is about six meters. The city is bounded on the east by a sharp scarp called Mokattam. Heliopolis and Nasr City, which are two developing areas are somewhat higher in elevation than the greater portion of the PROJECT Area. The city is bounded on the west by the pyramids plateau.

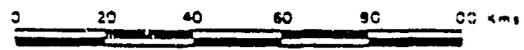
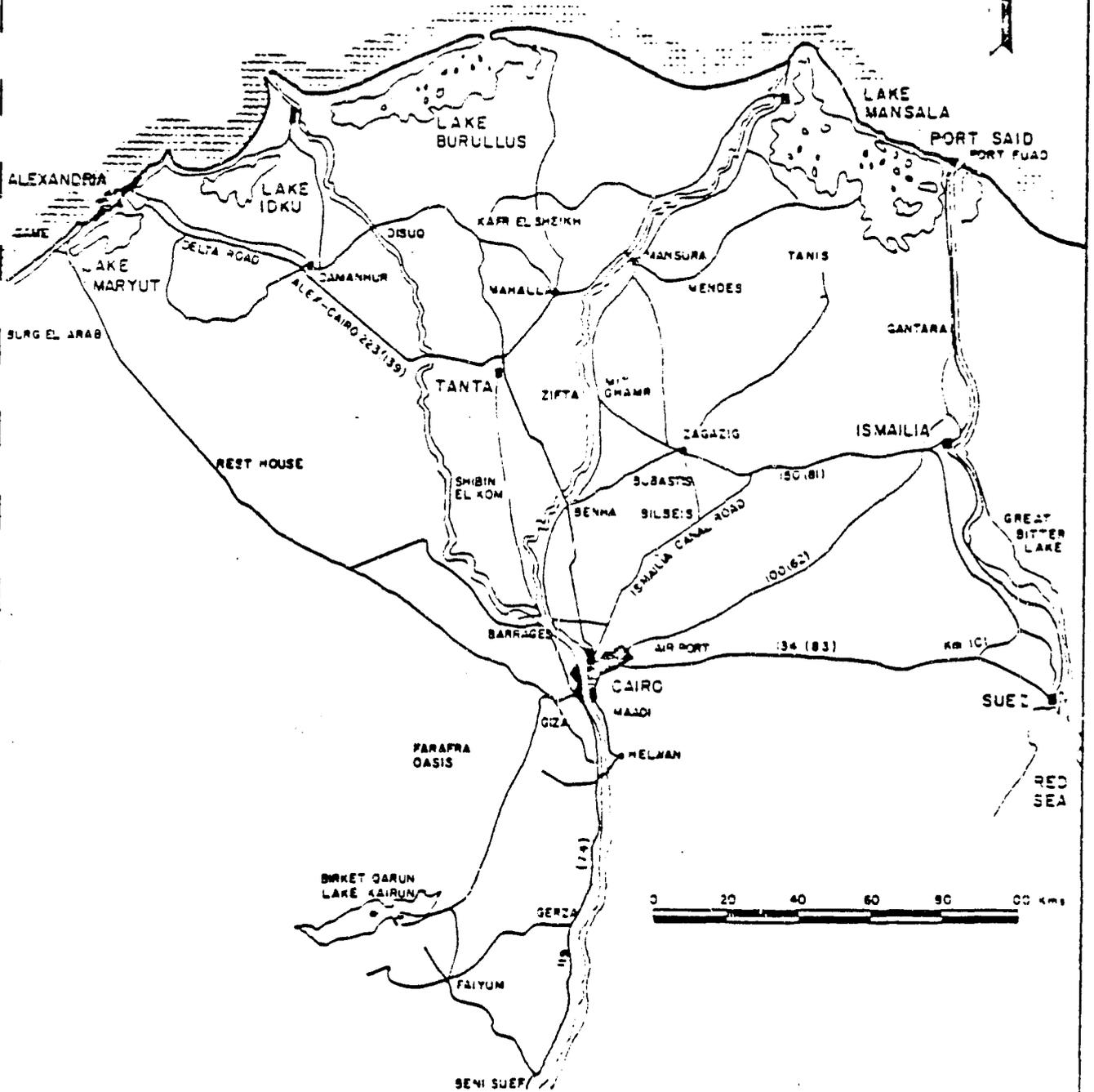
The total present urban area of Greater Cairo is about 240 km². The current population of Greater Cairo is nearly 8 million, with a projected year 2000 population of 14 million. Some districts within the PROJECT Area have population densities in excess of 1200 per hectare.

The climate of Cairo consists of a moderate winter and a hot summer. Mean air temperatures range from 28^o in July to 14^o in January. Humidity is in the range of 40 to 60 percent. Rainfall is minimal, averaging 27 mm per year and occurs between November and April only.

The area in and about Cairo consists generally of river deposited material such as silt, sand and gravel. Some clay is present. The eastern areas of the PROJECT are on rock, primarily limestone and sandstone. Groundwater within the flat areas of the valley is generally 2 to 3 meters below the surface.

MEDITERRANEAN

SEA



LOWER EGYPT

2.3 Existing Sewerage System

At the present time it is estimated that 30 percent of urban Cairo is sewered and that 70 percent of the population is sewer connected. The system is operated as a combined facility for wastewater and drainage.

The entire system can be divided into four principal zones. These zones are designated: (1) Southern, (2) Northern, (3) Central and Eastern, (4) Western, and are indicated on Figure 2.2.

2.3.1 Southern Zone:

Area - 40 km²

Auxiliary Pumping Facilities - 26 ejector stations (pneumatic)
17 pump stations

All flow is ultimately directed to a siphon under the Nile and delivered to the west-bank.

2.3.2 Northern Zone:

Area - 26 km²

Auxiliary Pumping Facilities - 21 ejector stations (pneumatic)
13 pump stations

All flow is ultimately directed to the Souk El Samak pump station, from where it is delivered to the Kossous primary treatment plant.

2.3.3 Central and Eastern Zone:

Area - 105 km²

Auxiliary Pumping Facilities - 35 ejector stations (pneumatic)
22 pump stations

All flow is conveyed to the three major collectors which discharge to two major pump stations. Collector No. 1 discharges to Ein Shams pump station which pumps to the Gabal El Asfar treatment works. Collectors No. 2 & 3 generally discharge to the Ameria pump station which pumps to two emergency canals located between Ein Shams and Gabal El Asfar, except for emergency situations when it pumps to the Kossous drain near the Kossous primary treatment plant.

2.3.4 Western Zone:

Area - 28 km²

Auxiliary Pumping Facilities - 19 pump stations

All flow ultimately reaches the Zenein Treatment plant.

2.4 Sewerage System History

The present East Bank Cairo sewerage system has its origins in the work of Mr. Charles Carkeet James who in 1906 developed a plan which was constructed and put into operation in 1914. The system was designed to serve 700,000 people which was the projected 1932 population of East Bank Cairo. At that time, all of Cairo was situated on the East Bank.

Since the construction of those initial works, which included Collector No. 1, Ein Shams pump station and the Gabal El Asfar treatment plant, additions have been superimposed. Collector No. 2 and the Amiria pump station were constructed between 1925 and 1929. Collector No. 3 was constructed in 1950.

A commission was established in the mid-fifties to prepare a Master Plan for sewerage facilities for Cairo for the remainder of the century. Their report (Cairo Sewerage Commission, "Report on the Sewerage, Sewage Treatment and Disposal of the City of Cairo", 1958) was never implemented.

In the early sixties, the situation in Cairo had deteriorated to the degree that emergency steps were necessary. It was in the mid-sixties that the "One Hundred Day Scheme" was enacted. Part of this effort included the Taweel - Soul El Samak system which was intended to relieve the northern zone and part of the central zone.

The present West Bank Cairo sewerage system did not begin to evolve until the late 1930's. The initial works were put on line in 1939 and comprised a gravity system discharging of the Giza Pump Station. The Giza Pump Station pumped to a treatment plant located at Abu Rawash about 16 km west of the Nile.

In 1970 an activated sludge plant was constructed at Zenein to treat 220,000 cmd of West Bank flow which includes flow diverted across the river from a siphon delivering sewage from the south zone of Cairo.

As part of the above mentioned "One Hundred Day Scheme" the Gamaa Pump Station was constructed and pumped to a new primary treatment plant, Nahya, located near by the Zenein treatment plant which was not yet completed.

Currently work is ongoing to expand Zenein to 330,000 cmd. At present West Bank flow plus diverted south zone flow is pumped to Zenein and Nahya for treatment. Effluent is discharged to the Nahya Drain which goes into the Muheit Drain which eventually discharges into the Rosetta Branch of the Nile. Sludge is pumped to drying beds at the partially abandoned Abu Rowash treatment works.

2.5 Current Problems

The current sewerage situation in Cairo is extremely serious. Current efforts by GOSSD to alleviate these conditions are hampered due to lack of equipment and serious shortcomings in the collection and conveyance system.

The Cairo sewerage system was started in 1914 with works designed to serve 650,000 people. Since that time several major additions were made without benefit of broad planning. Furthermore, a multitude of relief-cross connections were installed. The final result has been a system which is difficult to operate and maintain. Preliminary observations indicate a capacity far greater than that presently being utilized, provided significant operational changes are instituted, the major collectors are cleaned, and some moderate capital improvements are undertaken.

The above observations are directed only towards the collection and conveyance elements of the system. The existing East Bank treatment works are for all practical purposes totally ineffective at this time. One plant, Gabal El Asfar, is of very limited capacity. The other plant, Kossous, has potential for either effective primary treatment or even expansion to secondary treatment. The current mode of operation is such that treatment is minimal. At this time twelve primary clarifiers designed to provide primary treatment for 600,000 cmd are under construction about 4 kilometers west of the existing Gabal El Asfar works.

The West Bank treatment plants are also without significant effect given their present physical condition. The Nahya plant is totally without effect due to severe equipment shortcomings. The Zenein activated sludge plant is potentially capable of effective operation but must have a considerable amount of long delayed rehabilitation work performed as well as some operational changes.

Another major factor in the current situation is the high degree of siltation within the major collector pipes. The hydraulic capacity of some of these conduits is less than half of the capacity of the conduit if free of debris. Efforts have been underway to remove the silt-sand-debris but, because of lack of proper equipment, they have been only partially effective. At this time a pilot program is underway which is intended to test alternative cleaning methods, establish priorities between alternative types of rehabilitation effort, optimize use of equipment on hand, identify needed additional equipment, begin the training of crews, and initiate improved operational methods. This pilot program is funded by USAID and directed by a U.S.A. consultant working closely with the GOSSD staff.

The current rapid growth of the PROJECT Area will necessitate additional works including treatment facilities. However, to delay improving the current situation in order to await design, construction and startup of new works, which would require almost a decade, is not acceptable. In order not to continue the problems of the past, a trained and highly motivated staff is urgently needed to run the existing and proposed facilities. Last is the need for programmed capital expenditures to recognize Egypt's ability to finance and other pressing economic pressures. Any delay of major investments in new capital sewerage work made possible by the proposed rehabilitation and operational improvements will benefit Cairo's current situation. Such delay is more financially realistic than an immediate major capital expansion.

The program proposed for the PROJECT is intended to recognize the immediate problems and to provide a solution in the shortest possible time at minimum cost.

It should also lead to development of a skilled staff to operate the existing works efficiently and to be ready to operate the added works when they come on line, and to organize a plan for added facilities based on real needs and taking recognition of GOSSD's ability to finance them.

2.6 Recent Studies

A Master Plan for sewerage system of Greater Cairo was undertaken in January 1977 and presented in April 1978. The final draft report consists of six volumes:

Summary
Main Report
Existing Wastewater Facilities
Design Data and Criteria
Implementation
Economics and Finance

All prequalified proposers will be furnished a complete set for use in preparation of their proposals.

The Master Plan was prepared by John Taylor and Sons - Binnie and Partners in association with Dr. A. Abdel Warith. The PROJECT was undertaken for the Ministry of Housing.

This Master Plan constitutes the latest complete source of recent sewerage system data and it is expected that it will be a valuable starting point for the SERVICES, particularly for the Review-Study Phase.

The Greater Cairo Planning Commission prepared a land use map in 1966. There have been no significant efforts to update that plan. Taylor-Binnie made an update which is included in their report. The land use maps presented should therefore be used with caution since these are not from an official planning agency.

A Master Plan for improvement of the Cairo water system is currently being prepared by Engineering Science, Inc., and Ralph M. Parsons Corp. (ESP). Work commenced on May 2, 1977, and is expected to be completed by December 1978. The ESP study is divided into two sectors: (1) an immediate program to satisfy Cairo water demands through the year 1982; and (2) the staged development of waterworks to satisfy projected potable and non-potable water needs in the period 1982 through 2000. The first part of the work was completed in August 1977.

USAID is currently assisting in a project to: (1) rehabilitate the Rod El Farag Water Treatment Plant; (2) expand that plant by 200,000 cmd; (3) construct new transmission mains; (4) install 40,000 metered house connections.

2.7 Ongoing Activities

GOSSD has engaged ~~Camp Dresser & McKee Inc.~~ to develop and assist in implementation of a pilot program to clean detritus from the collectors of the PROJECT Area. As part of this pilot program certain operational changes at the major pump stations will be developed to enhance the pilot sewer cleaning operations. Furthermore, advice as to type and number of sewer cleaning equipment will be furnished based on experience during the pilot cleaning work. The contract was signed in April 1978 and will be completed in March 1979. ~~All data and conclusions from this pilot program~~ will be available to the CONSULTANT selected for the PROJECT. The intent is that the Rehabilitation Phase of the SERVICES will be an expanded continuation of the current pilot program.

GOSSD has underway several major construction projects which will provide additional sewerage facilities and/or improve operation of the existing works. Proposers should familiarize themselves with these projects to the degree that they may affect their proposals. These projects are discussed in Taylor-Binnie's (T-B's) report, Volume 5, Chapter 5, insofar as they relate to T-B's Top Priority Projects. A descriptive list of all ongoing GOSSD projects within the PROJECT Area will be furnished to all Proposers at the preproposal briefing. In addition, GOSSD will furnish a list of all presently owned maintenance equipment and spare parts, with a statement of condition.

3. SCOPE OF SERVICES

3. SCOPE OF SERVICES

3.1 Responsibility

The CONSULTANT shall serve as the engineer to GOSSD for the full period of the contract and shall furnish all necessary field investigations, design services, cost estimates, specifications, training and design-construction management, in addition to coordination of all design and construction work to be performed by others. Within the total funds obligated in the contract, the CONSULTANT shall furnish all labor, materials, tools and equipment required for these SERVICES and shall use its best efforts and resources to obtain the PROJECT objectives as stated herein, and complete to the satisfaction of GOSSD the SERVICES to be performed, described herein below, in accordance with the PROJECT schedule. GOSSD can request reasonable variations in these SERVICES. However, if the variations constitute a significant change in the Scope of SERVICES, a mutually acceptable contract amendment must be negotiated.

The CONSULTANT shall maintain close contact through periodic meetings with the representatives designated by GOSSD and USAID/Cairo on all matters related to the work. It is expected that frequent interchange of ideas and formal discussions with GOSSD'S and USAID'S representatives and other relevant GOE officials will result in agreement on the PROJECT activities during their planning and development and that final PROJECT implementation will be carried out as smoothly and quickly as possible.

The CONSULTANT shall, with representatives from GOSSD and USAID, form a steering committee to review, monitor, guide, and coordinate the work effort on a bi-monthly basis, or as requested.

3.2 PROJECT Area

The area for which the CONSULTANT shall provide the SERVICES under this PROJECT is designated the PROJECT Area. The approximate limits of the PROJECT Area are delineated on Figure 1-1 and comprise the whole of Greater Cairo, (except for Helwan) which extends from Maadi in the South to the proposed new industrial development area of El Aboure in the North.

Areas outside the PROJECT Area may be considered for the purposes of location sites for sewage treatment facilities, for the disposal of sewage, effluents and sludges, and for the utilization of effluents and sludge.

It is the intent of this Scope of Work to require the CONSULTANT to consider the wastewater facilities needed to progressively meet the requirements of the planned urban development as the city is expanded from its present limits to the boundaries of the future, as indicated in Figure 1.1. It is not intended that outlying areas and communities beyond the limits of the future city be provided with service extensions from the central system.

3.3 Description of SERVICES

The primary goals of this PROJECT are to restore Cairo's existing sewerage system to its original design capacity, to provide for the construction of urgently needed high priority improvements, and to prepare an incremental plan for the expansion of the system to meet current and future wastewater collection and disposal needs within the PROJECT Area through the year 2000. These goals, so easily stated, must be translated into specific engineering and construction activities which must consider and account for the various technical, financial, economic, and social factors involved. Because of the technical complexity of this work, the expertise of the CONSULTANT is needed to develop, supervise, and/or manage the principal project elements.

Performance of the SERVICES required for the Renabilitation Phase, the Training Phase, the Review-Study Phase, and the Design-Construction Management Phase of the work, all as described herein, shall include, but not be limited to, the specific tasks outlined below. The descriptions of the tasks are not intended to limit or restrict the CONSULTANT to the items contained therein and the CONSULTANT shall perform these tasks and such other tasks as may become apparent during the progress of the work, all in accordance with good United States engineering practices.

Plus

3.4 Rehabilitation Phase

The CONSULTANT shall thoroughly familiarize himself with the location, size, capacity, adequacy, efficiency, dependability, and functioning of

②

the existing wastewater facilities within the PROJECT Area.

An evaluation of relevant existing conditions of major components of the wastewater systems shall be undertaken. Although principally related to major components of the existing systems, this work shall also cover certain minor components where the CONSULTANT considers this necessary. In relation to the above, field inspection and survey programs shall be implemented as required during the formulation of the Rehabilitation Programs to augment, confirm, and rectify omissions of existing as built drawings, operating records and other data.

In the event that existing data, records, etc. are inadequate to determine capacities of the main components of the systems, the CONSULTANT shall, by inspection or direct measurement obtain this information.

The condition evaluation shall be made of the sewage treatment facilities, pumping stations, selected access and drainage inlet structures and, to the extent feasible, major sewers, collectors, and selected sub-main sewers, and overflow sewers. The existing system is a combined sewer system and, therefore, the condition, maintenance, and suitability of existing storm-water inlets and grates shall be examined and analyzed.

For the treatment plants, pumping stations, and similar facilities, surveys shall be made to obtain key dimensions and to ascertain the locations and types of all equipment, power supplies and pump capacities.

Inspections shall include checking ability to function, the condition of structures of mechanical and electrical equipment, reviewing apparent suitability of the present design, and causes of failure or nuisance. The condition evaluation and review of available engineering, construction, performance, or other data shall be used in estimating probable useful life. The analysis of making improvements or renovation shall take into account the possible need to change design criteria, power sources, and/or equipment type. Particular attention shall be given to that equipment for which spare parts are no longer readily available. Operating and supervisory personnel shall be interviewed.

The CONSULTANT shall investigate and analyze the existing sewage collection system to determine what additions or modifications are needed to correct deficiencies noted, improve sewerage service, reduce maintenance, and simplify control and operation. The condition and operation of the collection system shall be studied through field investigations, review of pumping and flow records, analysis of sewer failures, their frequency and cause, and any other information source.

The CONSULTANT shall, to the extent feasible, examine the condition of representative sections of the sewer system, especially those parts of the system known to be deficient, to assess the functioning and hydraulic capacity of the existing system. In this context, and to the extent practicable, the examination shall, inter alia, determine: the structural condition of the sewers, including cracking or deformation, failures at connections or joints where settlement has occurred, resulting in silt build up, retention of putrefactive matter or other loss of hydraulic efficiency, and indicate where corrosion attack is taking place.

The GOSSD and the other government organizations involved will cooperate fully with the CONSULTANT in this phase of the work by making available promptly all pertinent drawings, maps, records, previous studies, policies, standards, planning and design criteria, operating records, construction cost, demographic and statistical data, etc.

During this phase of the work, should the CONSULTANT determine that existing data or information are insufficient to fully evaluate any part of the system or that the development of these data will significantly add to the cost or exceed the time limits specified herein, then the CONSULTANT shall immediately notify GOSSD in writing of this deficiency; outlining the magnitude, significance and need, suggested scope of work, estimated costs, and time for obtaining these additional data or information.

In this context, the CONSULTANT shall identify those areas in the system where flow measurements shall be taken and carry out such measurements. The number of measurements and the type of equipment used therefore shall be dependent on the CONSULTANT'S professional judgement consistent with the above intent.

Supplementary field inspections shall be made of all major facilities which the CONSULTANT may be considering for abandonment because of their condition. Whenever feasible, such supplementary inspections shall be made in the presence of representatives of GOSSD or their designated representatives.

The condition evaluation shall include the engineering, hydraulic, sanitary, and safety aspects. Utilizing these data, the CONSULTANT shall identify present shortcomings and the most critical problems facing the wastewater systems in the PROJECT Area.

The CONSULTANT shall determine through careful economic analysis the justification to renovate, improve, modify, extend or discontinue using any of the existing equipment or facilities.

The CONSULTANT shall conduct the necessary laboratory tests to satisfy himself of the adequacy and efficiency of the treatment process in use. In performing these treatment analyses, the CONSULTANT shall become familiar with any existing pilot plants and/or in situ investigations previously carried out by others and shall consider the results of any such investigations pertinent to the PROJECT.

3.4.1 Sewers:

The CONSULTANT shall provide advisory assistance to the ongoing programs of removing sand and debris from the collection system. This assistance will include but not necessarily be limited to field advice, setting priorities and goals, assistance in sewer cleaning equipment procurement, supervision of and working with GOSSD'S cleaning crews to obtain the maximum effectiveness possible, and evaluation of results. Upon completion of the cleaning of each section of sewers, a complete survey shall be made and a special report shall be submitted recommending specific trunk, sub-collector and collector repairs and/or modifications required for proper functioning. On approval by GOSSD, the CONSULTANT shall prepare detail engineering plans and contract documents to enable GOSSD to do the repair work by either contract or its own staff. Hydraulic evaluation of all major collectors and sub-collectors will be undertaken and a plan of immediate optimization prepared.

Outline designs leading to detailed design and long range improvements will be developed under the Review-Study Phase of this contract.

3.4.2 Major Pump Stations:

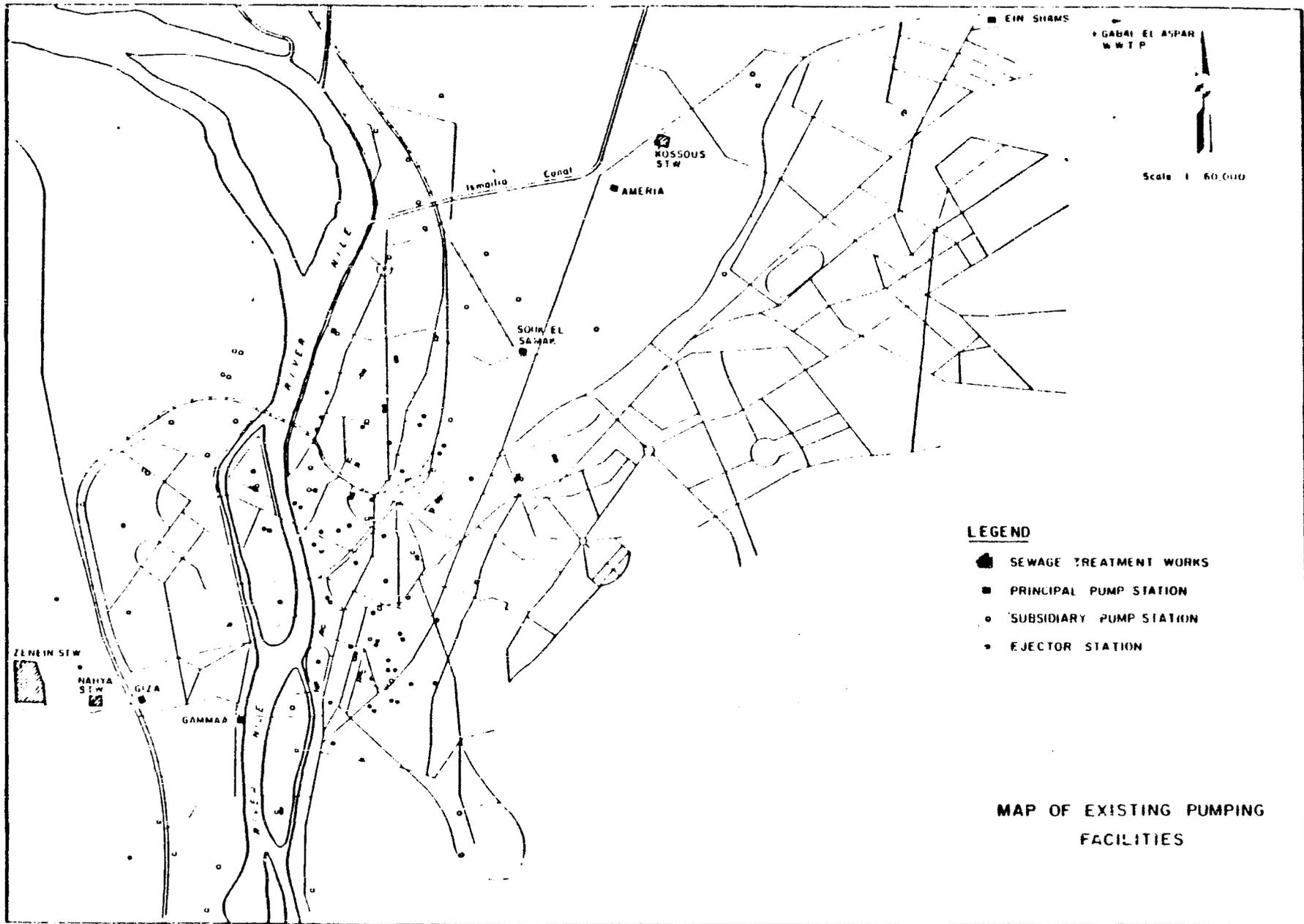
The CONSULTANT shall prepare as built drawings of all principal pump stations including head works and force mains. Existing plans will be utilized but must be field verified. The pump stations which are included in this category are: Ameria, Ein Shams (including the current addition), Souk el Samak, Giza, Gamaa, El Dayoura, El Tawil, and Cadrie.

A complete hydraulic and operational analysis will be made on all of the above stations. These analyses will lead to a detailed program of capital expenditures and operational changes resulting in maximum utilization of the existing works. Evaluation as to the need for installation of stand-by power will be made. Dual language operating instructions will be prepared for each of the facilities and assistance will be given in implementation of the new procedures. Detailed design drawings complete with equipment purchase documents will be prepared by the CONSULTANT for these improvements. In the case of capital improvements requiring tendering for installation, the CONSULTANT will furnish all necessary plans and documents and will assist GOSSD in the tendering process. The CONSULTANT shall assist in construction supervision during all actual improvement works whether carried out by GOSSD'S staff or by contractors.

After completion of the improvements, the CONSULTANT will assist in start up and adjusting the modified elements.

3.4.3 Secondary and Auxiliary Pumping Facilities:

These facilities comprise the existing pneumatic ejector stations and auxiliary pump stations in the system (see Figure 3.1). The CONSULTANT shall evaluate the condition of each unit including its force main and discharge point and prepare a recommendation for rehabilitation, modification or abandonment in accordance with the Review-Study Phase recommendations. Where rehabilitation and modification are involved, drawings and equipment purchase documents shall be prepared. Emphasis should be put on facilities located



LEGEND

- SEWAGE TREATMENT WORKS
- PRINCIPAL PUMP STATION
- SUBSIDIARY PUMP STATION
- EJECTOR STATION

MAP OF EXISTING PUMPING FACILITIES

FIGURE 3 I

in those areas where flooding potential is greatest. The CONSULTANT will provide advice during purchasing, installation and start up of rehabilitated-modified facilities.

3.4.4 Existing Treatment Plants:

The CONSULTANT will prepare sets of as built plans of the existing treatment plants. Existing plans and data will be utilized provided they are field verified by the CONSULTANT.

Studies shall be undertaken to determine the existing effective capacity of each plant and what immediate low capital improvements can be undertaken to improve operation. The CONSULTANT shall prepare outline drawings and descriptions of the proposed improvements. The above efforts will be coordinate with the Review Study Phase of the PROJECT.

3.4.5 Institutional and Equipment Replacement:

The CONSULTANT shall recommend changes in current institutional aspects of GOSSD specific to operation of the collection and conveyance systems within the PROJECT Area. These changes shall be limited to matters directly related to actual day-by-day operation.

The CONSULTANT shall make inventories of all equipment and vehicles utilized in the operation and maintenance of the system and currently owned by GOSSD. A program of maintenance and replacement as well as purchase of additional units shall be developed. Assistance with preparation of procurement documents and evaluation of tenders will be provided by the CONSULTANT.

3.4.6 Vertical Control:

The CONSULTANT shall establish a bench mark system, based on the AOD datum, encompassing all of the key pump stations listed in sub-section 3.4.2 of the Scope of SERVICES. In addition, the system shall encompass ten locations along the route of Collectors 1, 2, and 3. The minimum number of bench marks is indicated in Figure 3.2. Accuracy of the level runs shall be of the first order. Closure of all loops shall be plus or minus 3.000 meters times the square root of the total distance in kilometers. Permanent monuments with brass discs anchored in concrete posts shall be installed.

3.4.7 Manpower:

Because of the difficulty Proposers would have in quantifying the Rehabilitation Phase work and in estimating the manpower requirement, manpower estimates made by GOSSD are to be adopted by all Proposers. Manpower actually to be used by the selected CONSULTANT will be agreed with GOSSD during contract negotiations or as the work progresses and may differ from these figures. Payment will be on a cost-plus-fixed-fee basis in order to give the needed flexibility. Proposers are to indicate names, qualifications and directions of individual expatriate and other key assignments in accordance with the GOSSD estimates.

PROFESSIONAL AND TECHNICAL MANMONTHS

	<u>Foreign</u>	<u>Egyptian</u>
Sewers:		
Technical Guidance of Sewer Cleaning	12	-
Capacity Evaluation and Design of Repairs	20	36
Field Surveys	2	2
Drafting	4	10
Technical Management and Home Office Support	<u>7</u>	<u>4</u>
Subtotal	45	52
Major Pump Stations:		
Preparation of As Built Drawings	7	20
Operational Improvement and Instruction Preparation	18	6
Design Improvements, Prepare Documents	20	10
Tender Evaluation	4	2
Services during Construction	12	15
Field Surveys	3	1
Drafting	6	12
Technical Management and Home Office Support	<u>12</u>	<u>3</u>
Subtotal	82	72

	<u>Foreign</u>	<u>Egyptian</u>
Secondary and Auxiliary Pumping Facilities:		
Inventorying and Evaluation	6	16
Recommending and Designing Improvements	15	10
Assistance During Procurement, Installation, Start Up	10	20
Field Surveys	4	6
Drafting	4	10
Technical Management and Home Office Support	<u>10</u>	<u>4</u>
Subtotal	51	66
Existing Treatment Plants:		
Preparation of As Built Drawings	10	12
Outline Design of Improvements	3	6
Field Surveys	3	6
Drafting	25	25
Technical Management and Home Office Support	<u>12</u>	<u>6</u>
Subtotal	58	55
Institutional and Equipment Replacement:		
Institutional Aspects	1	-
Equipment Evaluation and Assistance	2	-
Technical Management and Home Office Support	<u>1</u>	<u>-</u>
Subtotal	4	-
Vertical Control:		
Field Surveys	<u>15</u>	<u>4</u>
Subtotal	15	4
TOTAL, Rehabilitation Phase	255	249

3.5 Training Phase

The CONSULTANT will provide operation and maintenance training to assist GOSSD'S personnel to operate and maintain the existing and improved system at or above design capacities.

3.5.1 Operation:

A training program for present employees and candidates for future positions of GOSSD will be established. The program will include but not necessarily be limited to the following:

- Sewer maintenance,
- Force main maintenance,
- Pumping facility operation and maintenance,
- Treatment plant operation and maintenance,
- Functional design of sewers and appurtenances,
- Functional design of force main and appurtenances,
- Functional design of pump systems,
- Functional wastewater laboratory operation,
- Service equipment maintenance,
- Safety procedures.

The program shall be directed specifically towards operation of the existing and proposed future facilities within the PROJECT. On site training at each of the existing major facilities will be undertaken in addition to classroom training.

The CONSULTANT will provide experienced operators and engineers to provide guidance on operation of the major facilities as part of the program.

Audio visual training aids will be provided by the CONSULTANT and used as supplements to site and classroom work.

A system of classification of personnel by skills will be developed and certificates awarded upon successful completion of the program.

The programs shall be developed to allow for continuous application and for upgrading current staff and developing new staff. They shall be adequately flexible to allow for future advances in technology.

As part of the program, dual language manuals shall be developed and prepared for continuing usage by the GOSSD staff. The following is a list of manuals to be provided:

- Sewer cleaning and maintenance,
- Pump station operation and maintenance,
- Treatment plant operation and maintenance,
- Safety procedures,
- Wastewater laboratory procedures,
- Functional design of sewers and appurtenances,
- Functional design of pump stations and force mains.

3.5.2 Pilot Studies:

Under this phase of the program, as part of the treatment plant operation and wastewater laboratory operation efforts, pilot studies on the Cairo wastewaters shall be undertaken. The purposes will be:

- (a) to assist in selection of treatment processes and criteria for use in the Review-Study Phase of the PROJECT; and
- (b) to train personnel of GOSSD in the planning and conduct of such pilot studies.

The pilot studies shall be at bench-scale and shall utilize representative samples of wastewater to establish qualitative and quantitative data for use in final design. To the extent possible and agreed to by GOSSD, the existing treatment works at Kossous, Gabal El Asfar, and Zenein shall be utilized to verify bench-scale results on a full scale. Studies to establish assimilative parameters of the receiving water of effluents from proposed treatment works shall also be made.

A program of flow gauging and sampling within the sewerage system shall be established to gather hydraulic data and furnish wastewater samples for laboratory analyses. The flow gauging should be closely coordinated with the cleaning efforts under the Rehabilitation Phase.

The CONSULTANT shall provide the necessary flow measuring and recording equipment, which shall become the property of GOSSD at the end of the SERVICES.

3.5.3 Manpower:

For the Training Phase, as for the Rehabilitation Phase, Proposers are to indicate names, qualifications and durations of individual expatriate and other key assignments in accordance with manpower estimates prepared by GOSSD, as follows:

PROFESSIONAL AND TECHNICAL MANMONTHS

	<u>Foreign</u>	<u>Egyptian</u>
Operations:		
Training Program and Classroom Work	6	10
On-Site Guidance and Training	24	12
Preparation of Manuals	8	16
Drafting	2	6
Technical Management and Home Office Support	<u>6</u>	<u>2</u>
Subtotal	46	46
Pilot Studies:		
Bench Scale Studies	10	10
Full Scale Studies	6	3
Receiving Water Studies	2	4
Technical Management and Home Office Support	<u>4</u>	<u>-</u>
Subtotal	22	17
TOTAL, Training Phase	68	63

3.6 Review-Study Phase

The CONSULTANT shall collect, review and evaluate all available data and information relevant to the PROJECT. The CONSULTANT is expected to review and familiarize himself thoroughly with all aspects of the "Greater Cairo Wastewater Project" reports, Volumes 1 through 6, prepared by John Taylor and Sons, Binnie and Partners, dated 1977 and 1978 and the "Cairo Waterworks Master Plan Study", prepared by ES-Parsons, dated 1978, especially those parts related and interrelated with the sewerage system. The CONSULTANT shall conduct additional surveys, investigations, and studies, as necessary to base and support recommendations for the stage expansion programs for the sewage systems development. The field surveys required shall be carried out within the shortest practicable period after the Notice to Proceed, especially the investigations

and collection of data needed for the completion of the Immediate Phase of Expansion of the Wastewater Facilities.

The matters to which particular attention is to be given are:

- a. Population, land use, and wastewater flow and strength projections.
- b. The possibility of making economical use of existing main collectors, after rehabilitation, taking into consideration different alternatives, i.e. open-cut versus tunnel interceptors and possible conflicts with other utilities.
- c. The possible means and benefits of eliminating sewer crossings of the Nile.
- d. The possible economic, health and environmental effects of permitting discharge of treated effluent to the River Nile (presently prohibited) instead of the Kossous, Moheit, and Balbase Drains, giving examples of similar practices in other countries.
- e. The possibility of making use of all existing treatment facilities, after rehabilitation, taking into account the technical and economic feasibility of such treatment facilities compared with the construction of new facilities.
- f. The most economical locations and capacity and process increments, and the relative present worth costs, of conveyance and treatment facilities to give (1) effective primary treatment of all collected wastewaters by 1985 and effective secondary treatment by 1995 with and without discharge to the Nile, and (3) effective secondary treatment of effluent to be discharged to the Moheit Drain by 1985 and effective primary treatment by 1985 and secondary treatment by 1995 of all other collected wastewaters.
- g. A cost effective and environmentally acceptable recommended staged program of construction of major conveyance and treatment facilities.

3.6.1 Population:

It is intended that the CONSULTANT shall, to the extent practicable, accept and utilize the results of population studies and projections presented in the 1978 Wastewater Master Plan Report. However, the CONSULTANT shall review the results of the 1976 census, recent development planning, and other data or information which has been developed or generated since the preparation of the 1978 Master Plan. In particular, the findings of several of the projects listed in Section 2 of the Terms of Reference may require that adjustments or revisions be made to the population projections previously developed. Where these more recent data so dictate, in the opinion of the CONSULTANT and upon completion of his review and subsequent evaluation of these data, the CONSULTANT shall make any adjustments to the 1978 Wastewater Master Plan estimates of the future population through the year 2000 that he deems necessary. The basic assumptions used shall be explained and the rationale for selection clearly defined.

These revised data shall be presented both narratively and graphically. The CONSULTANT shall coordinate the analysis of his investigations with the planning organizations involved, consider their views and attempt to reach agreement with such agencies on the population projections to be adopted for the development of the staged development program.

The CONSULTANT shall combine or rearrange the agreed population figures by the various appropriate sub-areas, through the year 2000, as required to conform with the water demand and usage studies of this PROJECT.

3.6.2 Land use:

Similar to population, it is intended that the CONSULTANT shall, to the extent practicable, accept and utilize the results of land use studies, including development patterns, rates of development and population densities, as presented in the 1978 Wastewater Master Plan. The CONSULTANT shall review recent development planning and other data developed since the preparation of the 1978 Wastewater Master Plan, including information from the various projects listed in Section 2 of this Terms of Reference. Where these more

recent data so dictate, in the opinion of the CONSULTANT and upon completion of his review and evaluation of these data, the CONSULTANT shall revise the land use proposals of the 1978 Wastewater Master Plan as he deems necessary. The CONSULTANT shall present the bases for these revisions. The revised data shall be presented narratively and graphically for the years 1980, 1990, and 2000, and if appropriate, other years coincident with the planned completion of major expansion to the wastewater systems.

3.6.3 Wastewater flow:

The CONSULTANT shall collect and review available historical wastewater data. Sewage peak and minimum flow characteristics, volume, and strength data shall be analyzed. Hourly, daily, wet versus dry, and other seasonal fluctuations shall be determined and evaluated. The quantity and characteristics of the flow handled in the various parts of the wastewater system shall be determined. Appropriate allowances shall be made for such factors as leakage from the water supply system, infiltration and exfiltration of the sewerage system, etc. Consideration shall be given to all wastewater discharge, including those wastewaters originating from private water sources, if they exist.

Field measurements and observations shall be made at pump stations, loading points, and other representative locations to corroborate estimated flows within the system and the quantities being delivered to the treatment plant. Weirs of various types; recording gauges; and/or other measuring devices shall be installed as required for this purpose. Representative samples shall be taken for physical, chemical and biological analysis, as the CONSULTANT considers appropriate.

Chemical analyses shall include, but not necessarily be limited to determining: biochemical oxygen demand, dissolved and consumed oxygen, total, suspended and dissolved solids, concentrations of total nitrogen, chlorides, phosphates and detergents, alkalinity, heavy metals and other constituents considered to be of importance in the work.

3.6.4 Collection and Conveyance:

The CONSULTANT shall develop a staged expansion program for the system, closely coordinated with the Rehabilitation Phase of the PROJECT and with projects now underway by GOSSD. Maximum economic use shall be made of the existing facilities in the recommended program. Phasing out of the existing ejectors and small (auxiliary) pump stations should be incorporated in the recommended program to the maximum practicable and economical extent. Options including continuation or elimination of trans Nile flow at the existing siphon and at Zamalek Island are to be considered.

The recommended program shall be based on economic comparisons which include operation and maintenance as well as initial construction costs, taking into account shadow pricing and other parameters to the extent relevant.

The recommended program should consider the serious traffic situation in Cairo and endeavor to minimize impact on it during construction of the improvements. Construction methods which will minimize disruption of traffic flow and conflicts with other underground utilities should be developed and evaluated economically in the report.

The CONSULTANT will develop a program to provide alternative disposal methods for certain solid wastes now being disposed of in the sewers. These wastes include mazout, used oil, toxic liquids, solid wastes, animal manure, and septage. The program will identify locations for collection, transfer, treatment and disposal. Conceptual designs and cost estimates for typical collection, transfer, treatment and disposal facilities will be provided by the CONSULTANT.

The required organization including equipment, vehicles and operational rules to implement the above will also be included in these SERVICES.

The CONSULTANT will review the recommendations in the Taylor-Binnie Report for lateral and branch sewer expansion, particularly in

presently unsewered areas and develop an incremental program for construction based on need and GOSSD'S financial ability to construct the proposed program. When approved by GOSSD the CONSULTANT shall prepare designs and contract documents for selected sewer extension projects and will supervise the construction work as part of his SERVICES under the Rehabilitation Phase of the work. The CONSULTANT will prepare system layouts for areas not included in the Taylor-Binnie report and where he feels departures from those recommendations are warranted.

3.6.5 Treatment and Ultimate Disposal:

Studies shall be made to determine treatment requirements based on receiving body assimilative capacities and current law. In addition, current laws regarding discharge of treated sewage to the Nile shall be evaluated and recommendations shall be made for modifications or retention of these laws as applicable to the PROJECT.

Field studies on the Nile are to be conducted under the Training Phase to establish its assimilative capacity. Oxygen sag analyses shall be developed based on these field studies in the reach of the Rosetta Branch immediately above and downstream of the Moheit Drain.

Studies shall be conducted on reuse of treated effluent and sludges, including the impact of elimination of the current discharge of raw sewage for irrigation at Gabal El Asfar and Abou Rawash. Sludge disposal alternatives shall include but not be limited to composting, subterrain application, and drying beds.

The existing Kossous primary treatment plant which will be upgraded as part of the rehabilitation phase shall be carefully evaluated for possible inclusion in the recommended system. Consideration shall be given to expansion for handling additional flow and/or to provide a higher level of treatment.

The existing Zenein plant shall be considered as an integral component of the recommended plan. Studies shall be made to determine its potential for expansion to handle either higher flows or to

treat wastewaters beyond the current design level. Particular emphasis should be put on solids handling and disposal methods and operation.

The existing Nahya Treatment Plant shall be studied for possible use either for the immediate future or for incorporation in the overall recommended plan.

Currently construction is underway on twelve new primary clarifiers and appurtenances in the Gabal El Asfar area. These works shall be utilized in the recommended plan unless it can be conclusively shown that using them in the recommended plan is economically unsuitable. The CONSULTANT shall make studies to determine the capacities of these units and to identify any possible improvements.

In the event that more than a single treatment plant is recommended, pumping of sludge between plants shall be studied as one of the alternatives for disposal.

Treatment processes considered shall not be limited to conventional activated sludge. The entire spectrum of biological and chemical processes shall be studied. Emphasis shall be on ease of operation and maintenance. Processes requiring sophisticated operating skills shall be avoided both from a process and a maintenance point of view.

Consideration shall be given to possible discharges of toxics into the Cairo system. A positive program to control such discharge shall be developed as part of these studies.

The need to provide covering or other provisions to prevent health or nuisance conditions in drains carrying sewage and industrial waste effluents shall be evaluated. In addition, the CONSULTANT shall perform studies to evaluate the hydraulic capacities of such waterways to handle projected effluent discharges.

3.6.6 Concurrent Related Projects:

Concurrent with the PROJECT a number of related projects have been or are being conducted by other consulting firms, under the aegis of MCH. These projects are:

Wastewater Facilities Master Plan Studies - Greater Cairo and Alexandria;

Waterworks Master Plan Studies - Greater Cairo and Alexandria;

Waterworks and Wastewater Master Plan Studies - Suez, Ismailia and Port Said;

Management and Tariff Studies - all five cities shown above.

The GOSSD will maintain liaison among these consulting firms to reduce duplication of effort by coordinating investigations and reviews, promoting cooperation in associated activities, and assisting in the exchange of information, findings, and recommendations. The CONSULTANT shall cooperate fully with the GOSSD in this effort.

3.7 Wastewater Facilities Master Plan Report

The CONSULTANT shall develop, evaluate, and compare alternative solutions and programs for the immediate and the long-term development of the wastewater facilities within the PROJECT Area.

The results of the surveys, investigations, analyses, and recommendations shall be embodied in a comprehensive Wastewater Facilities Master Plan Report. The report shall consist of two parts: Part I, Immediate Phase and Part II, Staged Development. In the preparation of the report, special attention shall be given to have the two parts complement each other. However, each part shall be, in itself, as complete as possible to minimize reference to the other.

The Part II reports shall be submitted in draft final and final forms within 10 and 14 months, respectively, from Notice to Proceed. The contents and additional details of these reports are described hereinafter.

It is mandatory that the CONSULTANT identify early in the work those components urgently needed to relieve Cairo's critical sewage problems as identified under the Immediate Phase of Development, Part I. The identified expansion projects or components shall be compatible with the

overall expansion program and presented in report form in sufficient detail, both technically and economically, to permit GOSSD and USAID to prepare a project paper for funds and start the design and construction work during 1979. The proposed major components identified under this initial work shall be presented in a separate report to GOSSD no later than June 1, 1979.

3.7.1 Part I - Immediate Phase of Development:

Part I of the Wastewater Facilities Master Plan Report shall include all modifications and additions needed to improve the adequacy and reliability of the existing wastewater facilities to satisfy near-term needs through the year 1985. It shall provide for extension of wastewater collection and conveyance facilities, to certain critical areas to be identified by the CONSULTANT as being presently without service or receiving only marginal service. The Part I reports shall include identification of the more important current problems; determination of urgently required remedial works or new facilities; improvements in plant components, equipment and operating techniques to realize better operating efficiency, reliability, and performance; preparation of pertinent technical-economic feasibility analyses; and completion of conceptual designs for the Immediate Phase improvements. Specific project packages shall be identified and their location, capacity and configuration, schedule of execution, and costs determined.

The Part I Wastewater Facilities Master Plan Report shall be submitted in draft final and final form within 6 and 12 months, respectively, from the Notice to Proceed.

The Part I Draft Final Report shall include technical and economic feasibility analyses and conceptual designs of the proposed physical improvements to be constructed in the Immediate Phase of Development, prepared to the extent and detail hereinafter described to enable GOSSD to make preliminary investment decisions and to facilitate appraisal of the Part I program by USAID and other international lending agencies. An environmental assessment of the proposed projects shall be included.

The Part I Draft Final Report shall include descriptions of the existing wastewater facilities and their deficiencies. It shall be supplemented by maps, plans, graphs, tabulations, photographs, etc. The description shall include, but not necessarily be limited to:

- a. Extent of wastewater collection and conveyance systems, areas, and population served;
- b. Type and degree of wastewater treatment;
- c. Method of wastewater disposal;
- d. Condition and capacity of existing wastewater collection, conveyance, treatment, and disposal facilities;
- e. Organization, strength, fiscal viability and management and experience of the operating organization;
- f. Operation and maintenance of the wastewater facilities;
- g. Adequacy of wastewater facilities service within the area served.

The investigations, analyses, proposals, recommendations, and conceptual designs carried out for the Immediate Phase shall be incorporated to the extent of their completion in the Part I Draft Final Report. In particular, the Part I Draft Final Report will contain a section on Review and Evaluation of Projects in Progress and a section on Plant Operation and Maintenance. The priority of improvements shall also be discussed in this Report.

Recommendations shall be presented in the Part I Draft Final Report for the establishment of an ongoing program of continuous data collection, as required to facilitate the decision-making processes in planning, design, staging of construction, and operation of projects beyond the Immediate Phase of Development.

The recommendations and programs presented in the Part I Draft Final Report shall be coordinated with the Part II proposals in preparing the Part I Final Wastewater Facilities Master Plan Report. The Part I Final Report shall take into account comments by GOSSD and USAID on the Part I Draft Final Report and shall update, detail, and revise as necessary, the material presented therein. The data, analyses, and conceptual designs contained in the Part I Final

Report shall be presented in sufficient detail to enable GOSSD and USAID to refine and confirm Part I investment decisions and program appraisals made on the basis of the Part I Draft Final Report.

To be included under Part I is the conceptual design of specific project packages. The conceptual designs, outline drawings, descriptions, cost estimates and feasibility analyses shall be prepared in such a manner that if so decided by GOSSD, final design of these project packages can proceed expeditiously. (Such final designs would be contracted under a separate agreement.) The conceptual designs embodied in the Part I Reports shall include, but not be limited to:

- a. Outline plans showing location, layout arrangement, approximate leading dimensions and elevations of proposed typical and major wastewater facilities, adequate to provide a basis for reasonably firm estimates of cost;
- b. Descriptions of processes, methods, capacities, etc., of major units of wastewater facilities equipment;
- c. Location and approximate configuration of property to be used for wastewater facilities development;
- d. Small scale plans of main collectors, gravity sewers and force mains;
- e. Approximate size, length, type, and general location of major sewers, drains, collectors, etc. at relevant wastewater treatment plant sites;
- f) Schematic flow diagrams and hydraulic profiles showing flow through the various units of wastewater treatment plants, where necessary to establish feasibility and/or costs;
- g) Outline drawings of special structures.

These conceptual designs and outline drawings, layouts, etc. shall clearly and absolutely convey the intent, general features, and specify and describe the basic performances, processes and sizes of the proposed facilities and their principal components. In general, but as appropriate, these drawings shall be prepared for individual facilities. Special considerations requiring particular attention during final design, such as the need for corrosion resistant materials, timing of delivery, or installation etc., shall be noted.

Appendices to the Part I reports shall contain information on survey data, investigations, tests, other supporting data, conceptual design details and other materials supplementary to the main text.

3.7.2 Part II - Staged Development of Wastewater Facilities:

The studies under Part II of the Wastewater Facilities Master Plan shall determine the wastewater facilities which best fulfill the needs of the PROJECT Area to meet projected wastewater requirements through the year 2000. The objective is to formulate a staged development program that is technically, environmentally, and economically sound and financially feasible. The studies shall identify and evaluate alternatives and shall be sufficiently detailed to permit reasonably accurate determinations of construction and operating costs for each alternative scheme. The expansion program shall indicate the facilities required during each proposed construction state.

In developing Part II of the Wastewater Facilities Master Plan, the following points shall be addressed:

- a. The existing wastewater facilities and all works covered under Part I - Immediate Phase of Development.
- b. Projects planned or in progress.
- c. Determination of wastewater flows throughout the planning period and the required facilities.
- d. Determination of the most suitable, reliable and cost-effective means of wastewater collection, conveyance, method and degree of treatment, and method of disposal.
- e. Development and evaluation of alternative programs.

3.8 Environmental Assessment

The CONSULTANT shall prepare an Environmental Assessment of Part I and Part II of the Wastewater Facilities Master Plan in accordance with the AID Environmental Procedures as published as Part 216 in the Federal Register on June 30, 1976. The purpose of the Environmental Assessment is to provide USAID and the GOSSD'S decision makers with a comprehensive understanding of the reasonable alternatives so that the expected benefits of development objectives can be weighed against adverse short- or long-term impacts upon the environment.

Environmental Assessment, as used in this Scope of Work, will not be construed to be an Environmental Impact Statement as defined in U.S. Government Regulations. The Environmental Assessment shall be embodied in a separate section of the Part I and Part II reports. It is not required that an individual or independent Environmental Assessment report be submitted.

Consideration shall be given to those effects upon the environment which adversely affect such aspects of the human environment as air, water, land, flora and fauna, and socio-economic conditions. Special attention shall be given, as appropriate, to problems involving solid wastes, noise, hazardous substances and natural resources development, and in addition action which:

- a. Degrade the quality of the human environment.
- b. Curtail the range of beneficial uses of the human environment and its resources.
- c. May have both detrimental and beneficial effects, even if on balance the effect will be beneficial.
- d. Have secondary effects which may be more substantial than the primary effects of the proposed action.
- e. Are likely to have an effect on any natural or cultural heritage, archaeological elements.

This Environmental Assessment shall include, but not be limited to:

- a. A description of the existing environment without the proposed improvements relevant to the analysis of alternatives and determinations of the environmental effects of the Wastewater Facilities Master Plan.
- b. A description of the future environment with no action to improve the wastewater facilities.
- c. An environmental assessment of the alternative programs studied. The significant direct and indirect effects of each alternative program shall be determined. Long-term, irreversible and induced impacts on socio-economic conditions, public health, etc., shall be considered in the selection process.
- d. A description of the future environment with the implementation of the Wastewater Facilities Master Plan. Direct and indirect impacts of the Wastewater Facilities Master Plan program shall

be described giving special attention to unavoidable impacts and steps to mitigate adverse impacts. The significance of land use impacts shall be evaluated, based on current and projected population within the PROJECT Area.

Throughout the SERVICES, the CONSULTANT shall take all available and reasonable steps to minimize adverse impacts directly or indirectly resulting from the SERVICES: (a) human conditions and activities, including commercial and social activity, traffic, economic conditions and environmental quality; (b) on land, air, water, plant, and animal resources; and (c) archaeological, historical, or cultural resources.

The CONSULTANT shall, in performing the Rehabilitation, Design-Construction Management, and Training Phases of the SERVICES:

- a. Provide for sewer cleaning operations to be conducted with minimum interruption of traffic and commerce and provide for solids, sludge, and/or debris, removed from sewers, to be trucked away daily to safe burial. In this respect he shall provide for the supply of suitable vehicles and other equipment and, with the assistance of the responsible agencies, identify suitable disposal locations.
- b. Plan and specify the rehabilitation and modification work so as to minimize the time and distance over which trenches will be open.
- c. To the extent necessary, provide for underpinning to prevent damage by trenching to nearby structures and for sheeting to protect roads and other surface against collapse and to protect workmen.
- d. Provide for backfilling, compaction, and repairing or other appropriate resurfacing so that there will be no residual permanent detrimental effect on land use due to underground work.
- e. Include odor reduction, along with operational aspects, in recommending both operation and maintenance and engineering improvements.

- f. Provide in construction contracts for contractors to minimize air pollution by: keeping construction equipment well tuned; servicing filters, blowers and injectors on gasoline and diesel engines to minimize emissions; removing all construction debris to approved dump sites and preventing any burning of refuse and using, to extent that they are available, low sulphur fuels to minimize emission of sulphur oxides.

In performing the Review-Study phase of the SERVICES, the CONSULTANT shall:

- a. Provide, to the extent feasible, for improvement and control of the quality of wastewater receiving waters so as to protect both their beneficial uses, including agricultural irrigation, fishing and urban water supply, and also their flora and fauna.
- b. Provide, to the extent feasible, for improvement of sanitary conditions within the PROJECT Area and in areas affected by wastewaters deriving from the PROJECT Area.
- c. Identify potential environmental impacts due to alternatives being developed and compared, take them into account in comparing the alternatives, and consider them in more detail in evaluating the recommended first stage and long-term programs. Such impacts shall include:
 - Toxic effects on fisheries, the food chain and community water supplies;
 - Taste and odor production and interference with water treatment processes for community water supplies;
 - Oxygen depletion and its results in receiving waters;
 - Nutrient and suspended solids effects on enrichment and eutrophication of receiving waters;
 - Effects of dissolved solids in irrigation water on agriculture;
 - Effects of non-biodegradable, carcinogenic and other deleterious substances not falling directly under the above categories;
 - Contamination of groundwater;

Interference with economic or commercial activity
(including traffic or transportation);
Interference with quality or location of habitations,
working environment, public safety or health and/or
safety of workers;
Noise;
Land use effects, including removal of land from
agricultural and urban use;
Temporary effects during construction and start up.

- d. Identify the environmental impacts of the proposed first stage construction, and of the long-term proposals, in relation to:
 - Existing conditions;
 - Conditions which will prevail without the project.
- e. Incorporate into his proposals measures to mitigate adverse environmental impacts which would otherwise have resulted, to the extent that these are reasonable and economical, taking into account not only impacts within the PROJECT Area, but also national and international impact.

3.9 Subsurface Investigations

The CONSULTANT shall review all available existing data and, where required perform field investigations and analyses to ascertain subsurface, soil, or strata conditions. Areas of unusual soil, foundation or groundwater conditions, as they relate to probable construction problems or to the cost of the alternative schemes, shall be identified and evaluated.

Where existing data are insufficient to complete the evaluations necessary for the formulation of the staged development program and complete final design of the Immediate Phase work, the CONSULTANT shall obtain such additional soils information as can be accomplished by simple means, such as test pits, hand augers, probes, examination of open excavations, etc., and the laboratory testing of disturbed samples, etc.

The CONSULTANT shall inform GOSSD at the earliest possible time of the need for soil boring or other specialized subsurface investigations, testing and analyses to support the feasibility of the proposed waste-water facilities programs and/or for the development of the final engineering

designs and contract documents of the recommended improvements. The CONSULTANT shall assist GOSSD in the planning, programing, and procurement of these special borings and tests and shall evaluate the results of such borings and testings as are performed within the time frame of the work.

3.10 Conflicts with Other Utilities

The CONSULTANT shall review all available plans, records, and other data on the location of existing utilities, and/or related municipal services, either underground or overhead, within the PROJECT Area and as relevant to the formulation of the wastewater facilities development program. Discussions shall be held with officials of these utilities to ascertain present and future improvement programs, and to determine and minimize to the extent practicable, conflicts with these utilities.

In developing the Master Plan, the CONSULTANT shall take into account the presence of utilities and shall consider the cost of utility relocation and public inconvenience caused by disruption of services related to the implementation of the staged development program. Special consideration in this respect shall be given to alternative alignments for trunk or interceptor sewers, or other projects proposed as part of the Immediate Phase Development.

3.11 Feasibility Studies

The purpose of the technical and economic feasibility studies is to assist GOSSD, USAID and other international lending agencies to evaluate the advisability of undertaking the wastewater facilities development program. The feasibility studies should integrate the results of the CONSULTANT'S investigations into the technical, financial, economic, and other aspects of the development program and should be sufficiently complete to permit independent appraisal of the soundness of the development program, on the basis of the data submitted and the assumptions used. The technical and economic feasibility studies shall include but not be limited to: evaluations, analyses, and recommendations, as appropriate, and as further described in the following sections.

These technical and economic feasibility studies are required for each discrete improvement stage of both Part I and Part II of the Wastewater Facilities Master Plan.

The material presented in this section, has been summarized from, "Economic and Technical Soundness Analysis for Capital Projects Submitted for AID Financing", which is the guideline established by USAID for financing capital projects.

3.11.1 Technical Soundness:

In support of the economic and financial soundness evaluations, as below, to be presented in the Feasibility Report, that report shall demonstrate the technical soundness of the proposed first stage works and shall present a comparative technical soundness evaluation of the subsequent stages through the year 2000.

These presentations shall include at least the following:

- a. Principal engineering features of the program as to type, capacity and characteristics of major facilities or units; relationship to existing and future service requirements.
- b. Justification of the scope of the improvements program in relation to development of the community served and the staging of the program.
- c. Design objectives, general criteria, standards, types and capacity increments of new facilities and equipment in relation to the existing system and the quality of services to be provided, with conceptual layouts and locations of major and typical facilities, together with local and foreign currency capital and operations cost estimates.
- d. Preliminary investigations and surveys sufficient to identify the significant technical problems, establish location and fix general criteria and standards.
- e. Justification of the criteria, standards, locations and extent of the facilities proposed as compared with other available alternatives.
- f. Conceptual designs and outline plans of all proposed first stage facilities, sufficiently complete to provide a basis for reasonably firm estimates of work quantities and costs. Local and foreign currency (direct FEC, indirect FEC), land, construction (labor and materials, equipment), and operations cost estimates should be

included, with separate provision for engineering and construction contingencies. Preliminary engineering should be sufficient to assure that all foreseeable costly and time-consuming factors which may occur in the course of final design have been eliminated.

3.11.2 Economic Feasibility:

Since it is intended that the first stage facilities should proceed through funding, detailed design and construction, the CONSULTANT shall demonstrate the economic soundness of the first stage.

The economic soundness evaluation shall show that the first stage proposals have an adequate internal rate of return that is significantly higher than that for any other technically feasible alternative.

In addition, the CONSULTANT shall make a general economic evaluation of the whole proposed development program through the year 2000 (benefits and operating costs beyond 2000 may be considered).

In the economic soundness evaluation, information on the aspects listed below and other necessary information shall be provided:

- a. A description of the community; population and principal occupations; industrial activities by type and magnitude; prevalence of water-borne diseases and other public health considerations.
- b. A description of the extent and condition of the existing wastewater facilities, area and population served; source, quality and amount of dependable water supply; adequacy of water and sewer service and demand for increased or improved service.
- c. Relationship of the staged improvement program to other wastewater facilities improvement programs envisioned for the PROJECT Area; relationship of the proposed first stage works to the staged program.
- d. A discussion of the character of anticipated benefits, both direct and indirect, resulting from the staged improvement program, and particularly of the first stage.

2. Scale of the proposed investment program in relation to other planned and ongoing public projects; relationship to stated Government development and related policies; relationship between amount and timing of benefits (quantifiable and unquantifiable) and costs (with shadow pricing as applicable); demonstration that the proposed PROJECT is the least expensive that will produce the proposed benefits.

3.11.3 Financial Feasibility:

Since it is intended that the first stage facilities should proceed through funding, detailed design and construction, the CONSULTANT shall demonstrate the financial soundness of the first stage.

The financial soundness evaluation shall show that the first stage proposals will produce revenues sufficient to cover all fixed charges, amortization, maintenance, and operating costs, and produce a return on investment of not less than six percent, in this connection "investment" shall be exclusive of necessary and available central Government and external non-refundable grants.

In making his financial evaluation, the CONSULTANT shall:

- a. Develop a financing plan, covering sources of local and foreign currency capital and revenues, in consultation with relevant agencies and officials, for the first stage works.
- b. Prepare projections extending ten years beyond the first year of operation or last year of construction (whichever is the later) of the proposed first stage works, of income statement, balance sheet and cash flow, taking into account ongoing sewerage activities by GOSSD in the PROJECT Area.
- c. Discuss ability and willingness to pay those who will be required to support the proposed revenue charges.
- d. Indicate in broad terms likely trends of unit costs, and annual rate of return prices through the remainder of the program beyond the projections under (b).
- e. Prepare a foreign currency annual investment projection through the construction and start up period, separating out the detailed design and construction of the proposed separate elements of the first stage.

3.12 Design - Construction Management Phase

As described in Section 3.7.1 the Immediate Phase of Development will, in general, comprise extension, improvements, and enlargements to the sewage collection conveyance, and treatment, and disposal systems to accommodate part of the growth forecast for 1985. Upon selection of the Immediate Phase Projects in consultation with GOSSD and having received approval by GOSSD, the CONSULTANT shall proceed immediately to establish schedules of the projected design work, expenditures in relation to the design, construction and start up of the Immediate Phase Facilities, separating them into convenient sized "packages" to facilitate implementation. This phase of the work shall include the supervision, coordination and management of final engineering designs, construction plans and documents, detailed cost estimates and construction furnished by other engineering and construction contractors. Therefore, the CONSULTANT shall provide as part of the SERVICES, overall management of the design and construction work of the Immediate Phase Projects. The program shall be such that the construction of each individual item of work shall be started as soon as possible without sacrificing quality and economics of the completed works. The CONSULTANT shall monitor and coordinate the work to see that it meets previously established criteria and schedules and shall include:

3.12.1 Design:

The CONSULTANT will prepare notices for prequalification of engineers to design the new works and will assist in their short-listing. The CONSULTANT shall prepare Terms of Reference to solicit proposals for design and construction supervision services from previously prequalified firms, and shall assist in the evaluation of the proposals with GOSSD and provide technical advice to GOSSD during contract negotiations with selected firms.

The CONSULTANT shall conduct periodic reviews of the design engineering contractors' work at a frequency and in detail sufficient to insure the final product of design and tender documents is in conformance with their contracts.

The CONSULTANT shall provide liaison between the engineering design contractors and GOSSD.

The CONSULTANT shall monitor and review the progress of the design contractors in order to insure timely completion of the various contracts.

The CONSULTANT shall conduct a detailed final review of all drawings and tender documents.

The CONSULTANT shall assist GOSSD to negotiate and implement all change orders resulting from changes in scope or concept during the design work.

3.12.2 Construction:

The CONSULTANT shall assist GOSSD in obtaining responsive tenders for the work designed by the engineering design contractors. This will include but not necessarily be limited to: preparation of advertisements, prequalifications of contractors, evaluation of tenders, recommendations for award and assistance during final contract negotiations.

The CONSULTANT will assist GOSSD in the negotiation of contracts with engineering design contractors to provide services during construction such as shop drawing review, answering tenderers' technical questions, resident engineering, preparation of as-built drawings, preparation of operation and maintenance manuals, and services during facility start up.

The CONSULTANT will monitor all construction contracts for maintenance of time schedule, overall quality control, overall cost controls and general conformance with plans and specifications. The efforts furnished herein will be general and complementary to the SERVICES provided by the engineering design contractors (e.g. resident engineering).

The CONSULTANT will review progress payment requests prepared by each engineering design contractor both for the construction contractors under his supervision and himself. Recommendations for action on these will be provided to GOSSD.

The CONSULTANT will make final inspections of the completed works prior to final acceptance by GOSSD. Any shortcomings found in those inspections will be reported to GOSSD and the engineering contractor.

The CONSULTANT will participate in an advisory role during start up of the individual facilities. The major role in start up will be by the respective engineering design contractor.

The CONSULTANT will perform all other services necessary to assist GOSSD to bring the new works from the study phase through operations.

3.12.3 Manpower:

For the Design-Construction Management Phase, Proposers are to indicate names, qualifications, and durations of individual expatriate and other key assignments in accordance with manpower estimates prepared by GOSSD as follows:

PROFESSIONAL AND TECHNICAL MANMONTHS

	<u>Foreign</u>	<u>Egyptian</u>
Schedules and Reports:		
Scheduling and Budgeting	6	4
Project Progress Reports	15	15
Financial Reporting on Project	<u>15</u>	<u>15</u>
Subtotal	36	34
Design:		
Prequalification and Selection Including T.O. R. Preparation	5	2
Management of Engineering Contractors	36	10
Final Reviews	8	8
Technical Management and Home Office Support	<u>10</u>	<u>3</u>
Subtotal	59	23

	<u>Foreign</u>	<u>Egyptian</u>
Construction:		
Prequalification and Selection of Supervision Contracts	5	5
Management and Inspections During Construction	100	72
Final Inspection and Start Up	24	20
Review of Operation and Maintenance Manuals	4	4
Technical Management and Home Office Support	<u>22</u>	<u>10</u>
Subtotal	155	111
TOTAL, Design-Construction Management Phase	250	168

3.13 Commodities

The Proposer shall list all special testing equipment, laboratory equipment, and other items which he considers necessary to import for the performance of the SERVICES. Equipment which shall be turned over to GOSSD should be so noted.

4. REPORTS AND PRESENTATIONS

4. REPORTS AND PRESENTATIONS

4.1 General

Due to the highly complex nature of the SERVICES, and the need for continual exchange of efforts, data, and concepts between the four phases of the SERVICES, an efficient system of communication will be mandatory. Furthermore, in order to allow for the maximum amount of cooperation and assistance by GOSSD, it will be necessary to maintain close and clear communication throughout the life of the SERVICES.

This section gives the minimum requirements necessary to achieve those ends. The CONSULTANT will be allowed to recommend additional steps beyond those presented herein.

4.2 Monthly Reports

The CONSULTANT shall submit monthly narrative reports, with exhibits as appropriate which shall include the following:

- 4.2.1 Personnel arrivals, departures, and end-of-month strength broken down into U.S., third country national, and Egyptian categories (separately for direct hire and counterpart).
- 4.2.2 Major conferences, submissions, approvals, decisions and events.
- 4.2.3 Major problem areas, current or foreseen, together with recommendations for their solution.
- 4.2.4 Progress accomplished versus progress scheduled (curve or bar chart form), with narrative comments regarding any significant slippage.
- 4.2.5 Anticipated services for the month.

The publication entitled, "Preparation of Monthly and Final Job Reports for Capital Projects, Construction, and Related Engineering", by USAID, Revised Guidelines No. 2, dated June 1966, shall be followed in preparing all monthly and PROJECT status reports.

Reports will be due on the tenth working day of each calendar month following the calendar month reported. Fifteen copies of each report shall be submitted to the Chairman of the GOSSD with concurrent information copies to USAID (five copies).

To insure close coordination between the CONSULTANT, the GOSSD, and USAID, during the course of the work, and to expedite the review of all drafts

plans and reports, it is recommended that the CONSULTANT'S monthly narrative reports through Phases A, B, and C include technical memoranda describing the work to date and/or preliminary drawings of options under consideration. Quantitative results insofar as improving the operation of the existing system, in assessing current progress of the rehabilitation work. In describing his approach to the SERVICES, the CONSULTANT should indicate in his proposed work program and schedule the extent to which technical memoranda will be included in monthly submittals.

4.3 PROJECT Progress Reports

Bi-monthly Progress Reports on design and construction progress prepared by the individual engineering design consultants shall be coordinated and compiled by the CONSULTANT. Incorporated with Project Financial Progress Reports to be prepared by the CONSULTANT, these shall be presented on the 15th calendar day following the end of the bi-monthly period reported on. These reports shall be prepared throughout the Design-Construction Management Phase of the SERVICES. These Project Progress Reports shall be separate from the CONSULTANT'S Monthly Report.

4.4 Preliminary and Special Reports

4.4.1 Rehabilitation Phase:

- Special Report No. 1 - As builts of major facilities
- Special Report No. 2 - Interim operation manual
- Special Report No. 3 - System capacity after improvements

4.4.2 Training Phase:

- Special Report No. 4 - Gauging results and sewage characteristics (6 months)
- Special Report No. 5 - Treatment process pilot plant and river study results (12 months)
- Special Report No. 6 - Operation and maintenance training manuals
- Special Report No. 7 - Certification and personnel development

4.4.3 Planning Review Phase:

- Special Report No. 8 - Preliminary recommended scheme and basic data (6 months)
- Special Report No. 9 - Immediate Phase of Development Part I, (6 months)
- Special Report No. 10 - Staged Development of Cairo's Wastewater Facilities, Part II (12 months)

4.4.4 Design Control Mgmt Phase

Special Report No. 11 -
Special Report No. 12 -
Special Report No. 13 -
Special Report No. 14 -

All special reports shall be furnished at the times indicated on the CPM included in the work plan, in the CONSULTANT'S Proposal. Twenty-five copies shall be furnished to the GOSSD and five information copies to USAID.

4.5 Draft Reports and Final Reports

A final report will be prepared for each of the four phases of the SERVICES.

The final report for the Rehabilitation Phase will include the material presented in the special reports and an overall summary of the work performed under this phase.

The final report for the Training Phase will summarize the programs developed and the data gained therefrom.

The master planning and feasibility study aspects will be incorporated in the final report for the Review-Study Phase. The report will summarize the studies made, justification for the proposed expansion program, and first stage proposals. Duplication of data already presented in the Taylor-Binnie report should be avoided.

The final report for the Design-Construction Management Phase will summarize briefly the technical, management, and cost aspects of the design, construction, and start up of the new works.

Each final report will include a summary in Arabic.

The final reports for the first two phases, Rehabilitation and Training, and Design-Construction Management shall be submitted in finished form, without prior draft submissions. Fifty copies of each shall be furnished to GOSSD and ten copies to USAID.

A draft version of the final report for the Planning Phase shall be submitted for review and comment. At the time of submission, a formal presentation by the CONSULTANT of his conclusions and recommendations will be made to GOSSD and, if required by GOSSD, to other parties. GOSSD will provide its comments and any discussion based on the draft within one month of submission of the draft.

Fifty copies of both the draft version and of the finished report will be furnished to GOSSD and ten of each to USAID.

4.6 Construction and Procurement Documents

Plans and specifications necessary for improvements under the Rehabilitation Phase (except for improvements to sewers) will be prepared so as to show all necessary details to enable the work to be tendered and constructed without the need for supplementary design drawings. The level of detail shall be in conformance with the CONSULTANT'S normal practice and shall be suitable for both Egyptian and international tenders. Where material and equipment must be obtained by importation from foreign sources, separate contract documents shall be prepared, one or more for the purchase of foreign items and one or more for work to be performed in Egypt. All purchase procedures for foreign materials and equipment must be in accordance with USAID regulations.

In some instances the modification work will be of such a nature as to allow installation by GOSSD staff. Drawings prepared for this purpose shall be comparable in detail to those prepared for tendering.

4.7 Reviews

The proposers shall indicate reviews in their work plans, whether internal or by GOSSD, for all key milestones within the SERVICES. In addition a steering committee comprised of members of GOSSD, the CONSULTANT, and USAID will meet weekly to review the progress of the SERVICES.

It is expected that the Resident Project Manager of the CONSULTANT will attend the meetings and when unable to attend will delegate another senior staff member to act in his stead. When appropriate or necessary certain other key members of the CONSULTANT'S staff will be required to attend in addition to the Resident Project Manager.

4.8 Language of Reports and Construction Documents

All reports will be in the English language except as noted otherwise below. As indicated elsewhere, interim operational manuals for the major existing facilities will be dual language (English-Arabic).

A summary in Arabic will be included at the beginning of each final report for all four phases of the SERVICES.

Construction plans for local tender shall be in English with key notes in Arabic. Arabic translations of the specifications and tender documents shall be prepared in addition to English for local tender contracts.

Construction plans and documents for international tendering shall be only in English.

Drawings for modifications to be done by GOSSD staff will be in Arabic with key notes in English.

5. INSTRUCTIONS TO PROPOSERS

5. INSTRUCTION TO PROPOSERS

5.1 Proposal Presentation

Proposers are required to submit a single, combined proposal for all four phases of the SERVICES. The Proposals should be responsive to the particular requirements of the Terms of Reference, and should be presented in 6 copies (plus 2 information copies to USAID) by noon on August 1, 1978.

5.2 Egyptian Subcontractor

It is the desire of GOSSD that the firm selected for these SERVICES obtain the services of an Egyptian engineering subcontractor(s) to more effectively and efficiently pursue the work. Therefore, each proposal should identify the Egyptian subcontractor(s) and fully describe its role in the work. There will be no objection to an Egyptian subcontractor being named in the proposal of more than one Proposer. The qualifications of personnel proposed from an Egyptian subcontractor(s) will be evaluated on the same basis as those of the U.S. Proposer.

5.3 Proposal Preparation

5.3.1 Schedule and Term of Work. It is expected that all SERVICES required in the Scope of Work will be completed within eighteen months after the CONSULTANT starts his work, except for those under phase four (Design-Construction Management). Recognition should be taken of the urgency of the first phase of the PROJECT. Figure 5.2 indicates key milestones to be maintained for the SERVICES. 5.1

5.3.2 Visit to the PROJECT site by the Proposers. Prior to delivery of his proposal, each proposer should have familiarized himself with the local conditions which may have any bearing on his proposal. Proposers shall also inform themselves of the data and reports available at GOSSD.

5.3.3 Preproposal briefing. To assist the Proposer in 5.3.2 above, a three day meeting (including site visits) will begin on June 26 1978 at 10:00 a.m., in the office of GOSSD, address:

General Organization for Sewerage & Sanitary Drainage
Mogamaa Building, 6th floor
Midan El Tahrir
Cairo, A.R.E.

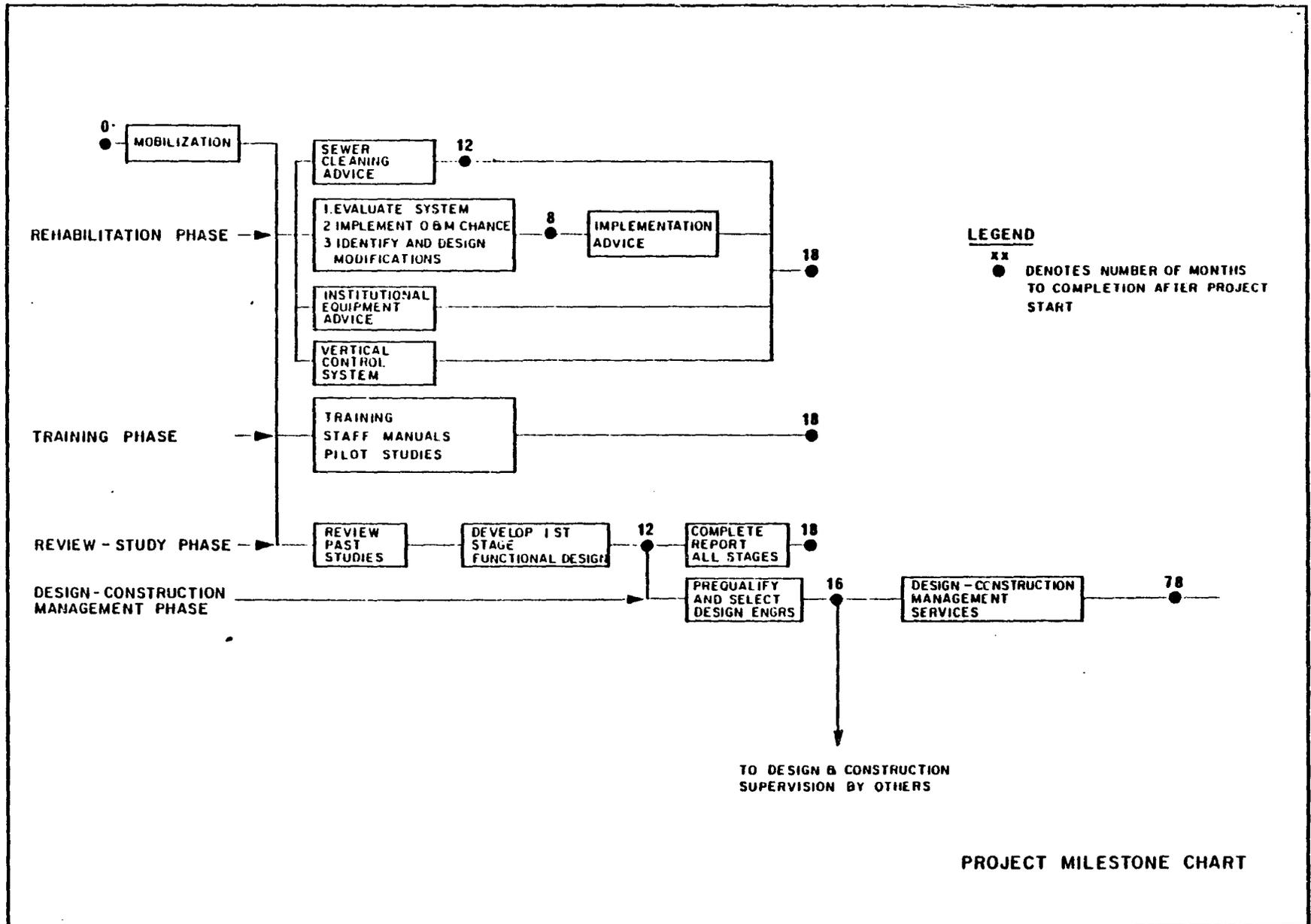


FIGURE 5.1

Proposers will have the opportunity to raise questions with respect to this invitation. At the same time, Proposers will be given additional background information and a tour of the major elements of the system which will be useful for the preparation of the requested proposals. It is recommended that all invited firms attend these meetings.

- 5.3.4 Expenses. All costs and expenses which are incurred to prepare Proposals, inclusive of the costs to visit Cairo and attend the briefing, will be borne fully by the Proposer.

5.4 Form of Proposal

Technical proposals shall be based upon the SERVICES to be provided as outlined in these Terms of Reference. The Proposer shall prepare his proposal using the format, headings, and sub-heading as described below. However, this is only a minimum requirement; the Proposer may add other headings, sub-headings, or items within the given framework, as necessary to convey his proposal in the manner deemed most satisfactory to himself.

- 5.4.1 Project Overview: In this section the Proposer shall demonstrate his understanding of the PROJECT and of the SERVICES to be provided. The Proposer shall also furnish brief statements regarding the following:
- a. Actions taken by the Proposer to familiarize himself with the PROJECT and the PROJECT Area for all phases particularly those beyond the organized preproposal site visits and meetings conducted by GCSSD.
 - b. The Proposer's views of the Terms of Reference, their adequacy and any suggested modifications of the Terms of Reference to better realize the objectives and improve the effectiveness of the SERVICES.
 - c. Other important aspects of the SERVICES that the Proposer deems as requiring elaboration or special emphasis.
- 5.4.2 Work Program: The technical proposal should set out in detail the Proposer's approach to the SERVICES in the form of a proposed work Program.

The Work Program shall include a breakdown of the work into tasks and sub-tasks. A brief narrative description of each task, the sequencing and interrelation of these tasks, and the manner of undertaking the tasks, including whether in Egypt or abroad, shall be presented.

The degree of detail provided in the Work Program should be sufficient to show at least the following:

- a. Gathering and evaluation of engineering data including field work;
- b. Review of current system conditions and operations;
- c. Review of recent studies including the Taylor-Binnie report and results of the current pilot rehabilitation program;
- d. Work elements required for the major items comprising the Rehabilitation Phase;
- e. Work elements required for establishment of a training program including wastewater pilot studies;
- f. Activities involved in the review of the Taylor-Binnie recommendations, and alternatives and development of a recommended program including environmental impact evaluation and economic and financial feasibility evaluation;
- g. Elements of the Design-Construction Phase of the SERVICES on the assumption of a 42-month first stage construction period;
- h. Preparation of the necessary reports and other documents;
- i. Technical management of the SERVICES and provision of home office support.

Proposers' intended work programs and schedules should show the relationship between the various work elements, the probable critical path, and resulting milestones. Particular attention should be taken in planning the program to allow for maximum exchange of information between the three initial Phases of the SERVICES (Rehabilitation, Training, Review-Study). Personnel assignments and manpower estimates should be clearly related to the work elements.

The proposed time schedule for the tasks and sub-tasks shall be presented in bar chart form, showing individual start and completion dates, as related to the starting date for the SERVICES. The four Phases of the SERVICES shall be clearly identifiable. The times of presentation of all reports and other documents shall be shown.

- 5.4.3 Organization and Manpower: The Proposer shall include the following items in the Organization and Manpower section of his proposal:

- a. Organization of the SERVICES, Organization Chart, and description of proposed division of major responsibilities, channels of command and communication, etc.
- b. Task Duration and Manpower Estimates.
- c. Personnel Assignment and Utilization Schedules.
- d. Names and curricula vitae of all key and expatriate foreign personnel to be assigned to the SERVICES, with particular reference to experience on similar past projects and to relevant technical qualifications, such as membership of the American Academy of Environmental Engineers.

These items are further described in detail below. Where convenient, more than one item of information may be combined in a single format. This also applies to the bar chart described in the previous section.

5.5 Organization of the SERVICES

As used in these Terms of Reference, the terms "Firm" and "CONSULTANT" are to be regarded as synonymous, and shall refer to the professional organization selected to perform the work. The CONSULTANT may be a single firm, a consortium of two or more firms acting jointly, or a single firm or a group of firms associated with other consultants or other professional entities acting as sub-contractors.

Proposals combining two or more consultants or firms must describe their proposed working relationship and allocation of responsibilities. Past associations among firms shown in the proposal should be indicated. However, it will not be necessary for the Proposer to include in the proposal proof of any formal association between the invited firm and its associated consultant(s). Notwithstanding, all firms or individual consultants comprising a joint venture will be required to assume all PROJECT responsibilities jointly and severally and show proof of formal relationship prior to the contract signing.

Although the design of the first stage facilities is not included in the SERVICES, Proposers shall demonstrate experience in design of such works as may be included in that stage.

The Proposer shall present a detailed organizational chart indicating the relation among all professional and key technical personnel, both foreign and Egyptian. Proposals combining more than one firm shall provide a clear description of the working interrelationships expected between the personnel from various firms or members of the consortium, and how an integrated team will be formed.

The organization chart shall clearly identify the Resident Project Manager, who shall be the staff member stationed in Egypt who will have direct responsibility for the work being performed in Egypt.

5.5.1 Task Duration and Manpower Estimates: The Proposer shall present a Task Duration and Manpower Estimation Schedule by Task and Duration, in matrix form. This Schedule shall indicate the individual and total professional level and key technical staff inputs, both foreign and Egyptian, contemplated for the PROJECT.

This Schedule will depict the man-month input by categories of personnel allocated by the tasks and sub-tasks shown in the Work Program. It shall also show the task durations.

The Personnel Utilization Schedule shall indicate man-month allocations of work to be performed in the CONSULTANT's home country and in Egypt. Egyptian professional and sub-professional manpower shall be included in such a manner that these inputs are readily identified.

The total number of man-months for other technical (non-professional) personnel shall be shown, divided into such categories as draftsmen, laboratory/office technicians, surveyors, survey and other field technicians, etc. Manpower requirements for non-technical personnel such as clerks, typists, drivers, laborers, etc., should be included.

5.5.2 Personnel Assignment and Utilization Schedules: The Proposer shall present a Personnel Assignment Schedule in bar chart form which will list all foreign and key Egyptian professional and technical personnel to be assigned to the PROJECT. Home Office PROJECT direction and professional level technical support shall be included. The Personnel Utilization Schedule shall include for each staff member:

- a. title of the position to be filled;
- b. name;
- c. firm;
- d. location of assignment;
- e. approximate start and finish of assignment, for personnel;
- f. man-months, by individual and totalled, in the following four categories: foreigners outside Egypt, foreigners in Egypt, Egyptian professional, and Egyptian technical (including draftsmen, surveyors and technicians).

Associated with the Personnel Assignment Schedule shall be a list showing the present assignment, location, and date of availability of all personnel to be assigned full time in Egypt.

The Proposer shall present a Personnel Utilization Schedule showing in matrix form the time to be spent, by each key professional and technical person to be assigned, by the tasks and sub-tasks identified in the Work Program.

The Proposer shall indicate in the Personnel Utilization Schedule any work to be sub-contracted.

The Proposer shall identify the resident expatriate who will be given full authority to direct all PROJECT personnel and to represent all constituent firms on PROJECT matters.

- 5.5.3 Curricula Vitae: Detailed resumes or personal experience records of all key professional, expatriate, and technical staff member shall be included. These resumes shall indicate name, nationality, education, professional qualifications (including AAEE diplomates), specialization, number of years with the firm, work record, and in particular, overseas experience that is relevant to the work he is expected to perform on this PROJECT. The resumes shall show the year of commencement and completion of each discrete employment period and include the individual's job title, firm, level of responsibility, and location of employment.

A resume or other appropriate document shall be furnished for each special individual CONSULTANT to be assigned to the PROJECT.

No employee of the Egyptian Government or any units of local government may be nominated, unless he has a signed release from his organization or if his employing organization will be involved in the review, approval, or execution of any element of this PROJECT.

5.6 Submittal of Proposals

It shall be the responsibility of the Proposer to ensure that six copies each of his technical and manpower proposals are delivered to the GOSSD not later than noon of August 1 1973. Proposals shall be addressed to GOSSD as specified below.

Eng. A.M.- Ashmawy, Chairman
General Organization for Sewerage and Sanitary Drainage
Mogaama Building, 6th Floor
Midan El Tahrir
Cairo, A.R.E.

Two additional copies of each proposal shall be transmitted to:

Mr. Jack R. Snead
USAID/CDE
c/o American Embassy
5 Latin America Street
Garden City
Cairo, A.R.E.

6. IMPLEMENTATION PROCEDURE

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6. IMPLEMENTATION PROCEDURE

5.1 Time of Implementation

GOSSD desires to initiate the work at the earliest possible date.

6.2 Evaluation of Proposals

Evaluation of the proposals leading to selection of the CONSULTANT will be by a committee of key members of the GOSSD. USAID will review and approve the results of the selection committee. The CONSULTANT will be selected solely on the basis of the following criteria:

- 6.2.1 Responsiveness of the proposal to the Terms of Reference.
- 6.2.2 Experience of the firm and successful completion of similar past projects.
- 6.2.3 Understanding of the PROJECT and adequacy of proposed work plan.
- 6.2.4 Experience of personnel to be assigned.
- 6.2.5 Adequacy to undertake the PROJECT considering current workload.

GOSSD'S evaluation of proposals and selection of the CONSULTANT shall be final and not subject to further appeal or discussion. In submitting technical proposals as outlined under these Terms of Reference, the proposer acknowledges GOSSD'S right to select the proposal that best satisfies its requirements, and waives any claim against GOSSD and/or their representatives with respect to any decision in connection with his proposal. GOSSD and USAID reserve the right to reject any or all proposals.

It is anticipated that evaluation will be completed within six weeks from the required submittal date of proposals. In completion of the evaluation, the proposing firms will be ranked in order of evaluated capability to perform the SERVICES described herein.

6.3 Conformance with USAID Procedures

Reference is made to Section 1.4, "General Conditions", of this Terms of Reference.

6.4 Negotiations

Upon approval by USAID of the selected order of proposals established by GOSSD, negotiations will be started between the top ranked proposer and

GOSSD to discuss the details of his proposal, and establish the fee and other terms and conditions pertinent to the form and manner for the execution of the work. If it is not possible to reach agreement with the top ranked Proposer, negotiations will be terminated before starting negotiations with the next ranked Proposer. This procedure will be repeated down the list until agreement is reached. All negotiations will take place in Cairo. The type of contract negotiated will be cost plus fixed fee (CPFF).

Following negotiations, the draft contract will be submitted, with supporting information, to USAID for approval. The final executed contract will be submitted to USAID for approval prior to issuance, by GOSSD, of Notice to Proceed.

The CONSULTANT shall start work with a core staff stationed in Egypt within one month of issuance of Notice to Proceed.



BRITISH EMBASSY

CAIRO

His Excellency
 Engineer Ahmed Talaat Tewfik
 Minister of Housing
 1 Ismail Abaza Street
 CAIRO

1 September 1953

Your Excellency,

CAIRO SEWERAGE

I am writing to confirm that as mentioned at the World Bank Consultative Group Meeting in Paris in June the British Government is prepared to allocate up to £50 million as a contribution towards the cost of the rehabilitation and expansion of the Cairo Sewerage System.

The new British policies on capital aid, announced by the Minister of Overseas Development on 31 July, mean that this funding will now be a grant, requiring no interest or repayment. It will be tied to the provision of British goods and services in the usual way. We believe that British firms have the necessary expertise to make a useful contribution to this project. The provision of this grant aid will of course be subject to a satisfactory agreement being reached between the Government of Egypt and the British Government on the project terms of reference and the establishment of priorities for its phased execution.

You will recall that during the meeting in your office on 2 August attended by Mr Rowley, Head of the Middle East Development Division of the United Kingdom Ministry of Overseas Development, it was suggested that the best way forward to provide for the satisfactory implementation of the whole of the extensive Cairo Sewerage Project would be for the initial planning and design phases to be undertaken in co-operation by the relevant authorities of the Egyptian Government, the British Government and USAID, bearing in mind the desirability of subsequent participation by other external financing agencies, particularly Arab aid agencies.

The British Government have now confirmed to me that they are happy to proceed on this basis and I would like to suggest that a tripartite meeting as envisaged at the meeting on 2 August, involving your Ministry, officials of USAID and officials from our Middle East Development Division should be organised during the period 11-14 September, at which time Mr Rowley and his associates would be happy to come to Cairo.

I am sending copies of this letter to His Excellency the Minister of Economy, His Excellency the Governor of Cairo, and to Engineer Ashmawy, Chairman of JCSSE.

Your sincerely,

Richard B. ...
 R. B. ...
 Director
 Cairo Affairs

EGYPTIAN LAW No. 93/1962 - CHAPTER 4

QUALITY STANDARDS FOR WASTEWATER DISPOSAL

A. Standards for the Discharge of Liquid Wastes to Public
Sewerage

The following specifications and conditions must be fulfilled for liquid wastes discharging from public, industrial and commercial establishments:

1. The temperature may not exceed 40°C.
2. The pH must not be less than 6 and not more than 10.
3. Settleable solids may not exceed 5 cm³/l in 10 minutes or 10 cm³/l in 30 minutes.
4. Discharges must not contain particles with a diameter more than 1.5 cm.
5. Hydrogen sulphide (as S) may not exceed 1 mg/l.
6. Grease and oil may not exceed 100 mg/l.
7. Discharges must not contain toxic substances that may affect fishes or any other living being.
8. Discharges must not contain materials producing inflammable gases that can ignite at 35°C or less.

B. Standards for Wastewater Disposal into Waterways

1. Waterways are divided into three classes:

Class A. Water streams mentioned in Items 1 and 3, Article 10 of Law No. 93/1962. This class is termed RIVER NILE AND ITS BRANCHES.

Class B. Water streams mentioned in Items 4 and 5, Article 10 of Law No. 93/1962. This class refers to MAINLAND CANALS.

Class C. This class covers the DM and LARCs.

2. Waste Waters are classified as follows:
Category A. This includes wastewater from public, commercial and industrial establishments. The appropriate waste standards are applied to this category.
Category B. This includes wastewater from sewerage systems. The domestic sewage standards are applied to this category.

In case of discharge of both categories the specification for Industrial Wastewater (Category B) as set out in Item 4 below shall apply.

3. Disposal of wastewater into the River Nile and its branches:

1. Industrial Wastewater

Industrial wastewaters discharged in to the River Nile and its branches must comply with the following specifications:

1. Biochemical oxygen demand (BOD) not more than 50 mg/l.
2. Chemical oxygen demand (COD) not more than 15 mg/l.
3. Suspended solids (SS) not more than 30 mg/l.
4. pH value not less than 6 and not more than 9.
5. Sulphide (as S) not more than 1 mg/l.
6. Cyanides not more than 0.1 mg/l.
7. Oils and fats not more than 10 mg/l.
8. Temperature not more than 35°C.
9. Wastewater must not include any materials which may harmfully affect fish or other aquatic life or which may degrade or affect the quality of water for drinking and other domestic purposes.

II. Domestic Sewage

It is forbidden to discharge sewage effluents into the River Nile or its branches.

4. Disposal of wastewater into drainage canals.

I. Industrial wastewater

Industrial wastewaters discharged into drainage canals must comply with the following specifications:

1. Biochemical oxygen demand (BOD) not more than 60 mg/l.
2. Chemical oxygen demand (COD) not more than 40 mg/l.
3. Suspended solids (S S) not more than 30 mg/l.
4. pH value not less than 6 and not more than 9.
5. Sulphides (as S) not more than 1 mg/l.
6. Cyanides not more than 0.1 mg/l.
7. Oils and fats not more than 10 mg/l.
8. Phenol not more than 0.1 mg/l.
9. Chlorine (free) not more than 1 mg/l.
10. The elements chromium, arsenic, silver, copper, mercury, cadmium, barium, selenium, lead and nickel, alone or together, not more than 1 mg/l.
11. Dissolved solids not more than 5000 mg/l.
12. Temperature not more than 35°C.
13. Color (based on clarity after settling for one hour) not more than 10 cm.
14. Should not include any traces of insecticides or radioactive materials.

II. Domestic Sewage

In case of discharge to canals the following specifications and conditions must be fulfilled:

1. BOD not more than 40 mg/l.
2. COD not more than 80 mg/l.
3. Suspended solids not more than 90 mg/l.

The sewage effluent must be purified with chlorine before discharge. After twenty minutes the residual chlorine must be not less than 0.5 mg/l.

5. Disposal of wastewater into the sea and lakes;

It is permitted to discharge all kinds of wastewaters into the sea and lakes if they do not contain any matter which may harmfully affect the beaches, navigation establishments, fish and other aquatic life.

6. Cooling Water:

It is only permitted to discharge industrial cooling water withdrawn from the same water stream or another stream of the same quality. Discharged cooling water must be used in a closed circuit inside the processing operation without any contact with the wastewater from the process itself. In this case wastewater standards specified in Items 3 and 4 do not apply except for the maximum limits on temperature and amount of oil and fat.

C. Standards for Disposal of Wastewater by Irrigation of Agricultural Land.

1. Wastewater is divided into three categories:

First Category: includes wastewater from the public sewerage system including all governmental districts (central or local) and public establishments owned by the Government. Quality standards in Items 3 and 4 apply to this category.

second category: includes wastewater from private sewerage systems which are not dependent on governmental discharges or public establishments. Standards in Item 5 apply to this category.

Third Category: includes industrial wastes. Quality standards in Items 3 and 4 apply to this category.

2. Soils are classified into two types:

First type: sandy soils

Second type: clay soils

2. It is prohibited to discharge wastewater from public

sewerage, or industrial wastewater, onto sandy land unless the following standards and conditions are met:

1. Settleable solids not more than 1 cm³/l (by volume) in one hour.

2. Grease, oil and resinous substances not more than 20 mg/l.

3. Sulphides (as S) not more than 1 mg/l or not more than 10 mg/l if discharge is more than 3 km from populated areas.

4. Percolation rate for the soil should be rapid enough so as not to allow the formation of ponds.

4. It is prohibited to discharge wastewater from public sewerage, or industrial wastes, onto clay land unless the following standards and conditions are met:

1. pH not less than 6 and not more than 9.

2. BOD not more than 80 mg/l.

3. COD not more than 50 mg/l.

4. Suspended solids not more than 80 mg/l.
 5. Sulphides (as S) not more than 0.1 mg/l.
 6. Grease, oils and resinous substances not more than 5 mg/l.
 7. Soluble salts not more than 2000 mg/l.
 8. Cyanides not more than 0.1 mg/l.
 9. Percolation rate for the soil should be rapid enough so as not to allow the formation of ponds.
5. It is prohibited to dispose of wastewater from private sewerage systems by means of surface discharge or land irrigation unless authorization is obtained from the health department responsible for the district, and the wastewater must comply with the standards and conditions for discharge to drainage canals. In this case the condition requiring treatment with chlorine may be disregarded.
- i. It is forbidden to cultivate vegetables, fruit or any plant which can be eaten raw, on land irrigated with sewage effluent. Also it is forbidden to breed cattle, or animals whose products such as milk can be consumed, on land irrigated with sewage effluent.

USAID/CAIRO, EGYPT
THRESHOLD DECISION BASED ON
INITIAL ENVIRONMENTAL EXAMINATION

Project Location: Cairo, Egypt

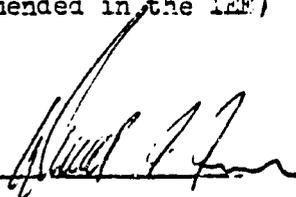
Project Title: Cairo Sewage System (No. 263-0091)

Funding (Fiscal Year and Amount): FY 78, \$25.0 Million

IEE Prepared By: Philip S. Lewis Date: 1/25/78

Environmental Action Recommended: Environmental Assessment

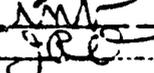
Mission Decision:
(Approval/Disapproval of Environmental Action Recommended in the IEE)

Approved : 

Disapproved : _____

Date : 1/31/78

Clearances:

FRSnead Environmental Coordinator:  Date 1/30/78
NBakley Other Mission Offices:  Date 1/31/78

INITIAL ENVIRONMENT EXAMINATION
NARRATIVE DISCUSSION

1. Project Location: Cairo, Egypt
2. Project Title: Cairo Sewage System (No. 263-0091)
3. Funding (Fiscal Year and Amount): FY 78, \$25.0 Million
4. IEE Prepared By: Philip S. Lewis Date: 1/25/78
5. Action Recommended: Environmental Assessment
6. Discussion of Major Environmental Relationships of Project Relevant to Attached Impact Identification and Evaluation Form:

This project will consist of the design and construction of expansions and improvements of Cairo's sewage collection, treatment and disposal system. Project will also include repair and rehabilitation of certain sections of the system which have been long neglected. The usual environmental factors associated with civil construction work, i.e., fugitive dust, noise, traffic disruption, etc., will be exacerbated by the dense urban conditions in Cairo and, therefore, will require greater efforts toward minimization. Other significant environmental concerns include: possible pollution of agricultural lands, Nile River water and/or groundwater by disposal of sanitary sewage effluents, industrial wastes and solid wastes; air pollution by waste incineration; and cross leakage between water and sewer systems under concurrent rehabilitation. The Environmental Assessment shall be prepared concomitant with project identification and study, and alternative methods reviewed relative to minimizing possible detrimental environmental factors by the feasibility consultant.

IMPACT IDENTIFICATION AND EVALUATION FORM

<u>Impact Areas and Sub-areas</u>	<u>Impact Identification and Evaluation/</u>
A. <u>LAND USE</u>	
1. Changing the character of the land through:	
a. Increasing the population	_____ N _____
b. Extracting natural resources	_____ N _____
c. Land clearing	_____ N _____
d. Changing soil character	_____ L _____
2. Altering natural defenses	_____ N _____
3. Foreclosing important uses	_____ L _____
4. Jeopardizing man or his works	_____ N _____
5. Other factors	
_____	_____
_____	_____
B. <u>WATER QUALITY</u>	
1. Physical state of water	_____ L _____
2. Chemical and biological states	_____ M _____
3. Ecological balance	_____ L _____
4. Other factors	
_____	_____
_____	_____

- 1/N--- No environmental impact
- L - Little environmental impact
- M - Moderate environmental impact
- H - High environmental impact
- U - Unknown environmental impact

IMPACT IDENTIFICATION AND EVALUATION FORM

C. ATMOSPHERIC

- | | |
|--------------------|----------|
| 1. Air additives | <u>L</u> |
| 2. Air pollution | <u>M</u> |
| 3. Noise pollution | <u>L</u> |
| 4. Other factors | |
| _____ | _____ |
| _____ | _____ |

D. NATURAL RESOURCES

- | | |
|--|----------|
| 1. Diversion, altered use of water | <u>N</u> |
| 2. Irreversible, inefficient commitments | <u>N</u> |
| 3. Other factors | |
| _____ | _____ |
| _____ | _____ |

E. CULTURAL

- | | |
|------------------------------------|----------|
| 1. Altering physical symbols | <u>N</u> |
| 2. Dilution of cultural traditions | <u>N</u> |
| 3. Other factors | |
| _____ | _____ |
| _____ | _____ |

F. SOCIOECONOMIC

- | | |
|--|----------|
| 1. Changes in economic/employment patterns | <u>L</u> |
| 2. Changes in population | <u>L</u> |
| 3. Changes in cultural patterns | <u>N</u> |
| 4. Other factors | |
| _____ | _____ |
| _____ | _____ |

IMPACT IDENTIFICATION AND EVALUATION FORM

G. HEALTH

- | | |
|-------------------------------------|-----------------------------------|
| 1. Changing a natural environment | <u> L </u> |
| 2. Eliminating an ecosystem element | <u> N </u> |
| 3. Other factors | <u> </u> |
| <u> </u> | <u> </u> |
| <u> </u> | <u> </u> |

H. GENERAL

- | | |
|-----------------------------------|-----------------------------------|
| 1. International impacts | <u> N </u> |
| 2. Controversial impacts | <u> N </u> |
| 3. Other factors | <u> </u> |
| <u> </u> | <u> </u> |
| <u> </u> | <u> </u> |

I. OTHER POSSIBLE IMPACTS (not listed above)

<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

Prepared By: Philip S. Lewis *PLW* Date: 1/25/78

Project Location. Cairo, Egypt

Project Title : Cairo Sewage System (No. 263-0091)