PD-AAP-540

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: _____ — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: EGYPT

3. PROJECT NUMBER: 263-0173

4. BUREAU/OFFICE: Near East

5. PROJECT TITLE (maximum 40 characters): Cairo Sewerage II

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 31 YY 94

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4): A. Initial FY 84 B. Quarter 4 C. Final FY 88

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. Total	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. Total
AID Appropriated Total	80,300	80,000	160,300	350,000	350,000	700,000
(Grant)	(80,300)	(80,000)	(160,300)	(350,000)	(350,000)	(700,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country		3,000	3,000		495,000	495,000
Other Donor(s)	1,000		1,000	100,000		100,000
TOTALS	81,300	83,000	164,300	450,000	845,000	1,295,000

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	C. PRIMARY TECH. CODE 2. Loan	D. OBLIGATIONS TO DATE 1. Grant	D. OBLIGATIONS TO DATE 2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	E. AMOUNT APPROVED THIS ACTION 2. Loan	F. LIFE OF PROJECT 1. Grant	F. LIFE OF PROJECT 2. Loan
(1) ESF						$700,000		$700,000	
(2)									
(3)									
(4)									
TOTALS									

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODE

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code							
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

The project is to improve, expand and assure proper management of the wastewater collection and treatment systems on the Cairo West Bank. The project would provide the basis for access to adequate wastewater disposal for approximately 8 million people by the year 2020, in turn assuring them of the provision of a basic human need and a guarantee of improved health.

14. SCHEDULED EVALUATIONS: Interim MM 06 YY 86 / MM 06 YY 88 — Final MM 06 YY 94

15. SOURCE/ORIGIN OF GOODS AND SERVICES: ☒ 000 ☐ 941 ☐ Local ☐ Other (Specify): _____

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY — Signature: M. J. W. Stoup — Title: Director — Date Signed: MM 08 DD 15 YY 84

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1350-4 (8-79)

CAIRO SEWERAGE II

TABLE OF CONTENTS

List of Tables

List of Figures

Annexes

ABBREVIATIONS

ORGANIZATIONS

AMBRIC:	American British Consultants
BVI:	Black and Veatch International
CDM:	Camp, Dresser and McKee
C/GOSD:	Cairo/General Organization for Sanitary Drainage
CWO:	Cairo Wastewater Organization
GOE:	Government of Egypt
GOSSD	General Organization for Sewerage and Sanitary Drainage
ODA	Overseas Development Administration (formerly ODM)
USAID:	United States Agency for International Development

Technical:

cmd	cubic meters per day
mm	millimeter
m	meter
km	kilometer
km^2	square kilometer
kg	kilogram
l/s	liters per second
FX	Foreign Currency
LE	Egyptian Pounds

CAIRO SEWERAGE II

PROJECT PAPER

SUMMARY AND RECOMMENDATIONS

1.	Grantee	:	Government of the Arab Republic of Egypt.
2.	Beneficiary	:	The Population of Cairo particularly on the West Bank of the Nile
3.	Implementing Entity	:	The Organization for the Execution of the Greater Cairo Wastewater Project (CWO),
4.	Grant Amount	:	$700 million
5.	Terms	:	To GOE entire amount as a Grant. To CWO, $664 million amount as a loan.
6.	Project Description	:	The Project will finance: (1) Equipment and construction costs, foreign exchange and local currency for new culverts, pumps stations and sewers in the Giza, Pyramids and Northwest areas, and for support of a household connections program. (2) Supervisory construction services. (3) It will also provide for authorization of participation in the construction of Abu Rawash Treatment Plant with funding to be established by Amendment ($100 - $150 M).
7.	Purpose	:	Improve, expand and assure proper management of the wastewater collection and treatment system on the West Bank of Cairo
8.	Total Project Cost	:	Total project cost, both foreign exchange and Local currency is $1,400 Million. AID will finance foreign exchange and local currency costs, up to $700 million under this authorization.
9.	Environmental Considerations	:	Have been addressed in PP and 1982 Environmental Assessment.

10. Grant Application: The GOE has requested AID provide the additional foreign exchange and a portion of the local currency costs of this project. The application is attached as Annex A.

11. Recommendation : Authorize a $700 million Grant to the GOE under the terms and conditions set forth in the project authorization in Annex B.

12. USAID Project Committee:

F.Zobrist, OD/UAD
R.Cook, DRPS/UAD
F.Breen, CON
B.Barrington, LEG
P.Crowe, DPPE/PAAD
J.Pollock, DRPS/UAD

ID#0879D

I. INTRODUCTION

1.01 The continuing crisis in the supply of potable water and wastewater collection in Egypt in recent years has evoked a response in policy and funding allocations from both the Government of Egypt and United States Agency for International Development. The Government of Egypt's current Five Year Plan ranks the provision of water and sewerage services among the top priorities and calls for a total investment of over LE 3 billion in the sector. The 1983-1988 Near East Bureau Strategy outlines regional development priorities which rank intervention in the areas of urbanization, water scarcity and utilization, and population and complementary health activities - all of which have large water and wastewater components - at the very top (see Annex D Excerpts from NE Bureau Strategy). The culmination of this shared perception of the need for development of Egypt's ability to provide adequate water and sewerage services to its citizens was the signing of a Memorandum of Understanding in which USAID agreed to obligate $1.2 billion to the sector over a five year period, subject to resolution of several crucial issues. (See Annex A Memorandum of Understanding).

1.02 USAID has, to date, committed ($129 million) to the effort to improve the Cairo sewerage system. The decision to provide funding to this sector was predicated on the understanding that 1) the provision of sewage systems adequate to protect the public health is a basic prerequisite for development and 2) U.S. investment in the region would be such that a large-scale rehabilitation and expansion program would prove attractive in the long run to both USAID and the GOE.

1.03 Cairo Sewerage II is the continuation of Cairo Sewerage (Project No. 263-0091) authorized in 1978 and amended in 1981. The primary purpose of the original Cairo Sewerage Project was to rehabilitate the existing system in order to reduce flooding, to develop the necessary designs to expand the system on both the East and West Banks, to upgrade the technical and management capabilities of the organizations in charge of the construction and operation of the system and to develop a program for unsewered areas.

1.04 Considerable progress on the project has been made in the three years since the 1981 amendment. Construction is underway on the rehabilitation projects and the designs have been completed for the East Bank tunnel program and initial construction contracts tendered. Construction of the tunnel system will begin this summer. Designs for the West Bank will be completed later this year and construction can start in early 1985, provided the necessary funds are made available by AID. Work in the areas of frequent flooding is continuing, with local engineering firms designing the secondary sewers necessary to increase capacity. (See Annex E Current Status of Project No. 263-0091 for more detailed discussion.)

1.05 While the Cairo Sewerage project is moving steadily forward, portions have not been without problems and set-backs. Most of these, however, have been of the sort endemic to any developing country- shortages of skilled manpower, unwieldy government institutions, unfamiliarity with construction techniques or technology- which have been exacerbated by the increased demands placed on the system by the magnitude of the projects. The Cairo Sewerage Project is undoubtedly one of the largest, if not the largest, wastewater construction project undertaken in Egypt. Since 1981, three major design contracts have been negotiated with AMBRIC

for the central and branch tunnels on the East Bank and the West Bank collection and culvert system. In addition, ten construction contracts, some in excess of $100 million, have been tendered. The time demands on the CWO and Ministry staffs to review designs, approve tender packages and awards and to enter into contracts are formidable. This is in addition to the huge task of monitoring current construction. On the whole, the Cairo Wastewater Organization has done a remarkable job considering the organization was only established in 1981. This past work has been an excellent training exercise for CWO for implementing the Cairo Sewerage II Project. With AMBRIC's management guidance, CWO will be able to adequately take on this expanded construction program.

1.06 Other elements of the project (i.e. training, management advisory services and the unsewered areas program) have progressed. AMBRIC is training GOSD/Cairo staff in pump station operation and maintenance and in sewer cleaning. ODA is furnishing management advisors to CWO and the unsewered areas amendment is under negotiation. The progress in these areas is modest but nevertheless important. Admittedly these programs are the most difficult because they must accomplish fundamental changes in the way organizations in Egypt operate. However the training emphasis will increase as construction phases are completed. This is especially true with the Zenein rehabilitation.

1.07 The initial phase of this project has given the Egyptian implementing organizations, USAID and the contractors an opportunity to determine specific areas in which GOE institutions require developmental support, to begin to put in place physical improvements which will allow for the introduction of new technical skills, and to develop a framework for grappling with problems in a

pragmatic and appropriate fashion. An effort has been made to use the experience of the past six years to identify problems which might arise during the implementation of Cairo Sewerage II and to address them specifically during project development. Components of the original Cairo Sewerage Project which will require increased attention over the next period of the project will be training, institutional development, and provision of improved sewerage service to Cairo's unsewered areas.

1.08 In summary, however, the original Cairo Sewerage project is moving ahead and has progressed to the point where funding for expansion of the collection network and treatment facilities on the West Bank is now necessary.

II. BACKGROUND

2.01 Under a 1976 program instituted by the Government of the Arab Republic of Egypt (GOE) to improve and expand its wastewater facilities, a Master Plan for Cairo's Wastewater System was prepared by a joint venture of two British engineering firms, John Taylor & Sons and Binnie & Partners (Taylor-Binnie). Work on the Master Plan began in January 1977, and was completed in April 1978. (See Annex F Cairo Wastewater Master Plan Summary) The foreign exchange cost of this study was financed by the Arab Fund. The studies concluded that, because of the tremendous backlog of work that had accumulated over the previous 25 years, much of the city was not adequately served nor did the existing system have sufficient capacity to handle the wastes collected. Sewers were surcharged to the point where sewage overflowed and ponded in many sections of the city. Little of the waste collected was treated and large emergency canals traversed the city to eventually empty into the agricultural drain system. As a result, the system represented a serious health hazard to the population. To correct the situation, Taylor-Binnie recommended an investment program totalling $593 million (mid-1977 prices) for 30 top priority projects.

2.02 Because of funding shortfalls, the program was not implemented. In January of 1978, the Deputy Prime Minister for Economy/Finance requested immediate U.S. assistance in financing the rehabilitation, improvement and expansion of the Cairo wastewater system. As an interim response, AID agreed to grant $500,000 for a

pilot sewer cleaning and personnel training program. At the same time, USAID concluded that Taylor-Binnie did not provide adequate information in their study to proceed with a rehabilitation program. USAID believed that rehabilitation could increase the capacity of the existing system and reduce the incidence of flooding. Furthermore, it was believed that much of the rehabilitation work could proceed independently of system expansion work and that there was no reason to postpone rehabilitation until expansion took place in the late 1980's. Accordingly, in FY 1978, USAID provided $25 million (under project 263-0091) as the first step towards major rehabilitation of the existing system.

2.03 In mid-1978, the then British Ministry of Overseas Development (ODM) expressed interest in the project and considered committing 50 million Pounds Sterling to the project. ODM's primary interest was in funding the construction of a tunnel system for the conveyance of sewage on the East Bank of the Nile. ODM and USAID nevertheless agreed that a joint venture of U.S. and U.K. engineering firms was the most effective means for continued joint funding of work on the Cairo System. In April 1979, the General Organization for Sewerage and Sanitary Drainage (GOSSD) signed a contract with a consortium of four firms: Camp, Dresser and McKee (CDM), Black and Veatch International (BVI), and Taylor-Binnie, collectively known as AMBRIC.

2.04 AMBRIC reviewed the original Taylor-Binnie studies and made specific recommendations for major rehabilitation and new construction projects. Rehabilitation costs for upgrading the primary collection system and the Zenien Treatment Plant and for

providing sewer cleaning and other equipment were estimated at $105 million at current prices.[1/] The costs of rehabilitating the existing secondary collection system were estimated of $30 million per year over ten years.[2/] This investment would prevent the surcharged conditions that result in flooding problems which effected an estimated 30 percent of Cairo and additional flooding that would occur in the future if nothing were done. Costs were estimated at between $1.2 and $1.5 billion to expand collection systems to unsewered areas, develop the central and branch tunnels on the East Bank and new collection systems on the West Bank, and to construct the necessary treatment plants. This expansion would increase the sewered population from an estimated 5.7 million in 1980 to 13.6 million in 2000[3/]. These projects must necessarily be undertaken to keep pace with water system expansion which is expected to grow at six percent per year in the forseeable future.

2.05 In 1981, AID authorized an additional $104 million, which brought total AID funding for the Cairo Sewerage Project to $129 million. The funds were earmarked for rehabilitation construction, the detailed designs for system expansion projects on both the East and West Banks, work in unsewered areas, training and management advisory services. (See Annex E). At the same time the British, through the Export Credit Guarantee Department, loaned the GOE an additional 100 million Sterling to finance a portion of the East Bank tunnel element of the project.

---

1. Interim Development Plan Part I, Table 12.1, published June 1980.
2. AMBRIC position paper December 22, 1980.
3. Interim Development Plan Part II Main Report February 1981 Table 2.5.

2.06 Since that time the detailed designs for the system expansions on the East and West Banks have been nearing completion. Refer to Figure 2.1. Tenders for the tunnel work on the East Bank have been received for 1) the Ameria Pump Station, the principal pumping facility rated at 1,000,000,000 cubic meters per day(first stage), 2) the tunnel from Ameria to the Fostat section of central Cairo and 3) for the culvert from Ameria to the urban boundary. Construction is scheduled to start in the summer of 1984. The total value of contracts tendered on the East Bank to date is approximately Sterling 160 million and LE 250 million . An estimated 90 million Sterling and LE 190 million will be required for the balance of the culvert and pump station construction phase of treatment on the East Bank. A schematic of the East Bank system is presented in figure 2.2. Designs for the West Bank were begun in January 1984, and will be completed by the end of this year.

2.07 In the summer of 1983, construction activity started on both the East and West Banks to rehabilitate 51 subsidiary pumping stations and 39 air-driven ejector stations, to construct six new stations and to install 20 km of force mains and gravity sewers. The value of the Howard-Harbert-Sadelmi contract is $38 million and LE 13 million. A second contract with Sadelmi (valued at $ 11.5 million and LE 5 million, has been awarded and construction should commence soon on the rehabilitation of five major pump stations. Figure 2.3 locates the pump stations and forcemains that are currently being rehabilitated. Detailed designs to increase the capacity of the sewer system in the flooding areas are currently being undertaken by Egyptian consultants, with major construction already underway. A total of nine projects are expected to be completed by the end of 1984. The total estimated cost of the work in the flooding areas is LE 70 million ($84 million equivalent).

2.08 Training is an integral part of the Cairo Sewerage Project (0091) and will play an increasingly important role in the future as physical improvements to the system come on line. The general strategy of the training program is to protect USAID's considerable investment by assuring that there is personnel familiar with project-financed equipment and facilities. To date, training has been aimed at sewer cleaners and the pump station operators and mechanics who will be responsible for operating and maintaining the facilities being upgraded under the Cairo Sewerage Project. Training includes jet and bucket machine cleaning of sewers and routine pump station operating and maintenance procedures. This training will be expanded in the future as additional rehabilitated pump stations and the Zenein treatment plant begin operation .

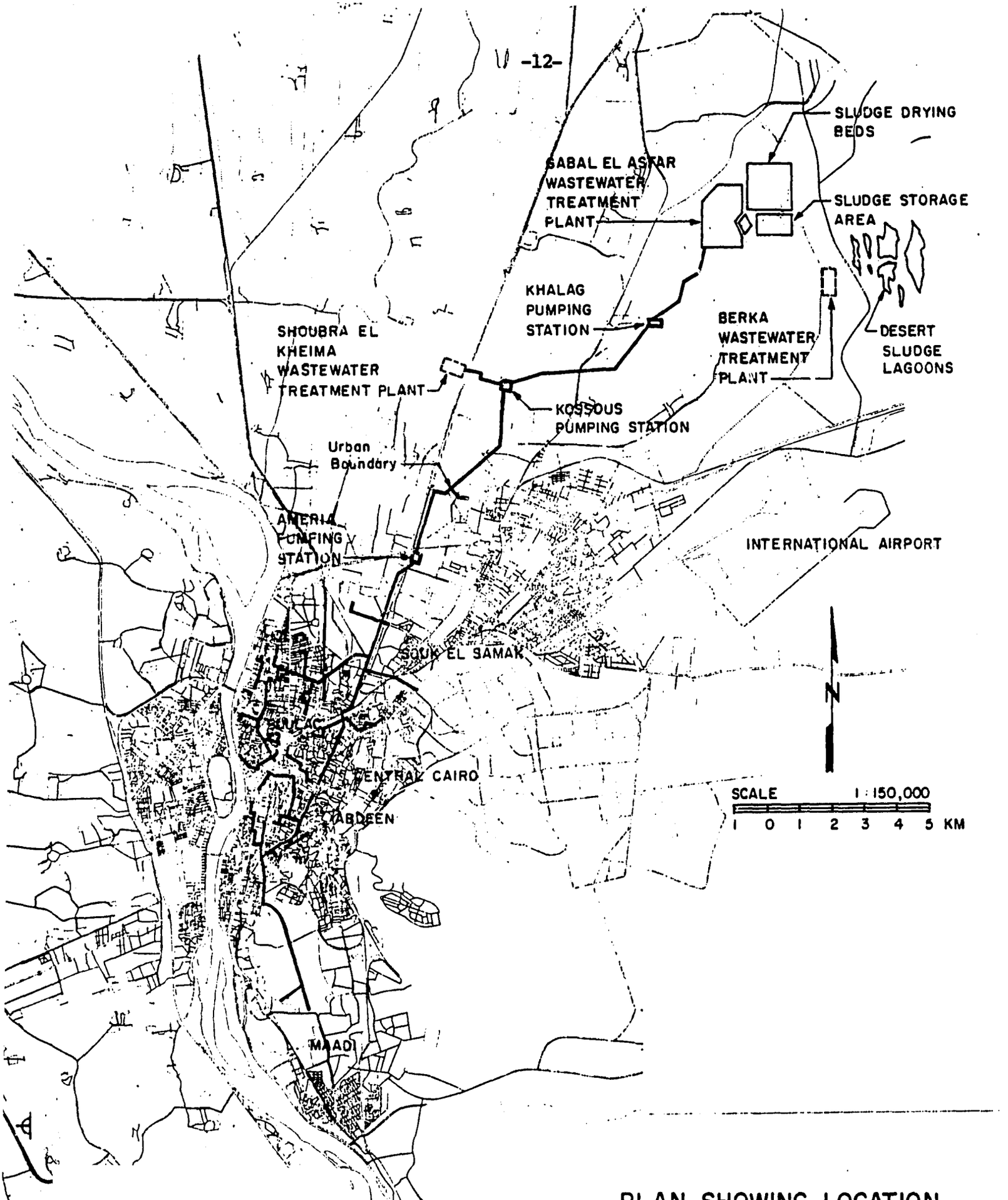
2.09 Internal management advisory services have been provided to the Cairo Wastewater Organization by the Overseas Development Agency. AMBRIC, however, has been their primary technical, management and administrative consultant, undertaking many of the duties that CWO lacks the skills and staff to support directly. The emphasis to date has been on the financial area, particularly in assisting CWO in drawing up budget needs for its capital program and in obtaining its requirements from the various ministeries. The ODA advisors have also been involved in the development of the financial terms in the East Bank tunnel construction tenders. A second set of advisors has been providing CWO with technical assistance. ODA's strategy is to place individual advisors on CWO's staff on an incremental basis rather than to develop a large program involving numerous individuals.

2.10 A program in the unsewered areas is currently under negotiation between AMBRIC and CWO. This program will be a pilot effort aimed at developing improved methods of collecting wastewater from areas not served by the central collection system. A number of different types of vehicles and pumps will be tested, as will the use of large central vaults instead of individual household vaults, and improvements to existing vaults such as more accessible manholes. The final part of the program will be to design and construct dumping stations for the sewage. The present practice is to dump the sewage in the most convenient place which is often an irrigation canal. The unsewered areas activity is an important endeavor. Residential construction continues to expand and the areas needing sewer service outstrip the capacity of the GOE to provide service. Thus no matter how rapidly the centralized system expands, there will continue to be unsewered areas. A continuing program to provide sewer services to these areas will be necessary. The information gained under the Cairo Sewerage Project will possibly be used to develop a more ambitious program under a separate project when the pilot program is evaluated.

Figure 2.1

Cairo Wastewater System
Year 2000 Development Plan

Refer to Folded Insert



PLAN SHOWING LOCATION
OF FIRST STAGE
EAST BANK PROJECT WORKS

FIGURE 2.2

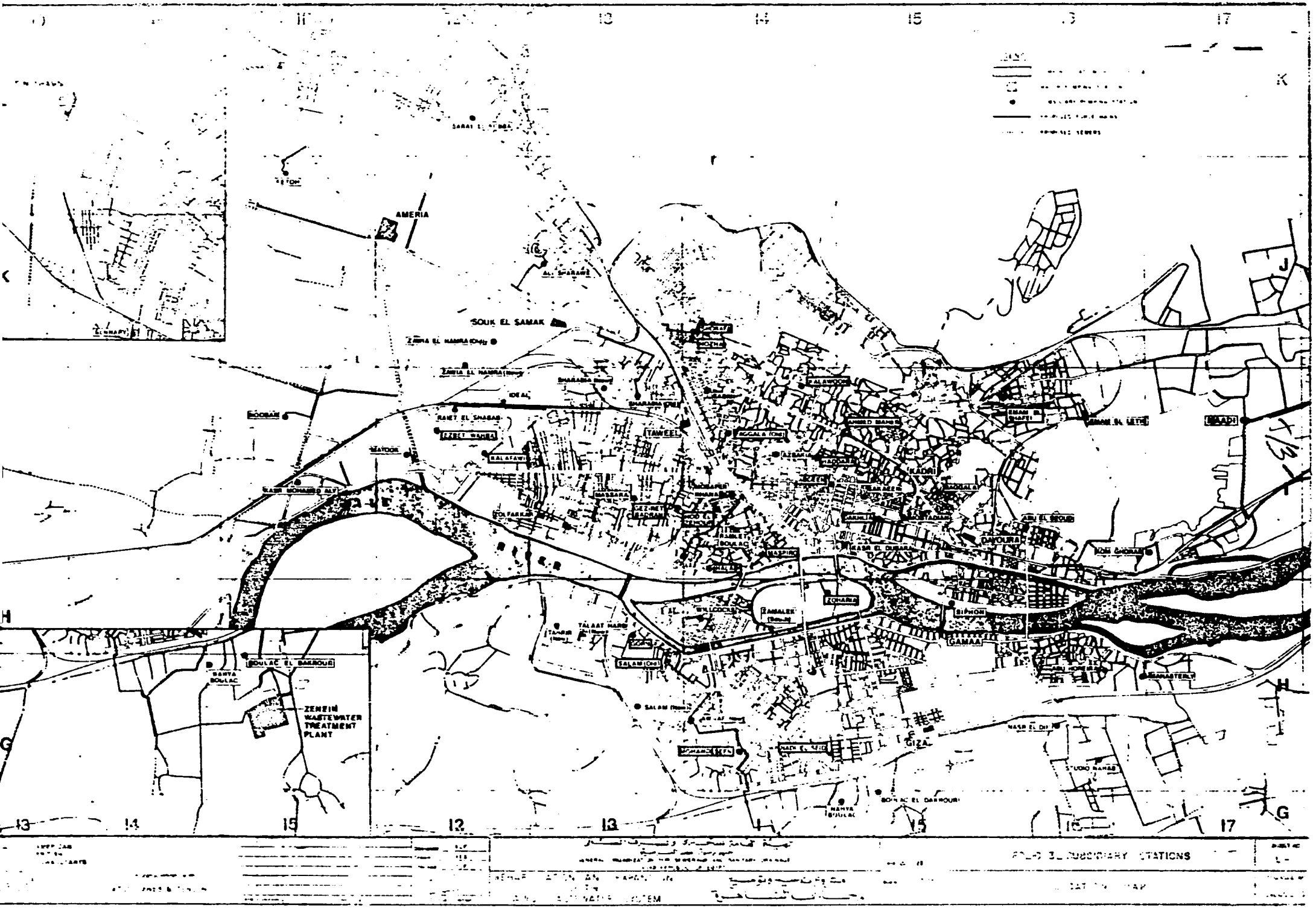

AMERIA
SOUK EL SAMAK
ZENEIN WASTEWATER TREATMENT PLANT
BOULAC EL DAKROUR
GIZA
DAYOURA
ZOHARIA
TALAAT HARB
SALAM (1ST)
SALAM (2ND)
SALAM (3RD)
SALAM (4TH)
SALAM (5TH)
SALAM (6TH)
SALAM (7TH)
SALAM (8TH)
SALAM (9TH)
SALAM (10TH)
SALAM (11TH)
SALAM (12TH)
SALAM (13TH)
SALAM (14TH)
SALAM (15TH)
SALAM (16TH)
SALAM (17TH)
SALAM (18TH)
SALAM (19TH)
SALAM (20TH)
SALAM (21ST)
SALAM (22ND)
SALAM (23RD)
SALAM (24TH)
SALAM (25TH)
SALAM (26TH)
SALAM (27TH)
SALAM (28TH)
SALAM (29TH)
SALAM (30TH)
SALAM (31ST)
SALAM (32ND)
SALAM (33RD)
SALAM (34TH)
SALAM (35TH)
SALAM (36TH)
SALAM (37TH)
SALAM (38TH)
SALAM (39TH)
SALAM (40TH)
SALAM (41ST)
SALAM (42ND)
SALAM (43RD)
SALAM (44TH)
SALAM (45TH)
SALAM (46TH)
SALAM (47TH)
SALAM (48TH)
SALAM (49TH)
SALAM (50TH)
SALAM (51ST)
SALAM (52ND)
SALAM (53RD)
SALAM (54TH)
SALAM (55TH)
SALAM (56TH)
SALAM (57TH)
SALAM (58TH)
SALAM (59TH)
SALAM (60TH)
SALAM (61ST)
SALAM (62ND)
SALAM (63RD)
SALAM (64TH)
SALAM (65TH)
SALAM (66TH)
SALAM (67TH)
SALAM (68TH)
SALAM (69TH)
SALAM (70TH)
SALAM (71ST)
SALAM (72ND)
SALAM (73RD)
SALAM (74TH)
SALAM (75TH)
SALAM (76TH)
SALAM (77TH)
SALAM (78TH)
SALAM (79TH)
SALAM (80TH)
SALAM (81ST)
SALAM (82ND)
SALAM (83RD)
SALAM (84TH)
SALAM (85TH)
SALAM (86TH)
SALAM (87TH)
SALAM (88TH)
SALAM (89TH)
SALAM (90TH)
SALAM (91ST)
SALAM (92ND)
SALAM (93RD)
SALAM (94TH)
SALAM (95TH)
SALAM (96TH)
SALAM (97TH)
SALAM (98TH)
SALAM (99TH)
SALAM (100TH)
SALAM (101ST)
SALAM (102ND)
SALAM (103RD)
SALAM (104TH)
SALAM (105TH)
SALAM (106TH)
SALAM (107TH)
SALAM (108TH)
SALAM (109TH)
SALAM (110TH)
SALAM (111TH)
SALAM (112TH)
SALAM (113TH)
SALAM (114TH)
SALAM (115TH)
SALAM (116TH)
SALAM (117TH)
SALAM (118TH)
SALAM (119TH)
SALAM (120TH)
SALAM (121ST)
SALAM (122ND)
SALAM (123RD)
SALAM (124TH)
SALAM (125TH)
SALAM (126TH)
SALAM (127TH)
SALAM (128TH)
SALAM (129TH)
SALAM (130TH)
SALAM (131ST)
SALAM (132ND)
SALAM (133RD)
SALAM (134TH)
SALAM (135TH)
SALAM (136TH)
SALAM (137TH)
SALAM (138TH)
SALAM (139TH)
SALAM (140TH)
SALAM (141ST)
SALAM (142ND)
SALAM (143RD)
SALAM (144TH)
SALAM (145TH)
SALAM (146TH)
SALAM (147TH)
SALAM (148TH)
SALAM (149TH)
SALAM (150TH)
SALAM (151ST)
SALAM (152ND)
SALAM (153RD)
SALAM (154TH)
SALAM (155TH)
SALAM (156TH)
SALAM (157TH)
SALAM (158TH)
SALAM (159TH)
SALAM (160TH)
SALAM (161ST)
SALAM (162ND)
SALAM (163RD)
SALAM (164TH)
SALAM (165TH)
SALAM (166TH)
SALAM (167TH)
SALAM (168TH)
SALAM (169TH)
SALAM (170TH)
SALAM (171ST)
SALAM (172ND)
SALAM (173RD)
SALAM (174TH)
SALAM (175TH)
SALAM (176TH)
SALAM (177TH)
SALAM (178TH)
SALAM (179TH)
SALAM (180TH)
SALAM (181ST)
SALAM (182ND)
SALAM (183RD)
SALAM (184TH)
SALAM (185TH)
SALAM (186TH)
SALAM (187TH)
SALAM (188TH)
SALAM (189TH)
SALAM (190TH)
SALAM (191ST)
SALAM (192ND)
SALAM (193RD)
SALAM (194TH)
SALAM (195TH)
SALAM (196TH)
SALAM (197TH)
SALAM (198TH)
SALAM (199TH)
SALAM (200TH)
SALAM (201ST)
SALAM (202ND)
SALAM (203RD)
SALAM (204TH)
SALAM (205TH)
SALAM (206TH)
SALAM (207TH)
SALAM (208TH)
SALAM (209TH)
SALAM (210TH)
SALAM (211TH)
SALAM (212TH)
SALAM (213TH)
SALAM (214TH)
SALAM (215TH)
SALAM (216TH)
SALAM (217TH)
SALAM (218TH)
SALAM (219TH)
SALAM (220TH)
SALAM (221ST)
SALAM (222ND)
SALAM (223RD)
SALAM (224TH)
SALAM (225TH)
SALAM (226TH)
SALAM (227TH)
SALAM (228TH)
SALAM (229TH)
SALAM (230TH)
SALAM (231ST)
SALAM (232ND)
SALAM (233RD)
SALAM (234TH)
SALAM (235TH)
SALAM (236TH)
SALAM (237TH)
SALAM (238TH)
SALAM (239TH)
SALAM (240TH)
SALAM (241ST)
SALAM (242ND)
SALAM (243RD)
SALAM (244TH)
SALAM (245TH)
SALAM (246TH)
SALAM (247TH)
SALAM (248TH)
SALAM (249TH)
SALAM (250TH)
SALAM (251ST)
SALAM (252ND)
SALAM (253RD)
SALAM (254TH)
SALAM (255TH)
SALAM (256TH)
SALAM (257TH)
SALAM (258TH)
SALAM (259TH)
SALAM (260TH)
SALAM (261ST)
SALAM (262ND)
SALAM (263RD)
SALAM (264TH)
SALAM (265TH)
SALAM (266TH)
SALAM (267TH)
SALAM (268TH)
SALAM (269TH)
SALAM (270TH)
SALAM (271ST)
SALAM (272ND)
SALAM (273RD)
SALAM (274TH)
SALAM (275TH)
SALAM (276TH)
SALAM (277TH)
SALAM (278TH)
SALAM (279TH)
SALAM (280TH)
SALAM (281ST)
SALAM (282ND)
SALAM (283RD)
SALAM (284TH)
SALAM (285TH)
SALAM (286TH)
SALAM (287TH)
SALAM (288TH)
SALAM (289TH)
SALAM (290TH)
SALAM (291ST)
SALAM (292ND)
SALAM (293RD)
SALAM (294TH)
SALAM (295TH)
SALAM (296TH)
SALAM (297TH)
SALAM (298TH)
SALAM (299TH)
SALAM (300TH)
SALAM (301ST)
SALAM (302ND)
SALAM (303RD)
SALAM (304TH)
SALAM (305TH)
SALAM (306TH)
SALAM (307TH)
SALAM (308TH)
SALAM (309TH)
SALAM (310TH)
SALAM (311TH)
SALAM (312TH)
SALAM (313TH)
SALAM (314TH)
SALAM (315TH)
SALAM (316TH)
SALAM (317TH)
SALAM (318TH)
SALAM (319TH)
SALAM (320TH)
SALAM (321ST)
SALAM (322ND)
SALAM (323RD)
SALAM (324TH)
SALAM (325TH)
SALAM (326TH)
SALAM (327TH)
SALAM (328TH)
SALAM (329TH)
SALAM (330TH)
SALAM (331ST)
SALAM (332ND)
SALAM (333RD)
SALAM (334TH)
SALAM (335TH)
SALAM (336TH)
SALAM (337TH)
SALAM (338TH)
SALAM (339TH)
SALAM (340TH)
SALAM (341ST)
SALAM (342ND)
SALAM (343RD)
SALAM (344TH)
SALAM (345TH)
SALAM (346TH)
SALAM (347TH)
SALAM (348TH)
SALAM (349TH)
SALAM (350TH)
SALAM (351ST)
SALAM (352ND)
SALAM (353RD)
SALAM (354TH)
SALAM (355TH)
SALAM (356TH)
SALAM (357TH)
SALAM (358TH)
SALAM (359TH)
SALAM (360TH)
SALAM (361ST)
SALAM (362ND)
SALAM (363RD)
SALAM (364TH)
SALAM (365TH)
SALAM (366TH)
SALAM (367TH)
SALAM (368TH)
SALAM (369TH)
SALAM (370TH)
SALAM (371ST)
SALAM (372ND)
SALAM (373RD)
SALAM (374TH)
SALAM (375TH)
SALAM (376TH)
SALAM (377TH)
SALAM (378TH)
SALAM (379TH)
SALAM (380TH)
SALAM (381ST)
SALAM (382ND)
SALAM (383RD)
SALAM (384TH)
SALAM (385TH)
SALAM (386TH)
SALAM (387TH)
SALAM (388TH)
SALAM (389TH)
SALAM (390TH)
SALAM (391ST)
SALAM (392ND)
SALAM (393RD)
SALAM (394TH)
SALAM (395TH)
SALAM (396TH)
SALAM (397TH)
SALAM (398TH)
SALAM (399TH)
SALAM (400TH)
SALAM (401ST)
SALAM (402ND)
SALAM (403RD)
SALAM (404TH)
SALAM (405TH)
SALAM (406TH)
SALAM (407TH)
SALAM (408TH)
SALAM (409TH)
SALAM (410TH)
SALAM (411TH)
SALAM (412TH)
SALAM (413TH)
SALAM (414TH)
SALAM (415TH)
SALAM (416TH)
SALAM (417TH)
SALAM (418TH)
SALAM (419TH)
SALAM (420TH)
SALAM (421ST)
SALAM (422ND)
SALAM (423RD)
SALAM (424TH)
SALAM (425TH)
SALAM (426TH)
SALAM (427TH)
SALAM (428TH)
SALAM (429TH)
SALAM (430TH)
SALAM (431ST)
SALAM (432ND)
SALAM (433RD)
SALAM (434TH)
SALAM (435TH)
SALAM (436TH)
SALAM (437TH)
SALAM (438TH)
SALAM (439TH)
SALAM (440TH)
SALAM (441ST)
SALAM (442ND)
SALAM (443RD)
SALAM (444TH)
SALAM (445TH)
SALAM (446TH)
SALAM (447TH)
SALAM (448TH)
SALAM (449TH)
SALAM (450TH)
SALAM (451ST)
SALAM (452ND)
SALAM (453RD)
SALAM (454TH)
SALAM (455TH)
SALAM (456TH)
SALAM (457TH)
SALAM (458TH)
SALAM (459TH)
SALAM (460TH)
SALAM (461ST)
SALAM (462ND)
SALAM (463RD)
SALAM (464TH)
SALAM (465TH)
SALAM (466TH)
SALAM (467TH)
SALAM (468TH)
SALAM (469TH)
SALAM (470TH)
SALAM (471ST)
SALAM (472ND)
SALAM (473RD)
SALAM (474TH)
SALAM (475TH)
SALAM (476TH)
SALAM (477TH)
SALAM (478TH)
SALAM (479TH)
SALAM (480TH)
SALAM (481ST)
SALAM (482ND)
SALAM (483RD)
SALAM (484TH)
SALAM (485TH)
SALAM (486TH)
SALAM (487TH)
SALAM (488TH)
SALAM (489TH)
SALAM (490TH)
SALAM (491ST)
SALAM (492ND)
SALAM (493RD)
SALAM (494TH)
SALAM (495TH)
SALAM (496TH)
SALAM (497TH)
SALAM (498TH)
SALAM (499TH)
SALAM (500TH)
SALAM (501ST)
SALAM (502ND)
SALAM (503RD)
SALAM (504TH)
SALAM (505TH)
SALAM (506TH)
SALAM (507TH)
SALAM (508TH)
SALAM (509TH)
SALAM (510TH)
SALAM (511TH)
SALAM (512TH)
SALAM (513TH)
SALAM (514TH)
SALAM (515TH)
SALAM (516TH)
SALAM (517TH)
SALAM (518TH)
SALAM (519TH)
SALAM (520TH)
SALAM (521ST)
SALAM (522ND)
SALAM (523RD)
SALAM (524TH)
SALAM (525TH)
SALAM (526TH)
SALAM (527TH)
SALAM (528TH)
SALAM (529TH)
SALAM (530TH)
SALAM (531ST)
SALAM (532ND)
SALAM (533RD)
SALAM (534TH)
SALAM (535TH)
SALAM (536TH)
SALAM (537TH)
SALAM (538TH)
SALAM (539TH)
SALAM (540TH)
SALAM (541ST)
SALAM (542ND)
SALAM (543RD)
SALAM (544TH)
SALAM (545TH)
SALAM (546TH)
SALAM (547TH)
SALAM (548TH)
SALAM (549TH)
SALAM (550TH)
SALAM (551ST)
SALAM (552ND)
SALAM (553RD)
SALAM (554TH)
SALAM (555TH)
SALAM (556TH)
SALAM (557TH)
SALAM (558TH)
SALAM (559TH)
SALAM (560TH)
SALAM (561ST)
SALAM (562ND)
SALAM (563RD)
SALAM (564TH)
SALAM (565TH)
SALAM (566TH)
SALAM (567TH)
SALAM (568TH)
SALAM (569TH)
SALAM (570TH)
SALAM (571ST)
SALAM (572ND)
SALAM (573RD)
SALAM (574TH)
SALAM (575TH)
SALAM (576TH)
SALAM (577TH)
SALAM (578TH)
SALAM (579TH)
SALAM (580TH)
SALAM (581ST)
SALAM (582ND)
SALAM (583RD)
SALAM (584TH)
SALAM (585TH)
SALAM (586TH)
SALAM (587TH)
SALAM (588TH)
SALAM (589TH)
SALAM (590TH)
SALAM (591ST)
SALAM (592ND)
SALAM (593RD)
SALAM (594TH)
SALAM (595TH)
SALAM (596TH)
SALAM (597TH)
SALAM (598TH)
SALAM (599TH)
SALAM (600TH)
SALAM (601ST)
SALAM (602ND)
SALAM (603RD)
SALAM (604TH)
SALAM (605TH)
SALAM (606TH)
SALAM (607TH)
SALAM (608TH)
SALAM (609TH)
SALAM (610TH)
SALAM (611TH)
SALAM (612TH)
SALAM (613TH)
SALAM (614TH)
SALAM (615TH)
SALAM (616TH)
SALAM (617TH)
SALAM (618TH)
SALAM (619TH)
SALAM (620TH)
SALAM (621ST)
SALAM (622ND)
SALAM (623RD)
SALAM (624TH)
SALAM (625TH)
SALAM (626TH)
SALAM (627TH)
SALAM (628TH)
SALAM (629TH)
SALAM (630TH)
SALAM (631ST)
SALAM (632ND)
SALAM (633RD)
SALAM (634TH)
SALAM (635TH)
SALAM (636TH)
SALAM (637TH)
SALAM (638TH)
SALAM (639TH)
SALAM (640TH)
SALAM (641ST)
SALAM (642ND)
SALAM (643RD)
SALAM (644TH)
SALAM (645TH)
SALAM (646TH)
SALAM (647TH)
SALAM (648TH)
SALAM (649TH)
SALAM (650TH)
SALAM (651ST)
SALAM (652ND)
SALAM (653RD)
SALAM (654TH)
SALAM (655TH)
SALAM (656TH)
SALAM (657TH)
SALAM (658TH)
SALAM (659TH)
SALAM (660TH)
SALAM (661ST)
SALAM (662ND)
SALAM (663RD)
SALAM (664TH)
SALAM (665TH)
SALAM (666TH)
SALAM (667TH)
SALAM (668TH)
SALAM (669TH)
SALAM (670TH)
SALAM (671ST)
SALAM (672ND)
SALAM (673RD)
SALAM (674TH)
SALAM (675TH)
SALAM (676TH)
SALAM (677TH)
SALAM (678TH)
SALAM (679TH)
SALAM (680TH)
SALAM (681ST)
SALAM (682ND)
SALAM (683RD)
SALAM (684TH)
SALAM (685TH)
SALAM (686TH)
SALAM (687TH)
SALAM (688TH)
SALAM (689TH)
SALAM (690TH)
SALAM (691ST)
SALAM (692ND)
SALAM (693RD)
SALAM (694TH)
SALAM (695TH)
SALAM (696TH)
SALAM (697TH)
SALAM (698TH)
SALAM (699TH)
SALAM (700TH)
SALAM (701ST)
SALAM (702ND)
SALAM (703RD)
SALAM (704TH)
SALAM (705TH)
SALAM (706TH)
SALAM (707TH)
SALAM (708TH)
SALAM (709TH)
SALAM (710TH)
SALAM (711TH)
SALAM (712TH)
SALAM (713TH)
SALAM (714TH)
SALAM (715TH)
SALAM (716TH)
SALAM (717TH)
SALAM (718TH)
SALAM (719TH)
SALAM (720TH)
SALAM (721ST)
SALAM (722ND)
SALAM (723RD)
SALAM (724TH)
SALAM (725TH)
SALAM (726TH)
SALAM (727TH)
SALAM (728TH)
SALAM (729TH)
SALAM (730TH)
SALAM (731ST)
SALAM (732ND)
SALAM (733RD)
SALAM (734TH)
SALAM (735TH)
SALAM (736TH)
SALAM (737TH)
SALAM (738TH)
SALAM (739TH)
SALAM (740TH)
SALAM (741ST)
SALAM (742ND)
SALAM (743RD)
SALAM (744TH)
SALAM (745TH)
SALAM (746TH)
SALAM (747TH)
SALAM (748TH)
SALAM (749TH)
SALAM (750TH)
SALAM (751ST)
SALAM (752ND)
SALAM (753RD)
SALAM (754TH)
SALAM (755TH)
SALAM (756TH)
SALAM (757TH)
SALAM (758TH)
SALAM (759TH)
SALAM (760TH)
SALAM (761ST)
SALAM (762ND)
SALAM (763RD)
SALAM (764TH)
SALAM (765TH)
SALAM (766TH)
SALAM (767TH)
SALAM (768TH)
SALAM (769TH)
SALAM (770TH)
SALAM (771ST)
SALAM (772ND)
SALAM (773RD)
SALAM (774TH)
SALAM (775TH)
SALAM (776TH)
SALAM (777TH)
SALAM (778TH)
SALAM (779TH)
SALAM (780TH)
SALAM (781ST)
SALAM (782ND)
SALAM (783RD)
SALAM (784TH)
SALAM (785TH)
SALAM (786TH)
SALAM (787TH)
SALAM (788TH)
SALAM (789TH)
SALAM (790TH)
SALAM (791ST)
SALAM (792ND)
SALAM (793RD)
SALAM (794TH)
SALAM (795TH)
SALAM (796TH)
SALAM (797TH)
SALAM (798TH)
SALAM (799TH)
SALAM (800TH)
SALAM (801ST)
SALAM (802ND)
SALAM (803RD)
SALAM (804TH)
SALAM (805TH)
SALAM (806TH)
SALAM (807TH)
SALAM (808TH)
SALAM (809TH)
SALAM (810TH)
SALAM (811TH)
SALAM (812TH)
SALAM (813TH)
SALAM (814TH)
SALAM (815TH)
SALAM (816TH)
SALAM (817TH)
SALAM (818TH)
SALAM (819TH)
SALAM (820TH)
SALAM (821ST)
SALAM (822ND)
SALAM (823RD)
SALAM (824TH)
SALAM (825TH)
SALAM (826TH)
SALAM (827TH)
SALAM (828TH)
SALAM (829TH)
SALAM (830TH)
SALAM (831ST)
SALAM (832ND)
SALAM (833RD)
SALAM (834TH)
SALAM (835TH)
SALAM (836TH)
SALAM (837TH)
SALAM (838TH)
SALAM (839TH)
SALAM (840TH)
SALAM (841ST)
SALAM (842ND)
SALAM (843RD)
SALAM (844TH)
SALAM (845TH)
SALAM (846TH)
SALAM (847TH)
SALAM (848TH)
SALAM (849TH)
SALAM (850TH)
SALAM (851ST)
SALAM (852ND)
SALAM (853RD)
SALAM (854TH)
SALAM (855TH)
SALAM (856TH)
SALAM (857TH)
SALAM (858TH)
SALAM (859TH)
SALAM (860TH)
SALAM (861ST)
SALAM (862ND)
SALAM (863RD)
SALAM (864TH)
SALAM (865TH)
SALAM (866TH)
SALAM (867TH)
SALAM (868TH)
SALAM (869TH)
SALAM (870TH)
SALAM (871ST)
SALAM (872ND)
SALAM (873RD)
SALAM (874TH)
SALAM (875TH)
SALAM (876TH)
SALAM (877TH)
SALAM (878TH)
SALAM (879TH)
SALAM (880TH)
SALAM (881ST)
SALAM (882ND)
SALAM (883RD)
SALAM (884TH)
SALAM (885TH)
SALAM (886TH)
SALAM (887TH)
SALAM (888TH)
SALAM (889TH)
SALAM (890TH)
SALAM (891ST)
SALAM (892ND)
SALAM (893RD)
SALAM (894TH)
SALAM (895TH)
SALAM (896TH)
SALAM (897TH)
SALAM (898TH)
SALAM (899TH)
SALAM (900TH)
SALAM (901ST)
SALAM (902ND)
SALAM (903RD)
SALAM (904TH)
SALAM (905TH)
SALAM (906TH)
SALAM (907TH)
SALAM (908TH)
SALAM (909TH)
SALAM (910TH)
SALAM (911TH)
SALAM (912TH)
SALAM (913TH)
SALAM (914TH)
SALAM (915TH)
SALAM (916TH)
SALAM (917TH)
SALAM (918TH)
SALAM (919TH)
SALAM (920TH)
SALAM (921ST)
SALAM (922ND)
SALAM (923RD)
SALAM (924TH)
SALAM (925TH)
SALAM (926TH)
SALAM (927TH)
SALAM (928TH)
SALAM (929TH)
SALAM (930TH)
SALAM (931ST)
SALAM (932ND)
SALAM (933RD)
SALAM (934TH)
SALAM (935TH)
SALAM (936TH)
SALAM (937TH)
SALAM (938TH)
SALAM (939TH)
SALAM (940TH)
SALAM (941ST)
SALAM (942ND)
SALAM (943RD)
SALAM (944TH)
SALAM (945TH)
SALAM (946TH)
SALAM (947TH)
SALAM (948TH)
SALAM (949TH)
SALAM (950TH)
SALAM (951ST)
SALAM (952ND)
SALAM (953RD)
SALAM (954TH)
SALAM (955TH)
SALAM (956TH)
SALAM (957TH)
SALAM (958TH)
SALAM (959TH)
SALAM (960TH)
SALAM (961ST)
SALAM (962ND)
SALAM (963RD)
SALAM (964TH)
SALAM (965TH)
SALAM (966TH)
SALAM (967TH)
SALAM (968TH)
SALAM (969TH)
SALAM (970TH)
SALAM (971ST)
SALAM (972ND)
SALAM (973RD)
SALAM (974TH)
SALAM (975TH)
SALAM (976TH)
SALAM (977TH)
SALAM (978TH)
SALAM (979TH)
SALAM (980TH)
SALAM (981ST)
SALAM (982ND)
SALAM (983RD)
SALAM (984TH)
SALAM (985TH)
SALAM (986TH)
SALAM (987TH)
SALAM (988TH)
SALAM (989TH)
SALAM (990TH)
SALAM (991ST)
SALAM (992ND)
SALAM (993RD)
SALAM (994TH)
SALAM (995TH)
SALAM (996TH)
SALAM (997TH)
SALAM (998TH)
SALAM (999TH)
SALAM (1000TH)

FIGURE 2.3

III THE PROJECT

3.01 Cairo Sewerage II will provide the core funding for construction, design and construction management, and system operations, maintenance, management and training activities on the West Bank of the Nile. This funding will assure that a complete system is in place, from household connections to final treatment adequate for both effuent and sludge reuse. The project is a continuation of the Cairo Sewerage Project. The analysis in the 1981 amendment to 0091 remains valid and that project paper is an important and accurate resource document as well as the authorized basis for continuing activity on the West Bank.

3.02 Although AID will finance both the foreign exchange and local currency costs of construction, the GOE effort on the overall Cairo Sewerage Project is significant and currently exceeds 700 million LE on the East Bank. On the West Bank project the GOE life of project investment is expected to be approximately LE 495 million ($500 million).

3.03 The Cairo Sewerage II Project is necessary to significantly expand the wastewater collection capacity on the West Bank of the Nile and to increase treatment capacity. This will reduce present flooding due to the undersized collection system and will permit further expansion of the potable water system. The most direct benefit, however, will be to significantly increase the number of people with access to direct sewer connections. It is estimated that the total 1990 West Bank population of 2,462,000 people will gain either improved or new service from these projects. Of the estimated population, 1,641,000 will receive new service only as a direct result of these projects. By 2020, the planning horizon for the project, the West Bank Project will provide the capacity to extend wastewater service to an additional 7,159,000 people.

3.04 The design of the main collector and conduit systems to be constructed under this project will be completed by the end of 1984, with construction tendering soon thereafter as funds are available. Funding needs are therefore immediate. Construction can be underway by mid-1985. It is expected that construction supervision will be done by the present design consultants, AMBRIC. Construction supervision by the designer is standard in the American as well as International Development fields. This approach is based, in part, on the fact that the designer has a legal responsibility for the adequacy of his work. In order to undertake this he must play an integral role during the construction process to assure that work is accomplished as specified and that required changes and modifications are compatible with the initial design effort. The alternative of shifting to a new construction supervision team would result in either absolving AMBRIC of their design responsibility or in duplicating supervision services with another consultant while AMBRIC still played a role adequate to assure satisfactory construction in accordance with their design. The first approach would require a costly and complete review of all of AMBRIC's design work by their replacement, while the second would result in a duplication of staff at the site. Both approaches would be much more costly, cause delays, and would be much more troublesome for both CWO and USAID to manage. The GOE and the Mission have been pleased with the quality of AMBRIC's work to date and for this reason alone would be reluctant to change consultants at this time.

3.05 Certain training and management advisory elements and work in the unsewered areas will continue to be funded under project 0091. Funding is also available in that project to finance construction in the flooding areas, principally by local construction contractors. Large rehabilitation efforts at the subsidiary and major pump stations and the construction of new gravity sewers and force mains to service those stations is continuing under 0091. (See Annex E Current Status of Project No. 263-0091.)

3.06 The total additional funding required for the project is approximately $1.4 billion dollars. An illustrative project budget and an illustrative USAID obligation rate are shown on the following tables 3.1 and 3.2.

Table 3.1

ILLUSTRATIVE PROJECT BUDGET

($ Million)

ITEM	USAID THIS PROJ	USAID 1985 AMEND.	GOE	OTHER DONOR
Giza Relief	42.0			
Culverts	165.0			
Pumping Stations	110.0			
Northwest Collectors	137.0			
Pyramid Collectors	75.0			
Abu Rawash Treatment		100.0		100.0
Northwest Laterals	60.0		115.0	
Pyramid Laterals	55.0		300.0	
Hookups	20.0		20.0	
Mgt/Training	9.0	9.0		
Construction Supervision	27.0	6.0	10.0	
Drain Improvement			20.0	
Lands/Easements			15.0	
Electrical Distribution			15.0	
Subtotals	700.0	115.0	495.0	100.0
TOTAL PROJECT	$1.4 Billion			

Table 3.2

ILLUSTRATIVE OBLIGATION BUDGET
($ Million)

ITEM	FY 84	FY 85	FY 86	FY 87	FY 88	Total
Giza Relief	42.0	-	-	-	-	42.0
Culverts	60.0	30.0	75.0	-	-	165.0
Pumping Stations	40.0	70.0	-	-	-	110.0
Northwest Collectors	-	93.0	44.0	-	-	137.0
Pyramid Collectors	-	-	-	75.0	-	75.0
Abu Rawash Treatment	-	-	60.0*	40.0*	-	100.0*
Northwest Laterals	-	-	21.0	39.0	-	60.0
Pyramid Laterals	-	-	-	30.0	25.0	55.0
Hookups	-	-	-	12.0	8.0	20.0
Mgt/Training	-	-	-	-	18.0*	18.0*
Construction Supervision	8.0	7.0	-	4.0	14.0*	33.0*
TOTAL PROJECT	150.0	200.0	200.0	200.0	65.0	815.0

* Tentative levels to be defined in 1985 amendment

IV. TECHNICAL ANALYSIS

4.01 Cairo Sewerage II is a comprehensive program to collect sewage from presently unsewered areas, to construct major conduits to carry the sewage to treatment plants, to relieve overloaded sewers, to construct one new treatment plant for proper treatment of sewage, and to provide long-term management/operation/ maintenance and training for the successful operation of the system.

4.02 At the present time all of the sewered areas on the West Bank discharge their effluent to the Zenein Treatment Plant. (There are two other small plants at Nahya and at Abu Rawash which are not operational.) Practically all the flow passes through the Giza Pumping Station, which is severely overloaded and forms a bottleneck in the event of a malfunction (such as that which resulted in widespread flooding of sewage in 1982). The remaining unsewered areas have a variety of ad hoc mechanisms for disposing of their sewage, with all of it eventually getting into the drain system in a raw state.

4.03 The two minor plants (Nahya and Abu Rawash) are not operational and no attempt is being made to place them in operating condition as they are programmed to be abandoned when the new system is in place. The Zenein Treatment Plant has some design flaws which are to be corrected by the rehabilitation project presently being designed by AMERIC. This will be funded under 0091. An IFB for the rehabilitation will be advertised to U.S. firms in mid 1985, and renovation is scheduled to be completed coincidentally with the completion of the Giza Relief portion of Cairo Sewerage II. At the present time the Zenein plant is neither maintained nor operated,

except to pass approximately two-thirds of the sewage through the plant and bypass the remainder. Even if the present plant were properly operated, it is only large enough to handle a small portion of the existing West Bank effluent. When sludge is produced it can be pumped to drying beds in the Abu Rawash area. However, it is presently remixed with the plant effluent and pumped to a nearby drain without the benefit of treatment. This desultory operation and maintenance of sewage treatment plants is common in Egypt and is the principal reason that expatriate supervision and responsibility for operation and maintenance is an integral part of the program being proposed in Cairo Sewerage II.

4.04 The Giza Relief Project. The primary purpose of the Giza Relief Project is to relieve extensive flooding problems in the Giza area as well as to allow future expansion of collection services in the area. Once completed an estimated 666,000 people will receive new or upgraded service by the year 1990. This project, which includes some 6.6 km of gravity sewers, collectors and force mains, will be designed to allow flow from portions of Boulac El Dakrour, South Giza and El Ahram to be diverted to Zenein from the presently overloaded collector draining to the Giza Pumping Station and to accept flow in the future from currently unsewered areas. A new 1400 to 2500 mm diameter precast concrete collector will be installed northward along the Zomar Canal, starting about 500 m south of the Pyramids Road. Flow from pumping stations at Abu Horiera, which is being rehabilitated, and Studio Nahas, which will be constructed under the present Cairo Sewerage project, will be carried by ductile iron force main to the collector. The main collector will continue along the Zomar Canal to a point 700 m north of Pyramids Road, then west and north about 3200 m to the Zenein Pumping Station which will be designed for an ultimate peak flow of

394,000 cmd (cubic meters per day). Refer to Figure 4.1. The pumping facility will be constructed to handle an initial peak flow of 220,000 cmd through a screw type two stage station. The total lift will be about 12 meters and standby pumping capacity will be provided. Flows will be treated at the Zenein Wastewater Treatment Plant which will be rehabilitated under an existing contract to accommodate 330,000 cmd. The liquid effluent from this plant will be discharged into the Nahya Drain and the sludge will be pumped to Abu Rawash. Refer to Figure 4.1.

4.05 The Northern Branch Project: The primary purposes of this project is to provide for collection in what is now a major unsewered area of Cairo and also provide major relief for overloaded collectors presently taking sewage to Zenein via Giza. These purposes are amplified by the fact that once sewerage is provided the more important basic human need, clean water, can also be provided. As is true in many areas in Cairo household water connections are not encouraged until the sewage collectors are in place. Once completed an estimated 1,568,000 people are expected to be provided with new and upgraded sewer and water services by 1990. These residents range from the affluent who are presently served by overloaded sewers to the poorest who are not served. This project, which includes some 37 km of gravity sewers and collectors, and 182 km of laterals will serve the presently unsewered developed area of Embaba and Urban Embaba Markaz and provide relief sewers in Mohandessin, Awkaf, Dokki, Embaba and Boulac El Dakrour as well as allow for expansion. Sewers and collectors in Embaba will be designed from 225 to 2500 mm in diameter, with a total length of 24 km. Included in this work will be the construction of manholes which will permit individual house connections. Flows in the Embaba area will drain to the Embaba Pump Station which will lift the flow to a main collector running south and then west to the new Boulac Pump Station. A new 1800 mm collector will be designed to collect all flows from the present Awkaf Pump Station in northern Agouza and

convey it 4.3 km to Boulac. A new 1200 mm collector will be designed to run from Mohandessin 2 km to the proposed Boulac station to intercept flows and a new 1800 mm collector will be designed to run into Dokki to collect flows from the wastewater system that will be cut off by the metro. Twelve pumping stations will be taken out of service by the Northwest project in total. The Embaba station will be designed and constructed for an ultimate peak flow of 240,000 cmd. The Boulac Pumping Station will be designed for an ultimate peak flow of 827,000 cmd and constructed for an initial peak flow of 432,000 cmd. The GOE plans to construct an additional 375 km of laterals in adjacent developing areas that will be served by the core system.

4.06 Flows from the proposed Boulac Pumping Station will be conveyed by gravity to Abu Rawash through 11.3 km of culvert. From Boulac the wastewater will flow by gravity to the South Muheit Pumping Station through 6000 m of culvert. The culvert will cross the Muheit Canal and Lebbeni Drain prior to reaching the South Muheit Pumping Station. The culvert will extend some 2800 m from the South Muheit Pumping Station to the Junction Pumping Station at the junction point with the Pyramids culvert. The combined flows will be conveyed through 2500 m of culvert to the Abu Rawash Plant. Refer to Figure 4.1. Culverts, rectangular in cross section and with dimensions of 3 m by 3.5 m, will be constructed of cast-in-place concrete with blue brick lining on the walls and a PVC lining on the ceilings.

4.07 The Pyramids Project: This project, which is similar to the Northwest projec will provide the Southwest area of Giza with the opportunity for both sewer and water services, with an estimated 228,000 people expected to be served by 1990. This project consists of approximately 39 km of interceptors, collectors and

laterals to collect sewage from this presently unsewered area. There will be one major pumping station which will discharge into 7.5 km of cast-in-place rectangular dual culverts with internal dimensions of 2 meters by 2.6 meters each, making a combined cross section of 10.2 square meters. These culverts will be lined as described above. The Pyramids Pumping Station will be designed to handle an inital peak flow of 225,000 cmd, with expansion capability to 685,000 cmd. This major conduit joins with the Northern Branch at the Junction Pumping Station and from there is pumped to the Abu Rawash Pumping Station. Refer to Figure 4.1.

4.08 The major conduits in the West Bank project have been designed as a gravity flow system to allow for future expansion in the areas adjacent to the conduits, and grades have been selected for scouring velocities. The screw type pump stations included in the system are designed for low lift high volume situations and require less maintenance than do centrifugal pump stations.

4.09 At the present time there are no public sewers in the general Pyramids area. Proposed for USAID funding are the installation of 29 km of collectors and 135 km of laterals as well as support for household hook-ups. The GOE has already issued design instructions for an additional 320 km of laterals and 50 km of collectors in the same service area. This additional work will be constructed under local currency contracts.

4.10 All three of the collection projects - Giza Relief, the Northern Branch and Pyramids - will rely on the provision of household connections from household collection boxes to manholes as the crucial link for assuring maximum utilization of the system and the concomitant health and social benefits. Although there is an

expressed willingness on the part of householders to pay for sewerage service and the GOE has made a provision for connecting the very poor (see Section VIII, Health and Social Analysis) a mechanism must be provided to assure both access to funds for those wishing to obtain service and sufficient capacity on the part of C/GOSD or another implementing body to provide connections in a timely manner. The West Bank construction schedule however is such that household connections to the collection system will not be feasible for at least three years after the start of construction. During this interim period USAID and CWO/C/GOSD will investigate means for guaranteeing adequate and timely provision of house connections. This may involve 1) establishing a program to extend C/GOSD subsidies to include a larger portion of the poorest residents, 2) creating a revolving fund within C/GOSD which will provide credit to those unable to raise the necessary funds up-front, 3) utilizing the Home Improvement Loan program currently in place with the Credit Foncier Egyptien as part of the Housing and Community Upgrading for Low Income Egyptians/AID Grant 263-0066 (see Annex H for a discussion of this project), 4) funding the construction of household connections directly, with construction undertaken by an Egyptian firm, possibly with American construction supervision. Funds for investigation and support of these means for providing household connections are included in the project paper budget.

4.11 The Abu Rawash Treatment Plant: The purpose of the Abu Rawash Treatment Plant is to adequately treat the wastes collected as a result of this project (except for Giza Relief) for agricultural reuse and/or for ultimate discharge back into the Nile. Both sludge and effluent have value for agricultural reclamation projects. Such treatment would be to levels necessary to meet international standards and Egyptian law. The first stage

works at the Abu Rawash Wastewater Treatment Plant (WWTP) will have a design capacity of 425,000 cmd average flow (650,000 cmd peak flow) and will receive wastewater from the Northwest and Pyramids systems via the Junction Pumping Station through double 2 m by 3 m cast in place culvert (12 sq meters total). Wastewater from the inlet culvert will be lifted by a two stage screw pumping station, screened by automatically raked curved bar screens, passed through detritors for grit removal, then through an open flume measuring device to the treatment works. The sewage will receive primary treatment in circular radial flow primary settling tanks. Secondary treatment will be accomplished in biofilters with plastic media, followed by activated sludge aeration tanks and final settling basins. The sludge will be treated in thickening tanks (gravity sludge thickeners) and then pumped to sludge lagoons for drying. The effluent from the secondary treatment process will be chlorinated and pass into the Kom Barakat Drain or to land reclamation sites.

4.12 In order to accept the proposed levels of effluent to be discharged, a study will be conducted of the total drain system from the Abu Rawash outfall to the Nile River to determine if any remedial construction or improvements are required to be undertaken by the Government of Egypt. There is a project currently underway to increase the capacity of the siphon under the Beheira canal by 50%. There are other flow restrictions in the drain and in general the drain suffers from lack of maintenance (infrequent dredging) which decreases its flow. A visual survey indicated that with only the normal drain flows and the effluent from Zenein and the unsewered areas the drain system is presently near capacity.

4.13 The design of the Abu Rawash Treatment Plant is currently underway with Japanese financing. The AMBRIC partner Camp Dresser & McKee, is a key joint venture partner of the Japanese design team as is the AMBRIC Egyptian local consultant EGYCO .

4.14 The Minister of Development and the President have both asked USAID to complete the West Bank sewerage works as a package, specifically requesting that the Abu Rawash Treatment Plant be included. As Abu Rawash is a critical element USAID has agreed to include this work in the total West Bank concept. At the time of the GOE's request a soft loan agreement had been reached with the Japanese to fund the design, with the consulting team awaiting a notice to proceed. In order to avoid further design delay USAID has suggested that the design proceed with Japanese financing under the supervision of AMBRIC. This supervision would assure that USAID design and construction requirements are included, in the event that construction is wholly or in part funded by USAID. Costs of the plant construction have not been firmly estimated, however they are assumed to be in the range of $200 million.

4.15 The Japanese are most interested in funding the foreign exchange component of this plant under their soft loan program. They note that once they have funded the design of a project, they have an unwritten commitment to fund the construction. The Japanese AID program to the GOE is large enough for them to easily meet the estimated foreign exchange costs of this plant in any given year, however probably not before late 1986 or early 1987 because of their programming requirements. This timing is contingent upon having a preliminary cost estimate by late 1984. The USAID interest in the West Bank works is in assuring a complete and viable system that

comes together in a systematic manner. Our major goal of expediting household hookups and maximizing clean water distribution can not be met until Abu Rawash is functioning. The USAID goal is also to obtain American visibility and credit for completing an entire system for the people of Egypt. The first goal can only be met if USAID agrees to fully support the construction of the Abu Rawash plant as well as to assure its completion in a timely manner. The latter visibility goal may be in conflict with the Japanese interests.

4.16 At this time planning and cost data are inadequate to include the detailed funding levels in this project paper. It appears that the Japanese financing approach will not assure that the Abu Rawash plant will be available to receive wastewater as the Northwest and Pyramids projects come on line. The GOE will not be able to meet this large local cost component required under Japanese financing in a timely manner nor will local contractors probably be able to meet the tight construction schedules required.

4.17 At this time the concept of Abu Rawash as being an integral part of the West Bank project is included for authorization only, with construction details and funding levels to be provided by amendment in early 1985 as cost estimates and construction approaches are further developed. Such inclusion would also be considered as part of the $1.2 billion committment under the Memorandum of Understanding. For informational background, the following alternatives are currently under consideration:

(a) Full USAID funding
(b) Co-financing with the Japanese.
(c) Phasing the plant construction; i.e. USAID financing primary works and Japanese financing secondary works.

Full USAID financing would assure maximum viability however it runs the risk of delaying household hook-ups by one to two years in the event the US fund flow to the water and wastewater sector is constrained.

4.18 Co-financing with the Japanese offers a certain amount of leverage to the USAID committment as well as a high visibility factor. More importantly this approach offers the opportunity to maximize hookups at an earlier date. USAID is currently maintaining a continuing dialogue with the Japanese and has discussed the possibility of co-financing. Although no commitments have been made by either side, the Japanese have expressed an open interest. Joint financing under this approach would probably result in much of the USAID funding going in support of local costs.

4.19 Phasing of the plant's construction could allow the two separate treatment processes, for example, to be constructed by separate funding and, in turn, separate contractors. The primary phase could proceed first with joint works, and be operated independently with effluent discharged in the drain rather than being subject to the secondary process. This would allow some service during the period the secondary treatments are under construction. This approach, though temporary, is of course subject to environmental considerations and Egyptian law, however it would be a great improvement over the dumping of raw sewage into the drains.

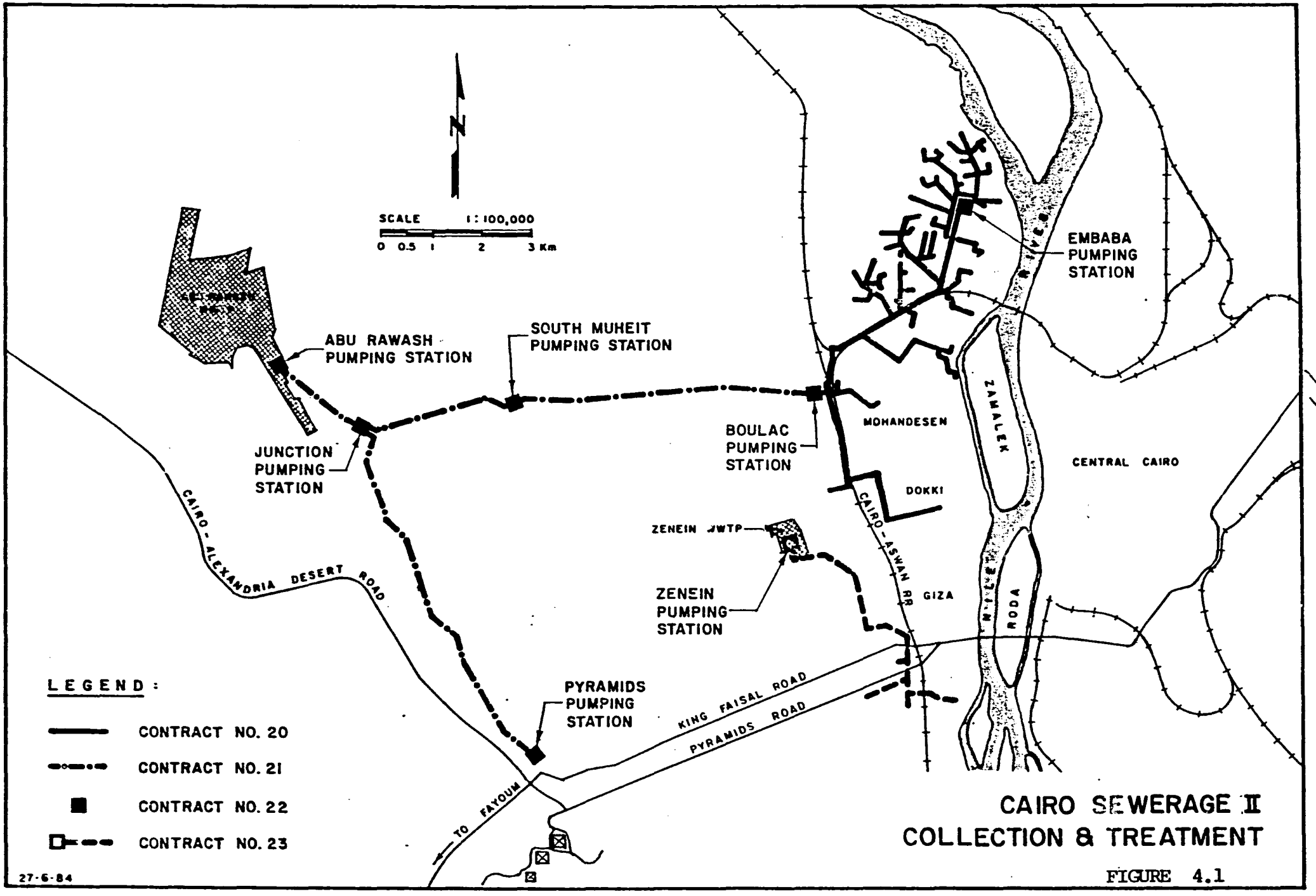
4.20 Once Abu Rawash is completed, the operation of the plant will be a major GOE responsibility and will pose a challenge to GOSD's resources. Historically, GOE operating agencies have failed to adequately operate wastewater treatment plants of even the most

unsophisticated types. Yet the same level of technical expertise has adequately operated more sophisticated water treatment and power generating facilities. This paradox may be due in part to the nature of the product. For example, continual power and clean water are mandatory outputs while sewage is disposed of equally as well in untreated or treated forms. To fully overcome this problem it is believed that a 5 to 10 year period of responsibility should be placed on an expatriate contractor for the proper operation and maintenance of the treatment plant. This concept will be developed further in the forthcoming Abu Rawash Amendment.

4.21 This concern and its treatment is also addressed further under the Zenien Treatment Plant Training Concept.

4.22 Zenein Treatment Plant Training and Management: A key element of the existing project (0091) will be to bring the Zenein Wastewater Treatment Plant up to a working level both by rehabilitation and through management and training initiatives. The latter component will serve as the test program for follow on efforts to be put in place at Abu Rawash and as the training center for the key staff to operate and maintain the Abu Rawash Treatment Plant and supporting pumping station. Approximately $4 million has been reserved under the previous authorization to put this plan into effect. As noted earlier, however, it is believed that USAID should be prepared to support such management operational and training needs for a period of 5 to 10 years in order to protect the US investments made. Careful monitoring and evaluations will be required to assure that these critical goals are being met.

4.23 It is the intention to have all construction work managed by U.S. Contractors, either by assuring that they remain in the primary role or that they play the lead in a joint-venture arrangement. The mission has been pleased with the accomplishments of American construction industry in the sewer and water sector to date. Experience on the Pumping Station Rehabilitation Project, and the expansion of the Rod El Farag Water Treatment Plant indicates that the ratio of expatriates to local craftsmen is about 1 expatriate to 15 local workers. The U.S. firms will be encouraged to make maximum use of Egyptian subcontractors and workers. Joint ventures between US contractors and Egyptian private sector contractors will be considered, subject to review of the joint venture management structure. Experience has shown that the major problems with the Egyptian construction companies relate to management, scheduling and quality control. Historically, USAID experience has been that without control and responsibility by a U.S. general contractor, schedules and quality suffer badly. In addition, the large local construction firms are generally stretched to and beyond their management capacities. This is due to the unusually large construction program in Egypt and to the heavy demands placed on the underground portion of the industry by the major wastewater projects on the East Bank. The proposed large pumping stations and precast culverts are unusual, both from the standpoint of technical difficulty and the sheer magnitude of the projects. Dewatering will be a major technical problem, as has been indicated in our rehabilitation projects.


N
SCALE 1 : 100,000
0 0.5 1 2 3 Km
ABU RAWASH PUMPING STATION
SOUTH MUHEIT PUMPING STATION
JUNCTION PUMPING STATION
BOULAC PUMPING STATION
EMBABA PUMPING STATION
MOHANDESEN
ZAMALEK
CENTRAL CAIRO
DOKKI
CAIRO - ALEXANDRIA DESERT ROAD
ZENEIN JWTP
ZENEIN PUMPING STATION
CAIRO - ASWAN RR
GIZA
NILE
RODA
PYRAMIDS PUMPING STATION
KING FAISAL ROAD
PYRAMIDS ROAD
TO FAYOUM
LEGEND :
CONTRACT NO. 20
CONTRACT NO. 21
CONTRACT NO. 22
CONTRACT NO. 23
27-6-84
CAIRO SEWERAGE II
COLLECTION & TREATMENT
FIGURE 4.1

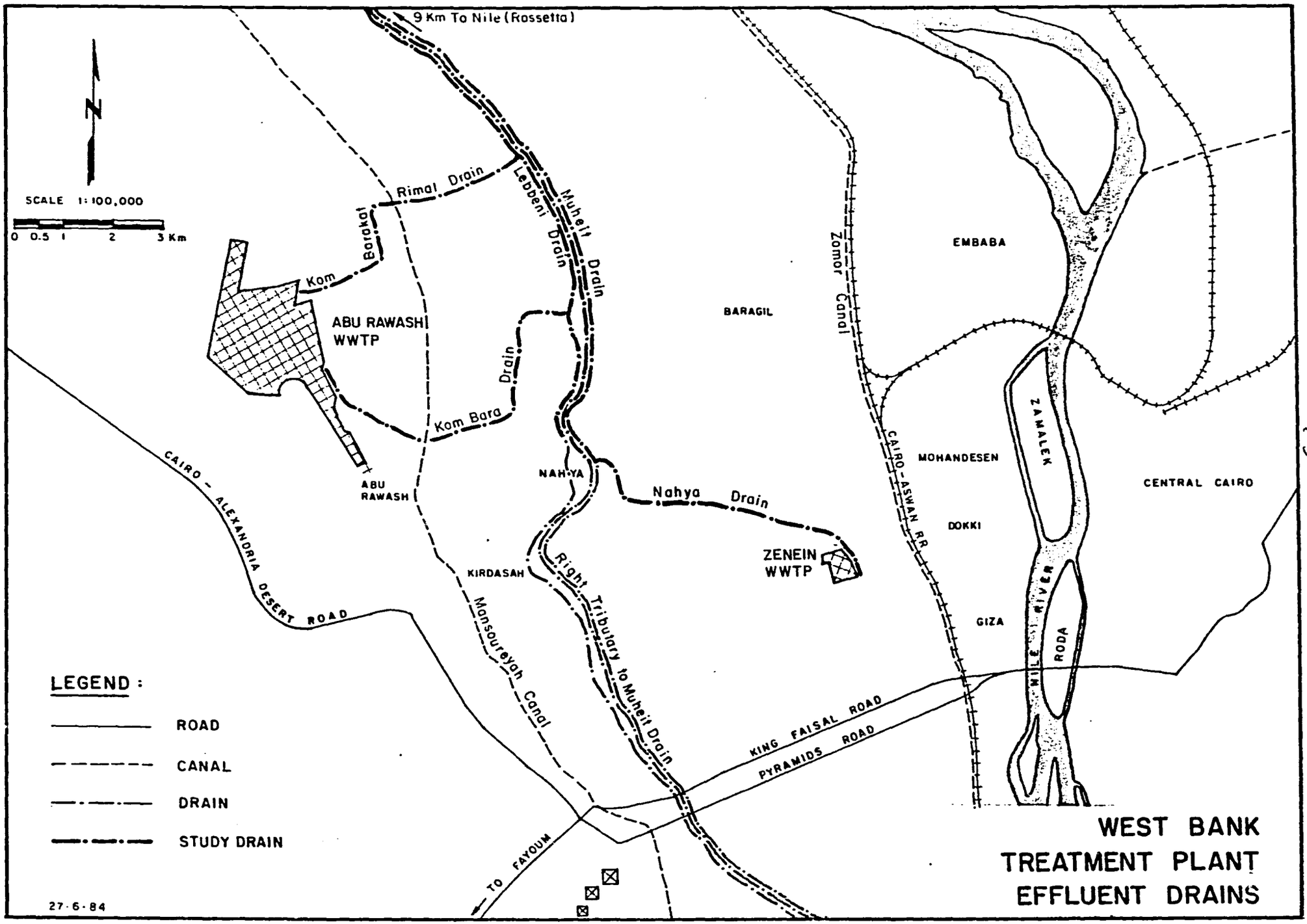

9 Km To Nile (Rossetta)
N
SCALE 1:100,000
0 0.5 1 2 3 Km
Rimal Drain
Lebbeni Drain
Muheit Drain
Barakat Drain
Kom
ABU RAWASH WWTP
Kom Bara Drain
ABU RAWASH
BARAGIL
Zomor Canal
EMBABA
ZAMALEK
CAIRO-ASWAN RR.
MOHANDESEN
CENTRAL CAIRO
DOKKI
GIZA
RODA
NILE RIVER
NAHYA
Nahya Drain
ZENEIN WWTP
KIRDASAH
Right Tributary to Muheit Drain
Mansoureyah Canal
CAIRO - ALEXANDRIA DESERT ROAD
KING FAISAL ROAD
PYRAMIDS ROAD
TO FAYOUM
LEGEND :
ROAD
CANAL
DRAIN
STUDY DRAIN
27-6-84
WEST BANK
TREATMENT PLANT
EFFLUENT DRAINS

FIGURE 4.2

V. Environmental Analysis

A. Introduction

5.01 In 1982, an Environmental Assessment of the Cairo West Bank was prepared by Stanley Consultants in connection with the Cairo Sewerage Project (263-0091). The Environmental Assessment focused on an evaluation of phasing alternatives for facilities construction, technical alternatives for wastewater treatment, and technical alternatives for effluent disposal. The scope of the Environmental Assessment covered all of the activities to be funded under the proposed Cairo Seweage II Project.

Under the provisions of 22 CFR 216.3 (a) (3), a Negative Declaration that the Agency will not develop an Environmntal Assessment or an EIS regarding an action found to have a significant effect on the environment is in order when the Agency has previously prepared a programmatic statement or assessment covering the activity in question which has been considered in the development of such activity. Findings of the 1982 Environmental Assessment have been taken into consideration in the design of Cairo Sewerage II Project, and AID Environmental regulations have thus been satisfied.

B. Existing Situation

5.02 The 875 square kilometer area on the West Bank to be served by the Cairo Sewerage Project contains a population of approximately 1.6 million. The existing wastewater collection system serves approximatly 55% of the residents, with the remaining 45% relying on private carriers to dispose of wastes discharged into vaults below or adjacent to houses. The majority of the population is served with piped water, either from standpipes or house connections, with the water network expanding in advance of sewer connections. Because of the currently inadequate capacity of the wastewater system, the new Embaba water plant must limit the amount of treated water it is distributing so as to avoid surcharging the system.

5.03 The sewage in Cairo is primarily of domestic origin. Industrial wastes make up less than 10% of the total flow, a percentage which is not expected to increase significantly in the near future. The characteristics of this industrial waste are not expected to effect treatment and do not preclude use of sludge or treated effluent for land reclamation.

5.04 The existing West Bank collection system has suffered from the effects of age, misuse, lack of maintenance and design deficiencies which have resulted in surcharging and pipe and pump station failure. The overflow of raw sewage floods into streets and ground floor dwellings. Unsewered areas are plagued by flooding caused by insufficient emptying of vaults and by the backing-up of homemade sewerage connections to irrigation canals or drains. Ponding of raw sewage is a serious health hazard, an obstacle to traffic and commerce, a source of foul odor and visual nuisance, and in extreme situations can lead to building collapse. A graphic example of the problems plaguing the collection system was the Giza Pump Station failure, which resulted in widespread flooding and water cutoffs for as long as two weeks in December 1982. The situation received wide publicity and had all the ingredients of a major public health disaster.

5.05 Sewage collected by the existing West Bank collection system is conveyed to Abu Rawash, Nahya and Zenein treatment works, none of which are currently in operation. Abu Rawash is primarily a disposal facility for sludges generated at the Nahya and Zenein treatment plants. Sludge is dried on sand beds and sold to local farmers as fertilizer. The Nahya and Zenein plants provide nominal primary treatment, after which the effluent is discharged into the Nahya-Muheit Drain system. (The Zenein plant is designed as a secondary facility but does not operate at that level.) The discharge of primary treated effluent to the main agricultural drains was a deliberate act on the part of the Government of Egypt during the mid-1960's when urgent action was needed to relieve the increased sewage flows removed from the city.

5.06 The Nahya-Muheit drain system is currently accepting about 250,000 cmd of raw sewage from the Nahya and Zenein facilities. The drain system, comprised of the Nahya, Muheit and Lebbani Drains and the Rahami Canal, discharges into the Rosetta Branch of the Nile. The Nahya and Muheit waters are septic for the entire length of the system, with sampling indicating no dissolved oxygen.

5.07 The region along the drain is, for the most part, sparsely populated and the impact of the effluent is not severe. Residents living along the drains are generally aware of the polluted condition of the water and do not use it for purposes other than supplemental irrigation. The primary danger to public health comes from the shallow wells which are located adjacent to the drains and are a source of drinking water.

5.08 The confluence of the drainage system with the Rosetta Branch of the Nile comes at a point 10 km downstream from the Delta Barrage. The nearest major water withdrawal for domestic and industrial use is 100 km downstream at Kafr el Zayat, however the Rosetta Branch is used for domestic, industrial and irrigation supply along its entire length. The flow in the Rosetta Branch is controlled at the Nile Barrages and fluctuates considerably as water is diverted into the Raiyah el Beheira Canal for domestic water supply and irrigation.

5.09 The discharge from the Muheit Drain into the Rosetta Branch of the River Nile is clearly distinguished by the difference in the color of the water. The discoloration persists for several kilometers and floating material of sewage origin has been observed

10 km downstream from the point of entry. Dissolved oxygen readings show a substantial reduction in the oxygen content downstream of the discharge point. Local fishermen report that catches are adversely affected for a few kilometers downstream. A UNDP study in August 1980, indicated, however, that water quality in the Rosetta Branch recovers quickly from the very sizeable organic load discharged by the drain system and that existing water quality conditions are not seriously deteriorated.

C. Effect of Project

5.10 The West Bank Collection Project is intended to extend or improve the wastewater collection systems in the Embaba, Giza and Pyramids areas of the West Bank, with the goal of providing access to service for an additional 1,214,400 people by 1990. This extension, along with population growth, will increase wastewater flow from its current level of about 250,000 cmd to approximately 480,000 cmd by 1990, and 1,000,000 cmd by the year 2000. Ultimately the basic system is capable of handling the effluent from approximately 8,000,000 people. Disposal of the sewage effluent will be primarily by drain to the Rosetta Branch of the Nile and to land reclamation projects, after treatment at Abu Rawash or Zenein.

5.11 Improvements in the sewage collection system will result in the elimination of the health hazard posed by flooding and ponding of raw sewage in the streets. The foul odor, visual nuisance and obstacle to transit and commerce resulting from the lack of a sewage collection system or from system failure will also be eliminated. Provision of increased sewage collection capacity will also permit the expansion of the potable water system and the public health

benefits associated with that service. The combined effects of this project should, therefore, substantially improve the local environment and contribute towards ameliorating the quality of life for area residents. (See Section VIII for a more detailed health and social analysis.)

5.12 Construction activity will have an impact on the local environment, although negative effects can, with care, be minimized. The major problems associated with the construction period will be a disruption of services (electricity, water supply, sewerage), traffic congestion resulting from the need to close off streets and increased truck and heavy equipment traffic, minor and temporary air pollution by exhaust emmissions and construction dust, and the potential for damage to structures adjacent to construction sites. These problems can be minimized by providing temporary sources of potable water and by-passes or tank trucks for sewage removal, identifying suitable traffic detours, assuring that construction equipment is properly operated and maintained, and providing underpinning and trench sheeting as necessary to prevent building collapse and protect workmen.

5.13 The additional sewage collected through the extension and improvement of the West Bank system will be treated and disposed of along with that from the existing system. The intent (see Section IV, Technical Analysis) is for the majority of the flow to be given secondary treatment at Abu Rawash, with the resulting effluent being discharged into the Kombarah Drain, an agricultural drain leading to the Muheit Drainage System and thence to the Rosetta Branch of the Nile or being used for land reclamation. The Zenein Plant, which has been recently expanded to 330,000 cmd, will also continue to discharge effluent into the Muheit Drainage System.

5.14 . Until such time as the Abu Rawash Treatment Plant is built, and both it and the Zenein Treatment Plant are operating at their designed secondary treatment level, the majority of the effluent from the West Bank system will continue to be discharged into the Muheit Drainage System with little or no primary treatment. The effect on the Nile of such large additional volumes of raw or nominally treated sewage is of concern. The limited data available would appear to indicate, however, that because the existing uses of Nile water within the influence of the Muheit Drain are minimal and the impact of the current level of discharge is not severe, discharge of primary or untreated effluent into the Rosetta branch is an acceptable interim solution when balanced against the alternative of increased flooding of sewage in Cairo. Treatment is planned and will be accomplished with the Abu Rawash plant and with improved operating performance at Zenein.

VI - Economic Analysis

6.01 The Cairo West Bank sewerage project, in its broadest definition, envisions spending a total of $1.4 billion over a period of six years to provide wastewater disposal to an area of the city that currently contains 1.6 million people and is expected to contain about 8 million people by the year 2020. The U.S. - financed portion of this system, Cairo II and its proposed 1985 amendment, is expected to cost $815 million.

6.02 This project, like most large scale infrastructure undertakings, presents difficult conditions for obtaining a favorable benefit/cost ratio: costs tend to be early, definite and identifiable, while benefits are late and difficult to quantify. Quantification of benefits is not ready derivable from evidence of customer's willingness to pay for services because Egyptians have never been charged for publicly provided sewer services. As the late Senator Hubert Humphrey once remarked, to the Commissioner of Labor Statistics (after learning of the many problems of estimating unemployment), "you mean, to tell me, Mr. Shiskin, that we are flying the Ship of State by the seat of our pants.?". And the answer was, (and is), "Yes, indeed."

6.03 The task of this analysis is to narrow the range of unknowns about the benefits and costs of providing sewerage to the West Bank of Cairo. Previous analyses of the economic and financial elements of sewerage projects in Egypt [1] have documented the costs per household of providing sewerage services using varying assumptions about the

---

1/(Cairo I - No: 263-0091 and Canal Cities - No. 263-0048 by USAID and the World Bank's, Arab Republic of Egypt Water Supply and Sewerage Sector Memorandum, Report #3801-EGT, January 13, 1984).

appropriate basis for allocating costs to the household (operations and maintenance only, full costs on a cash basis, costs on a utility basis, etc). These costs were then used to construct schedules of charges to the household, and pro-forma income and balance sheets for the public wastewater authority. The analysis of Cairo II draws upon these studies for certain key assumptions that feed into the benefit/cost formulation, and upon selected information on the costs of present practices of sewerage disposal from private contractors operating in Cairo.

6.04 The principal components of Cairo II benefit/cost calculations are estimates of:

1. current dollar construction outlays and related expenses necessary to build the system;

2. operation and maintenance expenses (O & M) needed to ensure continued operation of the system;

3. Constant (1984) dollar estimates for 1. and 2;

4. the conversion factor for translating financial costs to economic (resource) costs;

4. the number of beneficiaries (population served by the new sewers);

5. the constant (1984) dollar value of sewer service per capita; and

6. an estimate of economic benefits, direct and indirect.

6.05 Current Dollar Construction Costs

Table 3.2 provides a current dollar estimate for the major elements of Cairo II, for the fiscal years 1984 through 1988. A more detailed breakdown of the principal elements of these costs (labor, construction material, installed equipment and net capital consumed in construction) by major project component is provided in Table 6.1. Total West Bank costs, including estimates of the value of GCE and other donor contributions (provided in Table 6.2) are used for the analysis. These costs generally are based on a number of different assumptions on the average annual price increase over the construction period. Details of the inflation assumptions are included in the cost estimates in Annex G.

6.06 Operation and Maintenance Expenses

Operation and maintenance costs were developed by Ambric for the two treatment plants (Abu Rawash and Zenein) and for the seven proposed screw pumping stations. These constitute by far the largest portion of the O&M costs associated with the Cairo sewerage project on the West Bank. Once the system is complete these costs will rise to a current dollar total of about $30 million annually (in 1993), or slightly over 2 percent of the total project cost of $1.4 Billion. This is a somewhat larger ratio of O&M to total costs than was used in previous wastewater projects in Egypt, which relied largely on the BVI-ATK Associates studies of wastewater costs and tariffs.[1/] These studies suggested that the ratio of O&M costs to total value of assets created is likely to be 1.6 percent. However this ratio would vary with the nature and timing of construction costs and O&M costs, as well as other factors - including the inflation rate assumption applied to these costs. The ratio of constant (1984) dollar O&M costs to project total economic costs (including the GCE and Japanese contributions) is 1.4 percent when all components are in place and operating.

1/ Management and Tariff studies Relative to Water/Sewerage Systems. USAID Grant #263-0025 (1979).

6.07 Constant dollar estimates

The package of construction and O&M cost estimates in Cairo II contains a variety of inflation assumptions that reflect the price escalation experience of similar costs under Cairo I and other wastewater projects in Egypt. Estimates of the various costs were examined in as much detail as these data permitted (which was substantial) and deflated to a base year of 1984. These constant dollar costs then became the basis for conversion to economic (resource) costs.

6.08 Conversion Factor for Economic Costs

Conventional engineering/construction costs estimates were regrouped into a format that facilitates the calculation of a financial/economic cost conversion factor. The table below provides details of this calculation:

	Financial Costs ($ million)	Conversion Factor	Economic Costs ($ million)
Installed Equip	115		115
Construction In Place	700		809
Local Labor	(190)	(0.88)	(167)
Local Material	(110)	(2.20)	(242)
Foreign Labor	(205)		(205)
Foreign Materials	(90)		(90)
Const. Equip. Net	(105)		(105)
Total	815	1.13	924

No conversion factor was required for installed equipment, foreign materials, foreign labor, and construction equipment used up in the process of building the system. These inputs will be purchases from U.S. sources and accounted for in U.S. dollars.

The local conversion rate for labor (0.88) is an average of the accounting ratios for skilled (1.06) and unskilled labor (0.70) for urban public sector projects in Egypt.2/ The local conversion factor for materials (2.20) is an average of the World Bank accounting ratios for Egyptian building and construction materials (90%, ratio of 1.7) and fuel

2/p. 64 World Bank Report No. 4136-EGT, Arab Republic of Egypt: Issues of Trade Strategy and Investment Planning

(10%, ratio of 6.8). These accounting ratios tell us that the price system in Egypt tends to overvalue labor and undervalue materials. The aggregate conversion factor of 1.13 was applied to constant dollar U.S. construction inputs to determine the real resource cost of U.S. inputs.

GOE contributions, were converted to economic costs using a conversion factor of 1.41, representing the average economic cost for labor and materials, assuming labor is 60 percent of the total. This conversion factor was applied to the constant dollar cost of GOE construction inputs to determine their resource cost. The exchange rate applied to the conversion of local costs to dollars is the exchange rate of LE 1.12 per dollar.

6.09 Number of Beneficiaries

Table 6.6, provides the detailed population estimates for the Cairo West Bank sewerage project area. These estimates show population growing from the current population of 1.6 million to nearly 8 million by 2020. Table 6.7, provides a further breakdown of this population into those now sewered, and those expected to be sewered by the year 2020. By that year, an expected 7.2 million people will be provided with sewer access as a result of Cairo Sewerage II.

6.10 Financial Value of Benefits to Beneficiaries

There is little evidence on which to base this critical assumption. A January, 1984 World Bank study (report # 38001 EGT - cited previously) estimates the annual cost of providing urban sewerage at 200 LE per capita at 1983 prices. A 12 percent return to this capital investment would imply a financial value of 24 LE per capita annually, or 108 LE per household using the World Bank assumption of 4.5 numbers per household. Some evidence exists that households in Cairo now pay from 2 to 20 LE per person per month for the removal of sewage, which would equate to household cost of from 24 LE to 240 LE annually. Lacking further evidence, this analysis assumes that a financial benefit of 24 LE per capita (roughly $21 at $1=1.12) is an appropriate financial benefit value per capita.

6.11 Economic Value of Benefits

The economic value of benefits is assumed to equal or exceed the financial value in constant (1984) dollars. There is no attempt to estimate the inframarginal benefits or consumer surplus arising from convenient, reliable sewer service, although such an estimate would be appropriate. Nor is there any attempt to estimate the potentially considerable external benefits that will accrue to those other than the individual house customer for the sewerage services, e.g., through better community health, improved business climate, more tourists, etc. These benefits are even more difficult to quantify than direct benefits. Nevertheless, it is assumed the level of such economic benefits would be sufficient to provide an acceptable internal rate of return.

6.12 Results

Based on a projected financial value to the user of $21 and disregarding the consumer surplus and external benefits, the Cairo West Bank sewerage project (including the contributions of the GCE and Japan) shows an economic rate of return of 4.6 percent.

Construction costs amount to the U.S. dollar (1984) equivalent of $1,082 million, while O&M costs are estimated at $15.6 million annually. Annual financial Benefits to household customers increase from $35 million in 1990 to $154 million in 2020, as a result of population expansion in the area. Benefits in the final year of the benefit/cost period (2020) are raised by $974 million to reflect the value of existing assets at that time. Based on consultation with the engineers, it was assumed that the real value of assets in place at that time would be equal to 90 percent of the economic cost of construction. The O&M cost estimates provide for routine replacement of pumping and treatment equipment, and the bulk of the remaining assets are not expected to deteriorate significantly in thirty years.

To approximate the full economic returns, the per capita value of sewerage benefits was raised by 50 percent from the level of financial net benefits to about $32 per month (1984 basis) and by 100 percent to $43. As might be expected from the benefit/cost streams, these increases resulted in a roughly proportional increase in the internal rate of return. Specifically, the internal rate of return for $32 per capita rate of benefits was 6.8 percent and the return for $43 benefits was 8.6 percent (See Tables 6.4 and 6.5).

The above results are instructive of the areas in which we need to develop improved estimates of the value of sewer services to beneficiaries. They also indicate the magnitude of the indirect benefits that are required to show a high real economic rate of return.

TABLE 6.1

U.S. CONTRIBUTION ($ MILLIONS)

	Abu Rawash	Major Pumps	Culverts	Giza Relief	Collection Systems	Hookups	Management	Construction	Totals
Inst. Equipment	40	40	15	10	10	-	-	-	115
Construction in place	50	60	120	27	267	20	18	33	700
Local Labor	15	20	40	7	85	10	-	13	190
Local Material	10	10	20	5	55	10	-	-	110
Foreign Labor	15	21	40	9	82	-	18	20	205
Foreign Mat.	10	9	20	6	45	-	-	-	90
Construction Equip, Net	10	10	30	5	50	-	-	-	105
Totals	150	170	285	69	594	40	36	66	815

TABLE 6.2

GOE CONTRIBUTION ($ MILLIONS)

Fiscal Year	85	86	87	88	89	90	91	92
Electrical Distribution		5.0	5.0	5.0				15.0
Lands	15.0	-	-	-	-	-	-	15.0
Drain Imp.	-	7.0	7.0	6.0	-	-	-	20.0
Construction	-	1.0	2.0	3.0	2.0	2.0		10.0
Pyramid Lat.	-	-	50.0	100.0	100.0	50.0	-	300.0
NW Lat.	-	30.0	30.0	30.0	25.0	-	-	115.0
Hookups	-	-	5.0	5.0	5.0	5.0	-	20.0
Totals	15.0	43.0	99.0	149.0	132.0	57.0	-	495.0
* Japanese Contribution					50	50		

TABLE 6.3

INTERNAL RATE OF RETURN - PER CAPITA BENEFIT - $21

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
COSTS	67.39	194.88	290.22	271.38	180.54	78.04	15.66	15.41	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64
BENE-FITS	0.00	0.00	0.00	0.00	0.00	35.17	37.28	39.47	41.75	44.13	46.60	49.17	51.84	54.61	57.50	60.50	63.63	66.88	70.26

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64
	73.77	77.42	81.23	85.18	89.29	93.56	98.01	102.64	107.44	112.45	117.65	123.06	128.68	134.53	140.62	146.95	1127.73

Internal Rate of Return .0456099

TABLE 6.4

INTERNAL RATE OF RETURN - PER CAPITA BENEFIT - $32

ear	1985	1985	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OSTS	67.39	194.88	290.22	271.38	180.54	78.04	15.66	15.41	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64
ENE-ITS	0.00	0.00	0.00	0.00	0.00	52.75	55.92	59.21	62.63	66.19	69.90	73.75	77.75	81.92	86.25	90.76	95.44	100.32	105.38

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64
	110.66	116.14	121.77	127.77	133.93	140.35	147.02	153.95	161.17	168.67	176.47	184.59	193.02	201.80	210.93	220.42	1204.49

Internal Rate of Return .0675321

TABLE 6.5

INTERNAL RATE OF RETURN - PER CAPITA BENEFIT - $43

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
COSTS	67.39	194.88	290.22	271.38	180.54	78.04	15.66	15.41	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64
BENE-FITS	0.00	0.00	0.00	0.00	0.00	70.33	74.55	78.94	83.51	88.26	93.19	98.33	103.67	109.23	115.00	121.01	126.26	133.75	140.51

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64	15.64
	147.54	154.85	162.45	170.36	178.58	187.13	196.02	205.27	214.89	224.89	235.30	246.11	257.37	269.07	281.24	293.90	1281.26

59

ID$0096A

Internal Rate of Return .0863611

TABLE 6.6

CAIRO WEST BANK POPULATION PROJECTIONS

	1983 [1]	1990 [2]	2000	2010	2020
Northwest Project Area					
Embaba	434,000	571,000	845,000	1,251,000	1,852,000
Agouza	192,000	253,000	374,000	554,000	819,000
Boulak El Dakrour	430,000	566,000	838,000	1,240,000	1,835,000
Dokki	135,000	178,000	263,000	389,000	576,000
Total Northwest Project Area	1,191,000	1,568,000	2,320,000	3,434,000	5,082,000
Giza Relief System Area	278,000	666,000 [3]	986,000	1,459,000	2,160,000
Pyramids Project Area	173,000	228,000	337,000	499,000	738,000
Total West Bank	1,642,000	2,462,000	3,643,000	5,392,000	7,980,000

1. 1983 CAPMAS population data

2. Applying 4.0% annual rate of growth

3. As of 1990 the Giza Relief System area projections are expanded to include CAPMAS projections and AMBRIC projections of an expanded Giza area with a 1990 population of 300,000.

TABLE 6.7

CAIRO WEST BANK SEWERED POPULATION PROJECTIONS

	1980 [1] SEWERED POPULATION	1990 [2] PROJECTED POPULATIONS	1990 PROJECTED POPULATION TO BE PROVIDED WITH SEWER ACCESS AS A RESULT OF CAIRO SEWERAGE II	2020 PROJECTED POPULATION	2020 PROJECTED POPULATION TO BE PROVIDED WITH SEWER ACCESS AS A RESULT OF CAIRO SEWERAGE II
CAIRO WEST BANK					
Embaba/Agouza	298,000	824,000	526,000	2,671,000	2,373,000
Boulak El Dakrour/ Pyramids	193,000	794,000	601,000	2,573,000	2,380,000
Dokki	110,000	178,000	68,000	576,000	466,000
Giza	220,000	666,000	446,000	2,160,000	1,940,000
Total	821,000	2,462,000	1,641,000	7,980,000	7,159,000

1. AMBRIC's estimates of the 1980 Sewered Population

2. Population Projections based on CAPMAS data, applying 4% rate of growth

VII. Financial Analysis

7.01 A detailed financial analysis of the proposed multi-billion dollar expansion of Cairo wastewater disposal and collection facilities is provided in the Project Paper Amendment to Cairo Sewerage (263-0091). The analysis provided here quantifies the financial implications of Cairo Sewerage II, which is a large and important piece of this expansion plan.

7.02 The Memorandum of Understanding between the Governments of Egypt and the United States (Annex A), in its relevant sections, pledges that tariffs will increase until they are adequate to cover wastewater operations, maintenance, debt service, and routine improvements; and that this action will be taken by the time the construction program is completed. Estimates were made of the amounts that Cairo II would add to tariff requirements under the Memorandum of Understanding using the following assumptions:

(1) Operations, maintenance and routine improvements - Costs are based on AMBRIC estimates for the Abu Rawash and Zenein treatment plants, and for the seven pumping stations; figures used here are the same as those used for O&M in the economic analysis section, except the assumed 7.5 percent inflation rate used by AMBRIC is retained for the financial estimate. These costs were assumed to be adequate for provision of routine improvement, as well as O&M.

(2) Debt service - Cairo II proposes to grant $36 million of the funds provided to the GOE to the Cairo Wastewater Organization and loan the remaining $664 million (see p. 77). The service cost of this debt was calculated assuming the loan was made in three equal annual tranches beginning in 1985, with each tranche carrying a 5 year grace period for repayment of principal. Principal payments are to be made in twenty equal amounts beginning in the sixth year, with interest calculated at 13 percent on the outstanding amount of the loan.

A summary of the financial costs based on the above assumption are provided in Table 7.1 (below).

Table 7.1
Financial Costs
($million)

	1990	1993 1/	2000	2011 2/	2020
Debt	97.2	110.7	80.5	12.5	0
O&M	22.5	31.8	49.1	108.7	208.4
Total	119.7	142.5	129.6	121.2	208.4
Cairo West Bank Sewered Population (million)	2.46	2.77	3.64	5.61	7.98
Annual Cost per person					
Total	$49	$51	$36	$22	$26
O&M	$9	$11	$13	$19	$26

1. Peak year for total costs

2. Final year for debt service costs

7.03 Table 7.1 shows, in effect, the financial difficulties imposed upon the system as a result of the coupling of large initial expenditures with a slowly expanding base of beneficiaries. In 1990, Cairo II will add about $120 million in current costs, and 1.64 million new chargeable customers to the 821,000 customers currently serviced. If these customers were to be charged on a current basis for their services, they would have to be charged $49 per capita, or an average of $220 annually per household. Obviously, this would be neither equitable nor desirable, but the funds must be obtained from some source. Existing customers, who are not now charged for sewerage services, must bear the burden of expansion, as well as their own costs, or funds must be provided from general government revenues. Table 7.1 also shows the declining financial costs, as the debt is repaid. The risen financial costs after 2011(the last year of debt service) reflects the fact that population (which determines benefits) is growing at 4 percent, while inflation (which determine costs) is assumed to grow at 7.5 percent.

Table 7.2
Alternative Financial Costs
($ million)

	1990	1995	2000	2005	2010	2015	2020
25 Yr Loan							
13%	120	136	130	129	128	145	208
11%	106	126	122	125	127	145	208
9%	93	115	115	122	126	145	208
35 Yr. Loan							
13%	116	131	132	139	155	185	226
11%	103	119	122	131	150	182	226
9%	90	108	113	124	145	179	225

7.04 The cost of debt service, is of course, dependent upon the terms and conditions of the loan to the wastewater authority from the Government of Egypt. The rate used for Table 7.1 (13 percent) is the minimum of the lending range for bank loans to the service sector, established by the Central Bank of Egypt. It is also the maximum rate for loans to the industrial sector. Alternative total financial costs under varying assumptions about loan terms and conditions is provided in Table 7.2 (below). Assuming the more liberal terms of 9 percent interest and a 35-year loan, total financial costs would be $90 million ($37 per capita) in 1990, $113 million ($31 per capita) in 2000, and $225 million ($28 per capita) in 2020.

VIII Health and Social Analysis

A. Health

8.01 The 1981 Project Paper Amendment to the Cairo Sewerage Project contains statistical data on water related diseases, infant mortality and population densities as relate to public health. The epidemiological patterns described in that document remain applicable in 1984; the incidence of gastro-enteristis is significantly higher in urban populations, and Egypt, despite the general availability of medical care and the high basic nutrition level, has an extremely high infant mortality rate of between 110 and 180 per 1000 live births. Both phenomena can be related directly to unsanitary living conditions and exposure to the fecal-oral cycle of disease transmission.

B. Social

8.02 The poor standard of public sanitation is of great concern to Cairo residents. There is a general awareness that the accumulation of solid waste and wastewater is a health hazard and many neighborhoods have taken what steps they can to alleviate the problem. Most upper and upper middle class neighborhoods are sufficiently, if erratically, served by the water and wastewater systems and have made some provision for solid waste removal. The lower classes and the poor, however, often live in areas which, although they may have sufficient potable water supply, do not yet have access to household sewerage connections and have no satisfactory means for removal of solid waste. Residents in these

neighborhoods rely on self-help and community efforts and on making a sharp distinction between public and private space in dealing with problems of sanitation. Households generally have and use pour-flush lavatories and attempt to retain the high level of personal hygiene perscribed in Islamic religious literature. Much of the health hazard comes from the disposal of wastewater once it enters the public realm. Many homemade vaults and drainage systems are faulty or of insufficient capacity, and the public spaces surrounding buildings are used as dumping grounds for household wastes and wastewater.

8.03 If no action is taken to improve the sewage collection system, the sanitation problems which characterize low income and poor neighborhoods will no doubt worsen with the increase of population in the Cairo/Giza area and concommitant pressure on the housing stock. This increase, which is expected to bring the West Bank population to 2.7 million by the year 2000, will result in the establishment of more areas of informal housing on the urban fringe and increased population density in existing settlements, many of which are also informal. Informal housing, because it is not sanctioned by the government, is not served by the public services network. Electricity is often acquired fairly soon after establishment, however, with water and sewage connections following thereafter. Potable water supply, including piped household service, is usually available in advance of sewage connections. This is definitely the case on the West Bank where the new Embaba Water Treatment Plant is currently distributing 150,000 m^3/day less than it is capable of producing because of inadequate capacity of the sewage system. Most buildings do have wastewater vaults, which are emptied either by tank truck or manually at a cost of

anywhere from LE 1-2 to LE 20 per household per month. The frequency depends upon whether the vault is permeable or impermeable, soil conditions, grey water disposal practices, vault size and availability of potable water. In some cases the burden of the fee for emptying the vault becomes too much for a household and vaults are allowed to overflow or wastewater is thrown directly into the street. In addition to vault systems, some neighborhoods have, where conditions permit, laid their own sewer lines for disposal in canals or agricultural drains. In this case households pay LE 150 or more for connection rights. As population densities increase and areas are urbanized, canals and drains are filled in and this form of sewage disposal becomes impossible.

8.04 Improvement and expansion of the West Bank collection system will contribute to alleviating the problem of wastewater disposal in Embaba, Giza and the Pyramids areas and should provide access to service for area residents by putting secondary laterals within the reach of individual house connections. Once a street lateral is put in place apartment, house owners can apply to GOSSD/Cairo for a house connection, which average approximately 17 meters in length, from the nearest manhole to the household collection box (the common collection point from individual apartments). GOSSD will then either construct the connection themselves or hire a contractor to do the work. The cost to the householder is the cost of materials and labor plus 10% for overhead. The current cost is approximately LE 20/meter for materials and labor. In many instances house owners will circumvent the official process and arrange directly for a contractor to provide the connection.

8.05 The fees currently being paid by households for vault emptying and informal sewerage systems indicate that there is a willingness and, to varying degrees, an ability to pay for sewerage service. Interviews with residents in Ard El Gemeya, an unsewered area with household water connectioning in Embaba Markaz, indicate that they would readily pay LE 200-300 per structure for sewerage service. This sum would either be paid outright by the landlord who would then collect a monthly fee from tenants or it would be initially raised by soliciting residents' shares. Law 93/1962 (Concerning the Discharge of Wastewater) makes a provision for connecting the very poor by totally exempting owners of buildings constructed before 1962 which have an annual tax of less than LE 5 from connection fees. Owners of buildings of similar age that are taxed at less than LE 10 are required to pay only half of the connection fee.

8.06 The positive impact of improved wastewater collection on the above areas should be considerable. In addition to the toll which system failure and sewage flooding takes directly on the public health, it poses an obstacle to transit and commerce, it is an aesthetic nuisance, it can contribute to building collapse and can be a factor in political unrest. Sewage collection should help to remedy these problems and is a prerequisite for increased distribution and consumption of potable water, surfacing or resurfacing of roads and improved public health. It is unlikely, however, that the provision of a sewage collection system will increase the rate at which informal housing settlements encroach on agricultural land. The crucial factor in that process appears to be the accessibility, on even a standpipe basis, of potable water.

8.07 The increased flow collected as a result of the Project will ultimately receive secondary treatment at the Zenein and Abu Rawash Treatment Plants, with the effluent being discharged into the Muheit Drainage System, a series of agricultural drains which discharge into the Rosetta Branch of the Nile at a point 10 km north of the Nile Barrages. Until the Abu Rawash Treatment Plant is completed and the Zenein Plant is functioning at its designed secondary level, however, the effluent discharged into the drain will receive only nominal primary treatment at best. The entire length of the Muheit Drainage System between the Zenein outfall and the confluence with the Rosetta Branch is septic. The water is black, turbid and foul smelling. The few residents along the drain appear to realize that water from the drain is unsuitable for domestic use. There is little activity apart from some irrigation along the drain and the banks appear undisturbed. Given the current pattern of use, then, there is little reason to believe that an increase in the quantity of effluent flowing through the drainage system will necessarily have a negative effect on those living nearby. Area residents are accustomed to the presence of the drain, understand that it is poisonous and generally act accordingly. As noted in the Environmental Analysis, however, this is only an interim solution, the intent being to provide secondary treatment for West Bank wastewater.

C. Women in Development

8.08 The Women in Development section of the 1981 Cairo Sewerage Project Paper Amendment observes that social and cultural forces generally conspire to keep Egyptian women - particularly poor, illiterate women - confined to the home and neighborhood. The three years which have elapsed since that document was prepared have seen

little change in this regard. Neither have they brought about dramatic improvements in the environmental conditions of the neighborhoods in which so many poor and low income women live. Flooding of sewage into streets and ground floor dwellings and the limit on the use of potable water imposed by the inadequate sewage collection system continues to extract a high toll in the health of women and children.

8.09 Despite its generally high nutrition standards and the availability of health care, Egypt continues to have a very high infant mortality rate of between 110 and 180 per 100,000 live births. At least half of Egypt's annual deaths are children under five years old. In 1983, this meant that 250,000 of the 500,000 deaths were young children. This high infant mortality rate is the key component of the cycle of birth and death which so often characterizes the lives of poor women and children:

1) Poor sanitation and unhealthy living conditions contribute to a high incidence of infant diarrhea.

2) Dehydration related to diarrheal diseases causes 50% of infant deaths.

3) High infant mortality rates are compensated for by women having more children.

4) Multiple and closely spaced pregnancies and lactation lead to maternal nutrient depletion and anemia.

5) Poor maternal health contributes both to high maternal mortality rates* and to low birth weights.

6) Infants with low birth weights are less likely to survive bouts with infant diarrhea.

*The maternal mortality rate in Egypt is 1 per 1,000, or 15 times that in the United States. The general pattern of maternal mortality is that the highest number of deaths is among very young women (15-19 years), women having their first child, women over 35, and women already having given birth to three or more children.

While the provision of adequate wastewater collection will not automatically break the cycle of disease transmission, it is a necessary precondition for improved public health and personal hygiene, including increased use of potable water. Women and children who spend much of their time in the home and neighborhood will be in the position to benefit most from improved living conditions. Better health conditions will free women from some of the burden of multiple pregnancies and the concommitant toll on their health, and will allow them to participate more fully in the development process, particularly as producers of goods and services for the non-cash or local market. Improvements in neighborhood environments, both in terms of freedom of transit and aesthetics, should also contribute to drawing women into the economy by encouraging local commerce and increasing the provision of services.

IX. IMPLEMENTATION PLAN

A. Policy Dialogue

9.01 The rate of implementation for this project is keyed to the ongoing sector policy dialogue. This is articulated in the Memorandum of Understanding (Annex A) signed in January, 1984 by the Minister of Reconstruction and Minister of State for Housing and Land Reclamation, the Minister of Investment and International Cooperation and the USAID Director. Because of the sizable committment of USAID resources the AID Administrator personally approved the Memorandum of Understanding.

9.02 The Memorandum of Understanding provides for a $1.2 billion USAID funding program for the water and wastewater sector during the calendar years 1982 through 1987, subject to Congressional approval of funds. The memorandum anticipates that the construction program will be completed on/or before July 1, 1989.

9.03 The memorandum also provides for certain management and administrative actions by the GOE to strengthen Egyptian water and wastewater institutions. Specifically required of the GOE are adequate tariff increases, and increases in the size of the operations, maintenance and investment budget. Also agreed upon are provision of adequate facilities for training and technical services, and recruitment of qualified staff. The GOE is required to establish autonomous local water and wastewater organizations and to retain a construction management firm.

9.04 The memorandum provides that these specific management actions will be phased and will be fully in place by the July, 1989 target completion date.

9.05 Representatives of both parties are to meet annually to review and evaluate past and planned activities. At this time performance has been accepted as adequate to maintain a $200 million funding level through FY 1984. This conclusion was reached after the first annual review meetings in January and February of 1984.

9.06 USAID commitments to this program (based on a $1.25 billion level discussed in Jan. 1983 AID/W meetings) are as follows:

CY 1982 - $250.0 Million
CY 1983 - $214.2 Million

The CY 1983 program includes $31.9 million of FY 1984 funds obligated for the Alexandria Wastewater Project. The balance of the USAID commitment under the Memorandum of Understanding is therefore approximately $800 million.

B. Construction Scheduling

9.07 In addition to the availability of funds, several other critical factors affect the rate of construction. For example, household hook-ups cannot be made without a point of discharge for the wastewater once collected. For both the Northwest and Pyramid projects this point will be the Abu Rawash Treatment Plant. In addition the construction of collectors must coincide with the availability of pumping stations and so on. Unfortunately in providing new service the major supporting infrastructure including treatment works, pumping stations, conduits, collectors and laterals must precede the household hook-ups.

9.08 Geographically the Cairo West Bank works fall into three areas or separate units. The first is the Giza Relief Project which is served by the Zenein Wastewater Treatment Plant. The second is the Northwest Area which is served by five major pumping stations, a major conduit (culvert) and the Abu Rawash Treatment Plant. The third is the Pyramids Area served by the major conduit and a pumping station, and sharing with the Northwest Area two pumping stations, a major conduit and the Abu Rawash Treatment Plant.

9.09 The proposed construction approach is to first start the Giza Relief Project. Geographically this project is not tied to additional construction activities, and will allow some immediate visibility on the West Bank. The second geographic focus will be on the Northwest Area Project. The magnitude of this work will result in having several construction contracts structured to meet the total program objective while still protecting policy dialogue concerns and issues. This focus must include the ultimate receiver of the wastewater, the Abu Rawash Treatment works. The third and last focus will be on the Pyramids Area Project. This system will be treated as a branch to the main conduit and treatment works serving the Northwest area. Thus, work done in this area cannot be utilized without completion of the Northwest works.

Giza Relief Sewer and Pump Stations

9.10 Prequalification of potential contractors for this component will be done in August. Final construction documents will be completed in September 1984, with invitations for bidding expected to follow immediately. Construction could start on this project early in 1985. The current estimate for this work is $42 million with a 30 month construction schedule.

Northwest Area Sub-Project

9.11 The complexity of this project is best understood when divided into its discrete components. This can be accomplished by starting at the household then working downstream to the treatment plant, as outlined in the following table.

Northwest Site Works	USAID (Million $)
a. Household connection support	10.0
b. Laterals	60.0
c. Embaba collection system	29.1
d. New Area collection system	14.9
e. Embaba pumping station	18.0
f. Northwest spine	41.7
g. Southern Relief	29.8
h. Connect Existing to Spine	21.3
Transmission to Muheit Drain	
a. Boulac Pumping Station	18.0
b. Culvert	59.2
c. South Muheit Pumping Station	18.0
Transmission to Abu Rawash	
a. Culvert	30.0
b. Junction Pumping Station	19.0
c. Abu Rawash Pumping Station	19.0

Abu Rawash Treatment Works (Preliminary)

a.	Primary Phase	120
b.	Secondary Phase	80

For the Northwest Area, the minimum components which must be completed before laterals and household connections can be constructed are the transmission works to Muheit Drain plus key collectors and pumping stations noted under the site works (items c thru g). These items are also subject to phasing if some sub-regions are served earlier than others. This scenario assumes that sewage could be dumped into the Muheit Drain at the point of intersection with the culvert. This is forbidden by Egyptian Law (Law 48-1982), however this law is currently ignored by wastewater authorities for lack of alternatives. Any major discharge of untreated waste other than on an emergency basis is bound to become a subject of major local controversy and opposition. Obviously this could be focused at USAID if discharges continue or increase.

9.12 Assuming that construction will be phased to minimize the time lag for household hook-ups while at the same time protecting the integrity of the policy dialogue, this Muheit Drain discharge option must be considered. Working back from the drain work, items required for immediate start are:

a.	The Transmission to Muheit Drain (culvert and two pumping stations)	95.2
b.	Northwest Spine	41.7
c.	Southern Relief	29.8
		$166.7 M

Items that support these main sewer works are:

a.	Embaba Pumping Station	18.0
b.	Embaba Collection System	29.1
c.	New Area Collection System	14.9
		62.0 M

Those items required last in the system:

a.	Household connections support	10.0
b.	Laterals	60.0
c.	Existing Pump Connections	21.3
		91.3 M

Laterals must remain as a late construction item since the pressure for hookups is so great that unathorized work is expected to take place almost immediately. Such hookups made in advance of the time that the system is ready to accept sewage will be major problem.

9.13 Other factors such as the period of construction vary for each item and become important considerations when targeting a total system for startup by a selected date. This is best shown in the accompanying alternative work schedules.

Pyramids Project

9.14 The key elements of the Pyramids Project again include the down stream activities. Without these, laterals and household connections cannot proceed. The Pyramids Area Culvert and Pumping Station will be priority items estimated to cost approximately $95 million. Their use, however, is contingent upon completion the Abu Rawash Treatment Plant and the culvert from the Junction Pumping Station to the treatment plant. However the drain system (one branch of the Kombarah Drain) could provide some emergency relief for the dumping of raw sewage in the vicinity of the junction. The collectors and laterals in the Pyramids area are currently under design by local A&E's with the anticipation that construction would be done by CWO. However, the GOE has requested USAID funding support for this work because the GOE's support of the major East Bank projects has obligated much of the available funds. In order to assure that all necessary collectors, laterals and hookups are completed, financing by USAID on a cost sharing basis is proposed.

Construction Approaches

9.15 Several alternatives exist for packaging the construction contracts. Three are discussed as follows:

1) The first approach, the simplest of the three, would be to award contracts on the major items of work such as the culverts, pump stations, treatment plant and collectors as soon as construction documents are ready. This would allow for construction to start on all of the major work in 1985. Abu Rawash Treatment Plant however, could not begin before 1986. The contract amounts would total $500 to $600 million, however construction would be spread over a period of four years. Expenditure rates would probably not exceed the Mission target of $200 million per year obligation levels implied under the Memorandum of Understanding. This is the only alternative that would allow

USAID to meet the target July, 1989 construction completion date described in the Memorandum of Understanding. However, even under this plan all household hookups will not be completed until after the target date. Because of the large amount of funding required this approach is best suited to annual construction funding rather than the traditional front end funding. An obvious advantage in this method of funding construction is a greatly reduced pipeline. Other advantages are reduced costs from inflation savings, the completion of a workable system within the Memorandum of Understanding criteria and, most importantly, hookup service provided to a much greater number of people at a relatively early date. Lastly, this approach would not exceed annual target funding levels.

Disadvantages of this annual funding approach are, first, that USAID will lose much of its leverage for policy change as spelled out in the Memorandum of Understanding and secondly, each contract will require an escape clause in the event follow on funding is for some reason not available. This of course also puts a higher degree of risk on the contractor, which could be reflected in higher costs.

2) A second alternative is to follow traditional agency construction practice, which is to award only after funds are fully obligated. This approach is expected to extend the construction period by two or more years over the annual funding alternative. Other disadvantages are that USAID will be unable to meet the Memorandum of Understanding targets and that costs can be expected to increase as a result of inflation.

Advantages of this approach are that USAID will maximize its leverage for policy change by being able to defer construction starts. The annual expenditure rate for this approach would be similar to the first alternative.

3) A third alternative would incorporate the best features of the two previous approaches. This approach is keyed to awarding contracts of similar work activities with phased additives. For example, a contract may be let that provides for the construction of up to six pump stations. The contractor would be awarded the work for two immediately, with two more as an optional additive item at the end of year one and the last two as an optional additive item at the end of year two. Culvert construction could be awarded by usable segments compatible with the pumping station work. Collectors could start at the lower end and spread outward toward households in a pattern that once completed would be usable, assuming that downstream works are in place. Contract design would focus on the priority items that could most likely stand alone as discussed earlier. One key advantage of this approach is that the lag-time in readvertising and in mobilization will be minimized leading to a much earlier completion date, while still allowing USAID to maintain its policy leverage. Costs are also expected to be much less than in alternative two. This alternative is preferred by the mission and provides the basis for cost and construction documentation work currently in progress. An illustrative construction schedule is shown as Figure 9.1. Additional figures showing other optional model construction approaches are included in Annex G.

C. Construction Supervision

9.16 AMBRIC, as the project engineer will provide construction engineering and supervision and management services to CWO during the construction of all projects except for Abu Rawash. AMBRIC is currently supervising construction on the rehabilitation projects and will be supervising construction on the East Bank tunnel project. As is the case with the rehabilitation work, AMBRIC will be the primary contact with the construction contractors. AMBRIC

will approve shop drawings, provide inspection service to insure the work conforms to specifications, execute any necessary design changes, assist the contractor in obtaining permits and review and approve contractor invoices. At the end of construction, AMBRIC will provide CWO with as-built drawings of the completed facilities. Construction supervision of the Abu Rawash Treatment Plant is expected to be provided by the design contractor, with AMBRIC involved in the broader construction management role.

D. Training

9.17 In addition to the training oriented towards operation and maintenance of the rehabilitated collection system, the Cairo Sewerage Project (0091) will fund a training program for wastewater treatment plant operations and maintenance. This training program will be conducted as part of the rehabilitation of the Zenein Treatment Plant and will emphasize hands-on training of technicians as well as supplementary classroom instruction. GOSSD personnel trained under this program will provide both long term staffing for the Zenein plant and a core cadre of experienced operations and maintenance staff for the Abu Rawash Wastewater Treatment Plant and associated pumping stations. This training and management responsibility is expected to continue throughout the construction period of the Cairo Sewerage II Project (at least five years) after which time a detailed review and evaluation will be performed to determine further needs. After completion of 0091, funding for this effort will be continued under this new project.

9.18 The new components of the West Bank collection system which will be constructed under Cairo Sewerage II will require additional specialized training and will be able to utilize training initiated for the rehabilitation projects. Although the West Bank collection system has been designed to require a lower level of maintenance than the existing system, proper operation and maintenance of the screw pump stations will require that the contractor provide hands-on training and supervision to C/GOSD personnel responsible for the facilities.

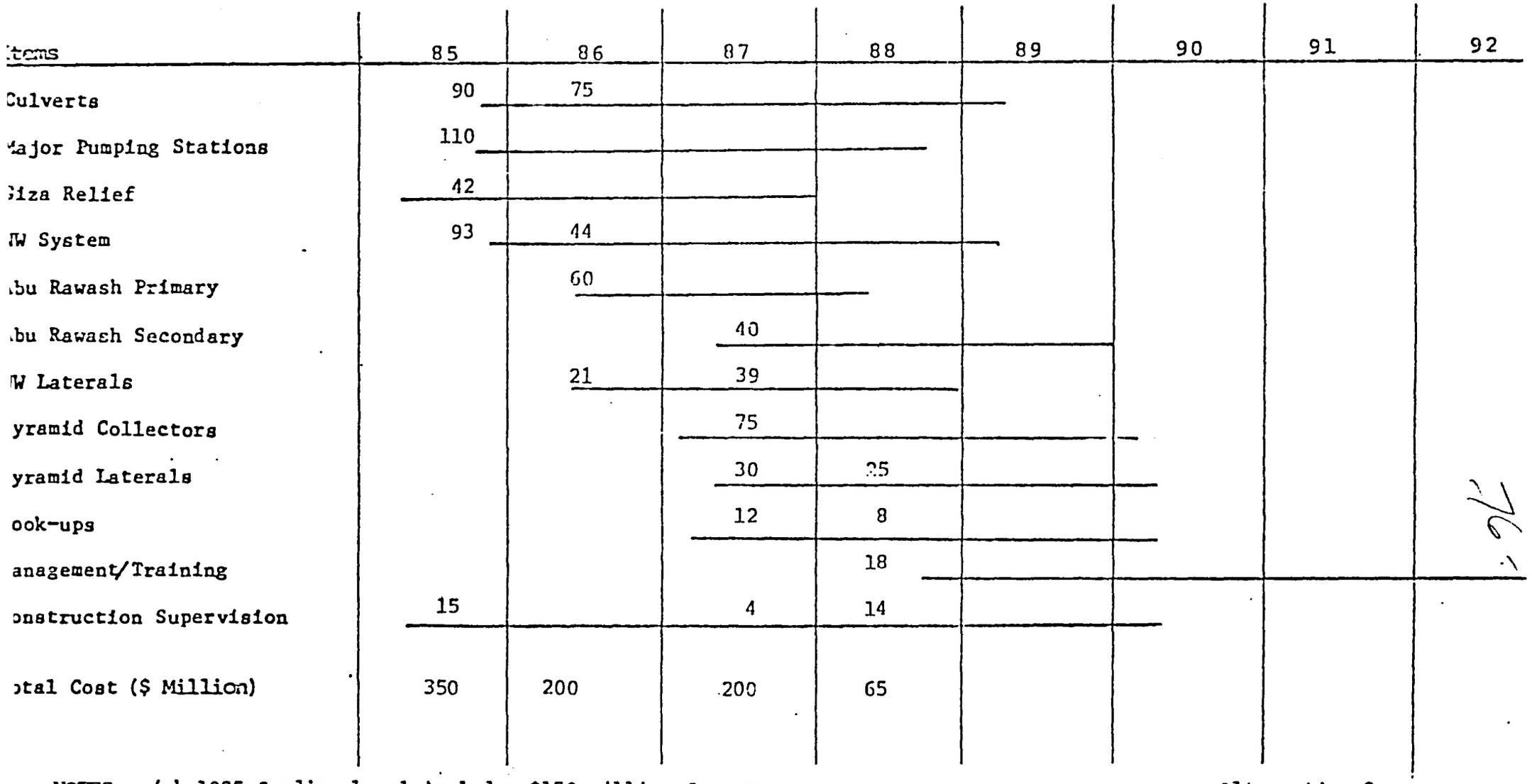
9.19 In order to assure that the Abu Rawash Wastewater Treatment Plant is properly managed, operated and maintained, responsibility for plant supervision and operation will be given to U.S. contractor. This concept will be developed further in the proposed project paper amendments to establish funding and construction approaches. In addition to day-to-day operation of the plant, the contractor will be responsible for providing hands-on and classroom training to C/GOSD personnel in all aspects of operating, maintaining and managing the Abu Rawash Treatment Plant. Contractor personnel will be phased out as C/GOSD staff demonstrate over time their ability to assume responsibility.

E. Evaluation Plan

9.20 The project will be subject to both interim and final evaluations. At one or more points during implementation, the GOE and AID will: (1) evaluate progress toward attainment of project objectives; (2) identify and assess problem areas which inhibit such attainment; and (3) determine how such information may be used to overcome implementation difficulties. A final evaluation will assess achievement of project objectives and, to the extent feasible, evaluate the overall development impact of the project.

System utilization, the key to beneficiary impact, is dependent not only upon the major infrastructure being in place but upon laterals and household connections being constructed in a timely manner. Therefore, both the interim and final evaluations will focus on whether the construction/installation of these facilities is keeping pace with the rehabilitation and expansion of pump stations, culverts, and treatment plants.

9.21 A water/wastewater sector evaluation is planned for February 1985 to assess attainment of objectives under the on-going water and wastewater projects in Cairo, Alexandria, and the Canal Cities. In addition, the evaluation will address the attainment of policy objectives. Inasmuch as the Cairo Sewerage I project is in effect a first phase effort on the West Bank, the lessons learned will be useful not only to implementing the new project but also to structuring the evaluation program.



NOTES: (a) 1985 funding level includes $150 million from FY
(b) First house connections estimated in early 1988
(c) Construction complete in 1990

Alternative 3
"Additive" Construction Approach

Illustrative Obligation and Construction Schedule

Fig. 9.1

X. Recommendation, Conditions and Covenants

A. Recommendation:

10.01 Subject to the conditions and covenants discussed above, it is recommended that AID authorize a grant from the Economic Support Fund of $700 million as a first tranche of funding for the foreign exchange and some of the local currency costs of the Cairo Sewerage II Project. These funds will be used for engineering and construction supervision on the East and West Banks and for equipment and construction on the West Bank. Of the total grant, it is further recommended that $36 million be passed on as a grant by the GOE to the Cairo Wastewater Organization and $664 million be loaned by the GOE to CWO. The regrant represents the estimated costs of management, training, engineering and supervision. In the past the costs of equipment and construction have also been regranted, but recent AID policy (see Amendment 1 to the Canal Cities Water and Sewer Project) calls for support for such costs to be loaned. All goods and services financed by AID will have their source, origin, and nationality in the United States and Egypt.

B. Conditions Precedent to Disbursement:

10.02 It is recommended that the following condition to disbursement be included in the Project Agreement:

That prior to the disbursement of any funds for construction under this project CWO have an approved contract amendment with AMBRIC for the construction management and supervision services for elements of construction funded by USAID.

C. Covenants:

10.03 In the past, AID has attempted to achieve policy objectives through covenants for water/wastewater projects calling for financial and institutional reforms considered essential to ensuring sufficient GOE capacity to develop, operate and maintain rehabilitated and expanded water and sewerage systems. This approach has been replaced by the AID-GOE policy dialogue which culminated in January 1984 in co-signing of a Memorandum of Understanding (MOU) spelling out the reforms which are considered critical and linking future AID support of the sector to GOE achievements. Therefore, the following covenant is considered sufficient to represent AID's interests in this regard:

> That the parties agree to meet at least annually to review progress toward the achievement of objectives set forth in the attached MOU of January 1984 as a basis for determining the level of continuing AID funding for Cairo Sewerage II Project.

In addition, the following covenants will apply:

> That the funds made available by this Grant for the purpose of financing the foreign exchange costs of equipment and construction will be loaned by the Grantee to CWO on terms and conditions acceptable to AID.

> That the Grantee covenant that adequate local currency financing for sewerage laterals and household hookups is made available as needed to ensure implementation in a timely manner.

That the Grantee covenant that discharges to drains are permitted and existing drains are expanded, as necessary, to ensure sufficient capacity to accept increased flows.

That the Grantee covenants that the provision of household hookups to the system will not be dependent on the house owner or resident's ability to pay for such hookups.

ANNEX A

MEMORANDUM OF UNDERSTANDING

The Governments of Egypt and the United States, recognizing the importance of improving Egyptian water and wastewater services, jointly agree to the following:

1. The implementation of a $1.2 billion funding program during the calendar years 1982 through 1987, such implementation being subject to U.S. Congressional approval of funds;
2. The need for certain management and administrative actions to strengthen Egyptian water and wastewater institutions, such actions being subject to the approval of the Egyptian Peoples Assembly and of relevant Egyptian local authorities:

   - Tariff increases adequate to cover the cost of water and wastewater operations, maintenance, debt service, and routine improvements, as well as appropriate increases by the GOE in the size of the operations, maintenance, and investment budgets provided to fund the sector;
   - Provision of adequate facilities for training and technical services to support the sector and also an incentive system to maintain and recruit qualified staff;
   - The establishment of autonomous local water and wastewater organizations, with the authority to retain service revenues for their own operating needs;
   - The retention during the program of a construction managem firm to ensure on-time completion of the projects.

It is anticipated that the construction program will be completed on/or before July 1, 1989. The management actions described above will be phased in and will be fully in place by that time. Notwithstanding the 1989 completion date, every effort will be exerted by both parties to ensure completion of the West Bank Cairo portion of the program within three years of the availability of the final engineering design for that project.

Representatives of both parties will meet annually to review the performance of the program during the previous year and the anticipated performance during the following year. The reviews will include evaluation of funding for the program, construction implementation, institutional development, and progress being achieved toward the agreed economic targets.

Eng. Hassaballah Mohamed
El-Kafrawi
Minister of Reconstruction
and Minister of State for
Housing and Land Reclamation

Date: _____

Dr. Wagih Shindy
Minister for Investment Affairs
and International Cooperation

Date: 22-1-84

M. P. W. Stone
Director
USAID/Egypt

Date: 4-1-84

81

ANNEX B

GRANT No._____

DRAFT

PROJECT AUTHORIZATION

Name of Country: Arab Republic of Egypt

Name of Project: Cairo Sewerage II

Number of Project: 263-0173

1. Pursuant to Part II, Chapter 4, Section 532 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Cairo Sewerage II project for the Arab Republic of Egypt (the "Cooperating Country") involving planned obligations of not to exceed $700,000,000 in grant funds up to 5 year period from this date subject to the availability of funds in accordance with the AID OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The rate of obligations will be subject to satisfaction of the objectives set forth in the January 1984 Joint USAID/GOE Memorandum of Understanding regarding the water and wastewater sector. The planned life of the project is 10 years from the date of initial obligation.

2. The project consists of assistance to the Government of the Arab Republic of Egypt to improve, expand and assure proper management of the wastewater collection and treatment system on the West Bank of Cairo.

3. The Project Agreement which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with AID Regulations and Delegations of Authority shall be subject to the following essential terms and convenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

4. A. Source and Origin of Commodities, Nationality of Services

Commodities financed by AID under the project shall have their source and origin in the Cooperating Country or in the United States, except as AID may otherwise agree in writing. Except for ocean shipping, the supplier of commodities or services shall have the Cooperating Country or the United States as their place of nationality, except as AID may otherwise agree in writing.

B. Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance construction, the Cooperating Country shall furnish in form and substance satisfactory to AID an approved contract amendment between the CWO and AMBRIC for the construction supervision of that element of construction.

C. The Cooperating Country shall covenant the following:

(1) That the parties agree to meet at least annually to review progress toward the achievement of objectives set forth in the MOU of January 1984 as a basis for determining the level of continuing AID funding for Cairo Sewerage II Project.

(2) That funds provided under the Grant for the purpose of financing the foreign exchange costs of equipment and construction will be loaned to CWO on terms and conditions acceptable to AID.

(3) That the Grantee covenants to make available adequate local currency financing for sewerage laterals and household hookups as needed to ensure implementation in a timely manner.

(4) That the Grantee covenants that discharges to drains shall be permitted and existing drains shall be expanded, as necessary, to ensure sufficient capacity to accept increased flows.

(5) That the Grantee covenants that households shall receive in a timely manner hookups to the system regardless of the house owner's or resident's ability to pay.

_____

_____

DATE

ID#0076A

UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

CAIRO, EGYPT

CERTIFICATION PURSUANT TO SECTION
611(e) OF FAA 1961 AS AMENDED

As Director and 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, I 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 in the Cairo Sewerage II project.

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

M.P.W. Stone
Director

8-5-84
Date

ANNEX D

The Near East Bureau Strategy, 1983-88 identifies the Bureau's regional strategies and sectoral priorities. Population and complementary health activities, urbanization, and water scarcity/utilization rank first, second and third respectively as the priority development problems in the region. Intervention in the three sectors involve large water and wastewater components including (1) improvements in maternal/child health (2) improved performance and efficiency of urban institutions, and improved social equity for the urban poor, and (3) an increase in the number and effectiveness of wastewater services.

1. P. 41, Table 20

2. Section 1, Priority Development Problems for the 1980's in the Middle East, Population and Complementary Health Activities, Urbanization, and Water Scarcity/Utilization.

ID#1766D

Agency for International Development

Near East Bureau Strategy

1983 - 1988

Revised
December 1983

7.3.5 In Table 20 the final list of priority development problems are presented in order of Bureau priority ranking. The Bureau ranking is derived from the three surveys and from our statistically-based socioeconomic analysis of the Region. Section 5, The Middle East Development Setting, identified the emerging trend toward urbanization as a major development theme for the 1980s.

Table 20
Priority Development Problems for the 1980's in the Middle East

Identified Development Problem	Final Bureau Priority Ranking
Population	1
Urbanization	2
Water Scarcity/Utilization	3
Employment Generation	4
Basic Education & Technical Training	5
Agricultural Productivity	6
Energy	7

7.3.6 Looking ahead to the year 2000, there are established trends which demand a change in focus for future A.I.D. financed activities. The three survey results summarized in Table 19 indicate a reasonable consensus among Missions and outside experts on the priority ranking of most development problems for the region. However, the inevitable urbanization trend in the Region, strongly suggests that Bureau attention must begin to shift toward the urban sector over the planning period 1983 - 1988; and that the urbanization process provides an organizing theme for a wide variety of future Bureau activities in the Region. More Bureau resources should be devoted to urban employment generation, provision of urban services, promotion of policy changes designed to improve efficiency and equality in the urban economy, strengthening of urban planning institutions, and supply of technical assistance to urban - related planning, management and productive activities.

7.4 Major development problems

7.4.1 Population growth as the engine behind urbanization. Projected rapid growth in total population, given generally limited arable land resources combined with a trend towards greater farm mechanization (especially on larger farms), provides an engine for continued migration of rural dwellers toward the cities (the "push" motive behind rural - urban migration). Over the next 25 years the total population in the nine countries that comprise the A.I.D. - assisted Middle East Region is projected to double regardless of whatever success there might be with family planning programs over the planning period (1983 - 1988).

Description of Development Problem

Continued rapid population growth, through the end of the century and beyond, at an average rate of growth of 2.6%, would result in a doubling of current population by the year 2010. A wide range of problems will arise from such rapid population growth, such as:

- each productive worker will have to support larger numbers of young dependents;
- vast numbers of school age children will make it impossible, or extremely expensive, to improve human resource development as education systems are overwhelmed by increased enrollments;
- as large numbers of young move up the population pyramid the Regional economies will be unable to generate productive employment opportunities apace, causing even higher unemployment and underemployment rates than at present; and
- in combination with limited arable land and water resources, rural-to-urban migration will continue (and may even accelerate) thereby increasing food import requirements, even with good agricultural policies.

Category A -- Countries with embryonic population programs, where AID assistance should be more thoroughly employed.
Includes: Jordan, Lebanon, Yemen and Turkey.

Category B -- Countries with successful or maturing population programs that will receive continued AID assistance.
Includes: Egypt, Morocco and Tunisia.

A Long-term Development Goal year 2000	B AID Strategic Objectives 1988	C Verifiable Strategic Indicators 1988	D Means 5 years	E Benchmarks 1985
Improve well-being of Region's people by bringing population into balance with country resources, which involves reduction in the currently very high population growth rates.	(1) Increase acceptability of family planning concepts and practices to host country governments and people.	(1) Host country policy commitment to family planning in Category A and to a further need to improve knowledge, attitudes and practices in Category B.	(1) Engage in policy dialogue at highest levels of host and donor country governments. (2) Develop programs to disseminate information on family planning-related knowledge, attitudes and practices.	(1) Establish effective policy dialogue on family planning with Category A; develop further with Category B. (2) All bilateral family planning projects integrate complementary health and nutrition components, such as oral rehydration, immunization and Title II food aid.
	(2) Improve maternal/child health as a complement to expanded family planning activities.	(2) Reduced child mortality rates. (3) Implementation of family planning programs in Category A, at least involving MCH, and expanded programs in Category B.	(3) Incorporate public health concerns in water/sewerage programs (See Water Scarcity for Means and Benchmarks). (4) Design and implement family planning delivery systems that integrate maternal/child health services and targetted nutrition programs.	(3) Increase number of contraceptive acceptors at MCH clinics dispensing family planning information and services.
	(3) Provide families throughout the Region, who so desire, with an effective choice of their family size.	(4) Attain contraceptive prevalency rates of 30-50% in Category B. (5) Reduced birth rates. (6) Access of a majority of all families to family planning info. and commodities in Category B (at least 40% in Category A). (7) Reduce the gap between rural and urban dwellers and between low and middle income families in terms of contraceptive prevalency.	(5) Provide and distribute contraceptives in order to establish future market for private sector. (6) Increase involvement of private sector in provision of family planning services, including contraceptive sales and domestic production, utilizing social marketing techniques where appropriate. (7) Balance urban/rural focus of family planning programs: - initial focus on cost-effective urban areas (except where vast majority of populace is rural); - focus on urban poor; and - evolve rural focus as program matures, particularly where other urban donors exist.	(4) Increased number of practitioners with a multi-disciplinary approach integrating family planning and health service delivery (5) Programs to involve private sector organizations in marketing, distribution (and production in Egypt) of contraceptives are in place. (6) Significant progress in attaining a balance between urban and rural components of family planning country programs.

URBANIZATION

Description of Development Problem

Poverty is increasingly becoming an urban phenomenon because the rapid growth of total population increasingly manifests itself in the dramatic growth of urban areas. Urban population in the region is expected to double by the year 2000, comprising 58% of the region's total population compared to 45% in 1983. Cities in the region are unprepared for the growth they are currently experiencing (well over half of total population growth over the period 1960-83 occured in urban areas) while estimates are that four out of every five new additions to total population over the remainder of the decade will live in urban areas.

A Long-term Development Goal year 2000	B AID Strategic Objectives 1988	C Verifiable Strategic Indicators 1988	D Means 5 years	E Benchmarks 1985
Management of the urbanization process so that it contributes to the achievement of national economic development objectives of the countries in the region, through development of efficient national urban settlement systems.	(1) Increased awareness by host governments of the need for explicit policies to utilize urban development to attain overall economic development objectives.	(1) Urban development is an integral part of program analysis in all Missions.	(1) The role of AID in urban development is currently being reassessed by the Agency. PPC is preparing an Urban Development Policy Paper. The Office of Housing and Urban Development has developed assessment packages that can assist Missions in urban analysis. The 1983 Near East Bureau Mission Directors Meeting will reach conclusions on how to integrate urbanization into country programs. A Near East Urban Working Group will identify specific urban intervention modes. (2) Finance urban/economic infrastructure facilities.	(1) Increase the level of awareness of Mission staff regarding the importance of the urbanization process in economic development
	(2) Improved performance and efficiency of urban institutions in the region.	(2) Implementation of urban projects that address identified constraints to progress.		(2) The NE Bureau will have prepared, in consultation with its Missions and the relevant central bureaus, an urbanization strategy applicable to AID-assisted countries in the region.
	(3) Improved social equity for the urban poor.	(3) Implementation of HGs for low-cost sites-and-services and/or slum upgrading.	(3) Develop methods to mobilize adequate domestic financial resources to expand the scale of already developed low-cost housing and urban services. (In the case of urban water/wastewater services see Water Scarcity/Utilization.)	(3) NE Bureau will make use of newly approved centrally-funded UDSS Project for assistance in an urban assessment or the urban component of a CDSS, and in the development of an urban PID.

WATER SCARCITY/UTILIZATION

Description of Development Problem

The countries of the Near East Region, excepting Egypt, are faced with severe to very severe water scarcity, with consequent rapidly increasing real costs for incremental supplies. Inefficient water utilization is compounded by inadequate water management policies largely related to inappropriate pricing of both water and wastewater services (in Egypt water user charges tend to cover less than half of O & M costs while there are no charges at all for wastewater services). Difficult choices will have to be made between irrigation versus municipal uses of scarce supplies in Jordan within ten years (without Yarmouk River water, that can only be made available if peace breaks out), while high cost desalination and wastewater reuse may be necessary in Oman and Yemen. Only 1/2 and 2/3 of the current urban population of the region has access to piped water while availability of wastewater services in urban areas is even more scarce (with essentially no communal sewerage systems in rural areas). As rapid urbanization continues, the capital requirements for new systems will be staggering.

A Long-term Development Goal year 2000	B AID Strategic Objectives 1989	C Verifiable Strategic Indicators 1988	D Means 5 years	E Benchmarks 1985
Optimize the use of scarce water resources among agricultural, industrial and municipal uses.	(1) Make available additional water supplies.	(1) Construction of additional water supply and aquifer recharge systems.	(1) Finance construction of urban or rural water supply systems.	(1) Yemen: remaining rural water systems constructed and 50 earthquake damaged systems rehabilitated. (2) Oman: Engineering design of aquifer recharge project finalized. (3) Tunisia: Five ongoing water projects completed. (4) Jordan: Three water supply projects complete and nine water/wastewater systems designed, of which two under const.
	(2) Increase the number and effectiveness of wastewater services in Egypt, Yemen and Jordan.	(2) Construction complete of wastewater systems in three Egyptian cities.	(2) Finance construction of urban wastewater systems where AID resources are adequate.	(5) Egypt: Design of Cairo and Alexandria wastewater projects 75% complete. Construction nearing completion on pre-FY83 projects.
		(3) Implementation of water/wastewater user charges that cover 100% of O & M costs, plus debt service/depreciation at least for portion of capital costs provided by U.S.	(3) Policy dialogue on: - establishment of water/wastewater pricing policy; - advantages of autonomous water and sewer organizations; and - formation of national water planning authorities.	(6) Agreement reached with Egypt on water/wastewater: - tariff levels; - GOE relending of U.S. grant; and - administrative independence for operating entities.
	(3) Improve water/wastewater management and planning at all levels of govt. and within private sector: - rate structure based on real operating and capital costs, - conservation and reuse of water.	(4) Water resource inventory completed for Yemen (and updated for other countries where needed).	(4) Provide technical assistance in assessing extent of water resource availability (eg. Yemen) and water management planning.	(7) Assessment of groundwater availability for Jordan (and Yemen?).
		(5) Program(s) begun in wastewater reuse (e.g. Yemen).	(5) Provide technical training/advisory services to water and wastewater authorities: - design, operation and maintenance of village systems, - training water utility operators, - private sector construction contractors, and - host country project preparation for other donors.	(8) Improved efficiency of industrial and agricultural uses of scarce water resources.
		(6) Water intensity of irrigated agriculture reduced below 1983 levels (See Agric).	(6) Finance irrigation and drainage systems to improve agricultural water use efficiency.	

ANNEX E

Current Status of Project No. 263- 0091, Cairo Sewerage

Background:

This project generally termed 0091, was first authorized in 1978 at a level of $25 million. These funds were for support of the design of expansion projects, training and management advisory services and for the most part to initiate rehabilitation work primarily on the Cairo West Bank. In addition to USAID and GOE funding, support was also provided by the British and by the West Germans. The project was amended in 1981 to provide for an additional $104 million of US funding resulting in a LOP of $129 million.

The current status of the 0091 project as amended is discussed as follows:

Project Status

The 0091 project is divided into 5 categories as follows; Rehabilitation Equipment ($14,000,000); Rehabilitation Construction ($79,000,000); Engineering Design ($29,000,000); Training Management Advisory Services ($4,000,000) and Unsewered Area Intervention ($3,000,000) for a total of $129,000,000.

1. All expenditures planned for rehabilitation equipment have been made. At this time there are 3.127 million US Dollars carried as an unearmarked balance, and being retained for rehabilitation construction.

2. The rehabilitation construction element has been divided into several sub categories. A contract has been awarded to Howard-Harbert-Sadelmi for $38.5 million to rehabilitate 53 existing pumping stations along with associated forcemains and gravity sewers, 39 ejector stations, and to construct 6 new stations. This contract is on schedule and will be completed in mid FY 85. A second contract has been awarded to Sadelmi to construct 5 new pumping stations in early 1984 for $11.5 million. The remainder of the money is to be used to rehabilitate the Zenein Wastewater Treatment Plant, and to rehabilitate 3 pumping stations on Koda Island.

3. All of the Work Orders planned under the Engineering Design Element have been given to AMERIC. There are two amendments to these work orders which are currently being finalized by AMERIC and CWC. These proposed amendments include the following:

   a. Authorization to complete the design of the rehabilitation of the Zenein Treatment Plant. AMERIC had previously completed 70% of this rehabilitation design, at which point they were instructed to stop by CWC and the design was given to a public sector company to complete. CWC now wishes to have AMERIC complete the design for US funding. Cost of construction is estimated to be $25.0 million.

b. Authorization to design the rehabilitation of the three pumping stations on Roda Island. These stations are an important part of the sewer system for Roda Island, however the design had not been authorized in previous work orders. Cost of construction is estimated to be $5.0 million.

c. Authorization to implement a pilot program in the unsewered areas. AMERIC has prepared a draft proposal program for this pilot program and needs CWO approval and authorization to proceed. Estimated cost of pilot program $1.0 million.

d. Authorization to review and modify the design for the collection system in the Pyramids area. Although this design work was originally in the AMERIC assignment, CWO assigned the design to a local firm. CWO now has requested US funding of the collectors and laterals in this area, which will require examination of the Egyptian design, and some modifications and additions to make it acceptable to USAID and international tendering standards. The estimated cost of this work is included in the cost estimate for Cairo Sewerage II.

e. Authorization to design a training program at the Zenein Treatment Plant for operation and maintenance of treatment plants and major sewage pumping stations. $4.5 million have been reserved for this program.

f. Authorization to make a study of the Muheit drain system. All of the effluent of the Zenein Treatment Plant and the proposed Abu Rawash Treatment Plant currently has to flow into the Muheit drain through its tributary system. There is strong evidence that neither the tributary which drains the Abu Rawash area nor the Muheit drain itself can accommodate the expected flows. Although there has been some initial reluctance on the part of the CWC and the Ministry of Irrigation to accept any assistance in this evaluation, CWC now fully supports the need for the study. Remedial work will have to be identified early on so that the necessary work of the drain system can be completed before the Abu Rawash plant is fully operational.

g. Authorization to proceed with a final review of the flooding areas on the West Bank. AMBRIC identified all flooding areas in a report submitted in December 1981, and recommended measures to alleviate the problem. The CWC then initiated a crash program to correct these flooding problems. This program included the pumping station rehabilitation and construction being undertaken by US contractors under the present 0091 project, design by GOSD for construction by local contractors, design and construct contracts given to local public sector companies and various combinations of these approaches. Because of these various approaches a comprehensive review is now required to assure that some problem areas may not have been inadvertently omitted from the overall effort which can be accomodated in the 0091 program.

The design of the pumping station renovation and construction projects has been completed. The overall West Bank design is scheduled for completion in Dec. 1984 while the Giza Relief portion is scheduled for final review on August 1984.

The balance of funds in the project are expected to be sufficient for all the design and construction activities described above, including a small contingency amount.

RECAPITULATION

	Committed	Unearmarked	
1. Rehab. Equip.	10,872,191	3,127,809	No further equipment proposed for purchase. Unearmarked funds to be used for Rehab Construction
2. Rehab. Constr.	50,626,779	28,373,221	Unearmarked funds to be used as follow: Zenein Rehab $25,000,000 Roda Island work $ 5,000,000 Contingency $ 3,000,000 Additional funds to be transferred from: Rehab Equip. $3,000,000 Unsewered areas $2,000,000
3. Engr. Design	25,995,470	3,004,530	Unearmarked funds expected to be used for additional design work described above. Presently earmarked funds will complete design of West Bank project, and construction of 0091 projects described above.
4. Training and Mgt Advisory Services	-0-	4,000,000	All funds reserved for this use are expected to be utilized.

5. Unsewered Area Interventions	-0-	3,000,000	The present estimate is that less then $1,000,000 will be utilized in the pilot program, the remaining funds will be utilized in the rehab work.

Rehabilitation Work and Relationship to Cairo Sewerage II Work

The rehabilitation and construction of sewage pumping stations under the 0091 project has been carefully designed to meet both the apparent and urgent needs of getting the sewage off the streets (flooding), and to integrate them into the overall system of the West Bank major projects.

For instance on the West Bank, Zenein (through the existing Giza Pumping Station) for all practical purposes is the only "discharge" point for sewage. Both the Zenein plant and Giza pumping station are overloaded. The Giza pumping station is capable of becoming a major bottleneck as evidenced by the widespread flooding associated with the failure of the pumping station system in 1982. Thus all the renovations made on the West Bank have been directed toward relieving the flooding conditions and providing the facility for directing much of the sewage to the Abu Rawash system when the major projects are completed.

The attached map shows areas in the Northwest Project Area which are now subject to sewage flooding either repeatedly or continuously. Several additional problem areas have been corrected by GCSD projects to divert flows to nearby drainage areas or to replace "bottlenecks" with larger pipe.

The basic problem throughout the area is that there is insufficient pipe capacity to carry the total flow out of the project area. The new Awkaff force main (under construction in 0091) will provide extra carrying capacity and will provide short term relief for the major gravity sewers flowing toward the Giza Pumping Station. This construction will greatly diminish several of the flooding areas, and will provide major relief for the Giza system.

9b

Construction of the Northwest Sewers and Collectors will provide even more relief by allowing a free discharge of sewage from existing drainage areas. (The present sewers often discharge into a surcharged collector.) The beneficial effects of the deep collectors will be widespread. Although some areas such as Awkaf, Gorn, Salam, Talaat & Tahrir improved or resolved by the present 0091 project work, the amount of relief in other areas will be difficult to predict.

Following is a brief description of each of the areas shown on the map:

1. Areas which will be corrected by present 0091 construction/ rehailitation:

   a. A new 1600 diameter sewer from Tahrir Pumping Station will eliminate flooding on Wahdeh Street.

   b. A new 900 diameter sewer to the Salem (Old) Pumping Station will eliminate flooding in Sudan and nearby streets.

   c. A new 1200 diameter sewer to the Gorn Pumping Station will eliminate street flooding in this area.

2. Areas which may not be totally corrected by present 0091 work:

   a. This area has very dense housing and small secondary sewers. Although the rehabilitation of Tahrir and Talaat Harb Pumping Stations (and their later removal after the NW Project) will help, larger secondary sewers are needed. The new sewers could be designed to flow west to Bouhi Stret after the NW Project's "spine" is completed.

b. Chronic Flooding in El Nil Street is probably due to undersized local sewers. The relief from rehabilitation of Salem (Old) and Gorn Stations will be difficult to estimate. Although a GOSD project is presently replacing some sewers, additional work may be required.

c. Rehabilitation and eventual elimination of the Salem (Old and New) pumping stations will affect this area, but some replacement of undersized sewers may be required.

d. This area discharges into the Old Dokki collector which is surcharged. The rehabilitation (especially the Awkaf work) and NW projects will greatly reduce the flow in this collector. Although relieving the Old Dokki Collector will help, replacement of several undersized sewers will probably still be required,

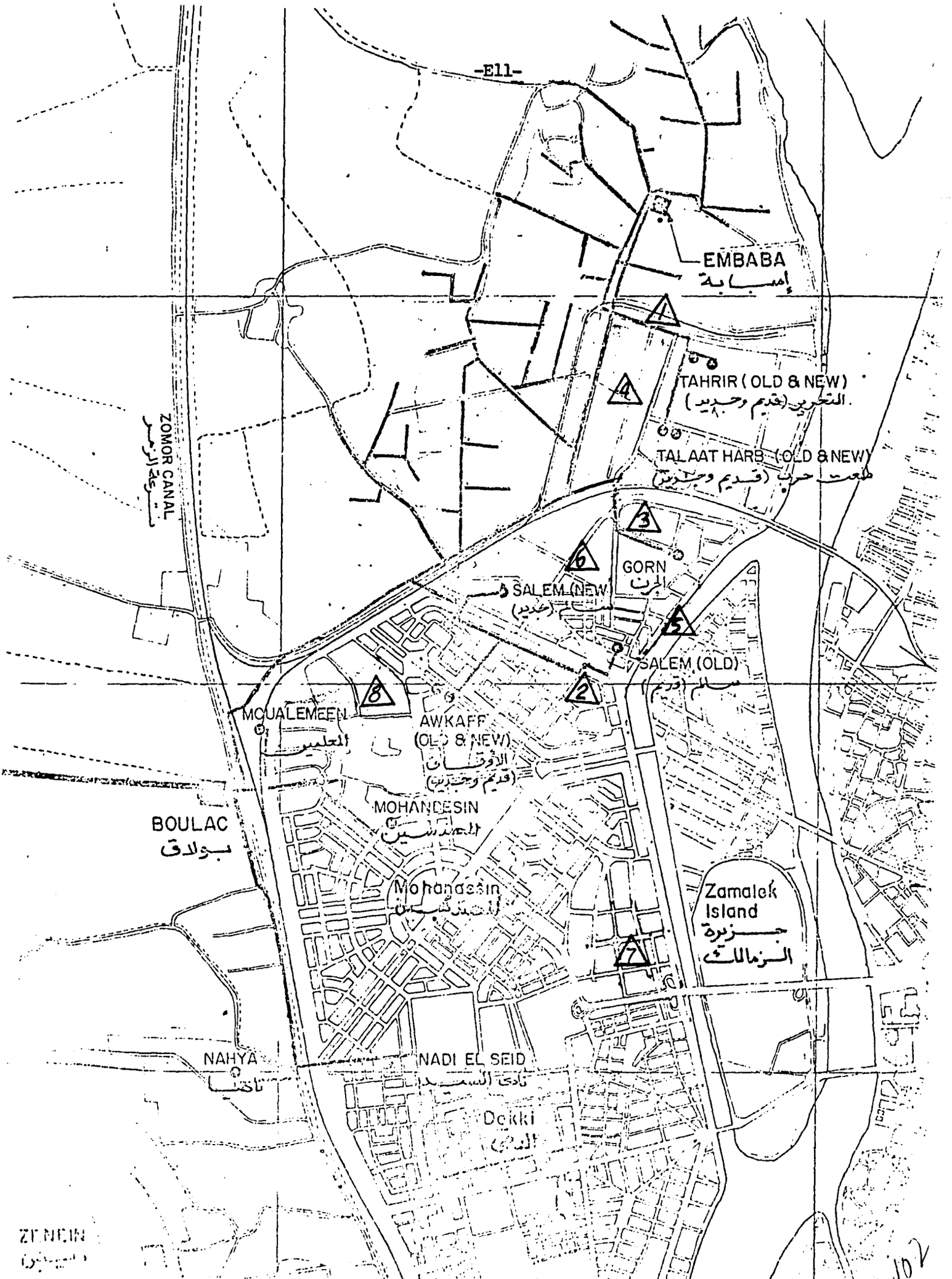
e. Problems in this area are similar to area 4. The rehabilitation of Awkaf Pumping Station and removal of Mohandessein and Moualemeen will have some limited affect, but undersized sewer replacement will probably be required.

3. All of these areas will receive additional study under the present AMERIC work orders, and remedial construction and or other action will be taken where necessary.

The rehabilitation of the Zenein Treatment Plant will be designed and constructed under the 0091 project, and possible more importantly for the new project will be the opportunity to provide a management training program in conjunction with the rehabilitation work. Such a program will benefit the trainees by providing hands-on training, both for the treatment plant renovation, and for the construction of a major archemedian (screw) pumping station at the training site. Both types of facilities are major components of the Cairo West Bank expansion work.

The overall O&M management and training effort to be funded under the new project will use the training program at Zenein (described above) for trained personnel input. In a rapidly expanding urban area such as west Cairo, there will inevitably be a long term need for unsewered area service. The pilot program being funded under the 0091 project should provide the basis for this continuing effort.

ID#1555D


EMBABA
إمبابة
TAHRIR (OLD & NEW)
التحرير (قديم وجديد)
TALAAT HARB (OLD & NEW)
طلعت حرب (قديم وجديد)
ZOMOR CANAL
ترعة الزمر
GORN
الجرن
SALEM (NEW)
سالم (جديد)
SALEM (OLD)
سالم (قديم)
MOUALEMEEN
المعلمين
AWKAFF
(OLD & NEW)
الأوقاف
(قديم وجديد)
MOHANDESIN
المهندسين
BOULAC
بولاق
Mohandesin
المهندسين
Zamalek
Island
جزيرة
الزمالك
NAHYA
ناهيا
NADI EL SEID
نادى السيد
Dokki
الدقى
ZEMEIN
(الزمين)
1
2
3
4
5
6
7
8

ANNEX F

CAIRO WASTEWATER MASTER PLAN SUMMARY

The increase in population, water consumption and the area of the city connected to the wastewater system will, in the period 1980-2000, increase the flow of wastewater from about 1.5 to 5.0 million m^3/day. Very extensive new works will be required to protect the health of the citizens of Cairo and to maintain the city's role as the capital city of Egypt and center of government, tourism, commerce and industry.

The Cairo Wastewater Master Plan was prepared in (1977-1978) by a joint venture of two British engineering firms, John Taylor and Sons and Binnie and Partners. A joint venture of American-British consultants, AMBRIC, has reviewed and updated the Taylor-Binnie master plan, developed the program for rehabilitation and expansion of the system and is now providing the engineering services for the project.

Rehabilitation of Existing Facilities

The rehabilitation work proposed in the Master Plan includes the principal and secondary sewer systems. Comprehensive analysis of critical portions of the existing collection system showed the need for providing 750 km of additional sewers to reinforce the hydraulically overloaded system. Other elements of the rehabilitation work are major pumping stations, 100 subsidiary and ejector stations and the Zenein wastewater treatment plant.

Expansion of Existing Facilities

East Bank

On the East Bank of the River Nile, the overloaded central collector system will be relieved by a principal tunnel with a diameter of 4-5m, extending from South Cairo to Ameria at a depth of 15 to 20 meters below ground level. In addition to the principal tunnel project, branch tunnels will be constructed to tie in the main tunnel eliminating most of the existing subsidiary pumping stations. Flows from the East Bank will be conveyed through a number of new main pumping stations, gravity culverts and force mains, to be treated at new plants at Shoubra El Kheima, Khalag, Berka and Gabel El Asfar.

West Bank

On the West Bank of the Nile, three new major sewerage systems are proposed, one serving the northern area with a conveyance culvert to a new treatment facility at Abu Rawash, a second serving the southern areas with conveyance culvert also to Abu Rawash, and the third serving the west central area draining directly to the Zenein WWTP. The existing east central area system will drain via Giza Pumping Station to Zenein WWTP, which will have been relived to the point where it can handle these flows. The relief of the east central area system shall allow for flows from the two islands, in the Nile, Zamalek and Roda to be carried to the West Bank for treatment.

The Master Plan provided for the initial disposal of treated effluent to existing drains on the east and west banks, with provision in the longer term for the reuse of effluent and sludge for the reclamation of desert land in the vicinity of Cairo.

Helwan Suburb

Helwan has its own sewerage system which consists of a gravity network, main pumping stations and a wastewater treatment plant. A German engineering firm is providing the consulting services for the project.

Project Cost

The planned improvements will be accomplished in several stages. The implemetation of the much needed rehabilitation program and the First Stage of the Master Plan new works is envisaged to be achieved in the next five years (1984-1989). These works are currently estimated to cost over LE 4.4 billion. The cost breakdown is as follows:

Cost Item	Cost, LE X 10^6	Foreign Exchange funded by:
1) Technical services	200.0	US, UK, EEC
2) Rehabilitation:		
- Pump stations & Maintenance equipment	70.0	Most US, some Germany
- Secondary sewers reinforcement	170.0	US (nominal)
- Zenein WWTP	35.0	None to date US (proposed)
3) Master Plan new works:		
a. East Bank Scheme:		
- Tunnel group	1000.0	UK, GOE
- Pumping stations group	125.0	UK, GOE
- Culverts group	150.0	UK (nominal)
- Gabel Asfar WWTP	635.0	UK, GOE
- GOSD's projects	250.0	GOE
b.West Bank Scheme:		
- Sewers and collectors; Pumping stations, Giza relief system and laterals	880.0	US (possibily)
- Abu Rawash WWTP	165.0	Japan/US (proposed)
- GOSD's projects	55.0	GOE
4) House Connections	90.0	
5) Helwan Suburb	125.0	EEC, Italy & Holland
6) Contingency	450.0	
Total:	4400.0 million	

The foreign exchange component of the Cairo Wastewater Projects as itemized above is about LE 1400 million. Foreign exchange commitments from U.S., U.K., EEC, German and possibly Japan are as follows:

	Commitment (millions)
US (grant)	$ 129 or LE 107.0
UK (grant)	LS 50 or LE 60.0
UK (loan)	LS 100 or LE 120.0
UK (loan) (under negotiation)	LS 80 or LE 96.0
Germany (loan)	DM 9.5 or LE 3.4
Japan (under negotiation)	$ 3 or LE 2.4
EEC* (Grant)	LE 26.3
Italy* (Grant)	LE 4.9
Holland* (Loan)	LE 3.4
Total:	LE 423.4

PROJECTS IN PROGRESS

Rehabilitation of Existing Facilities

Two contracts have been executed with US contracting firms. The first is with Howard, Harbart and Sadelmi for the rehabilitation of the subsidiary and ejector stations with a value of $38.6 million and LE 13.4 million. Work commenced on March 1983 and is expected to be completed in February 1985. The second contract, valued at $11.9 million and LE 5.4 million, has been awarded to Sadelmi and construction has commenced on the rehabilitation of five major pump stations. Contract completion date is February 1986.

* Funds for Helwan Project

The secondary sewerage system has been investigated in some detail where incidents of sewage flooding have been reported. Predesign reports have been prepared to identify the system's deficiencies in 35 different areas and to recommend a program for relieving the wastewater flooding. The construction of some 146 km of new pipe lines is required at an estimated cost of LE 70 million. To date, construction contracts in excess of LE 6.5 million have been awarded for collection system improvement for nine areas. Four of these contracts have been completed and it is expected that the others will be completed before the end of 1984. Design of another nine projects with a total value of LE 25 million is now underway and expected to be tendered before the end of 1984. The other projects are dependent on Master Plan facilities being installed and planned to be completed by 1988. USAID is financing the foreign exchange for the rehabilitation work while the GOE is providing funds for the LE cost.

East Bank Scheme

The East Bank Scheme is comprised mainly of nineteen contracts. Funds for eleven of these contracts are now available. The value of the funded contracts is LE 535 million and LS 246 million, of which LS 200 million is financed by the British government. Nine of the eleven contracts have been tendered. Two contracts were signed, the first contract has been awarded to the UK's GEC Pojects Ltd. and the second to Arab Contractors. Letters of intent have been issued for another two contracts. Others are expected to follow soon, and throughout 1984. Tender documents for the other three contracts are now near completion.

The GOE is also financing the cost of three other East Bank projects, Shoubra El Kheima Sewerage and WWTP, Berka WWTP, and Nasr City Collector. These are now under construction and have a total value of LE 155 Million.

There is still a shortfall of about LS 330 million in foreign exchange to complete the East Bank first stage works. In addition, the GOE will need to provide about LE 670 million in local currency over the next five years for this unfunded East Bank Work.

GOE is currently seeking additional U.K. funds in the amount of LS 330 million for the unfunded projects. Tendering of these projects is pending the availability of funds.

West Bank Scheme

AMBRIC started the design work for the West Bank in February 1984. Four contract packages were proposed at that time:-

Giza Relief, Collectors and Pumping Station
Culverts
Northwest Project, Sewers and Collectors
Pumping Stations

The designs for this project will be completed by the end of 1984. The preliminary cost estimate for the four construction contracts is LE 400 million.

In addition to AMBRIC efforts, an Egyptian consultant is designing the Pyramids sewerage system and the Japanese Government will finance the design of Abu Rawash Wastewater Treatment Plant.

Projects which GOSD now has under construction on the West Bank are the forth module of the Zenein WWTP and the dry sand beds at Abu Rawash WWTP. These have a total value of LE 33 Million

Helwan Suburb

Design and tender documents for the construction of the wastewater projects are complete. The estimated cost of the project is LE 125.0 million. The project shall be implemented in two phases. The phase one projects have been tendered. Construction contracts with a value of LE 15.0 million have been awarded to local contractors. Tenders from the countries of the European Market in the value of LE 65 million have been received and are now under evaluation. Completion of phase one is scheduled for in mid 1988.

GOE Funding for the Cairo Sewerage Program:

The GOE has undertaken major financial commitment to this project over the present year. To date total GOE commitments to the project are in the amount of LE 900 million and are as follows:

Cost Item	Cost LE X 10^6
1) Technical Services	50
2) Rehabilitation Works	60
3) Master Plan new works	
a) East Bank Scheme	
Tunnel group	195
Pumping Stations group	68
Culverts group	146
Gabel Asfer WWTP	163
GOSD's projects	155
b) West Bank Scheme	
GOSD's project	33
4) Helwan Suburb	30
Total LE	900

The GOE commitments will be increased to LE 1570 million in the event that the negotiation with U.K. for the additional funds (LS 330 million) for the East Bank are successful.

Annex G

Technical and Cost Data

I. Discription of Proposed Core Facilities

II. Summary of Core Cost Estimates

III. Operations and maintenance costs of Core System

IV. Construction scheduling based on various funding alternatives

I. DESCRIPTION OF PROPOSED CORE FACILITIES

GENERAL

A description of each of the proposed pumping stations, plus general descriptions of the proposed culverts, collectors, and sewers are presented below.

DESCRIPTION OF PROPOSED PUMPING STATIONS

Seven pumping stations will be designed for Stage I of the West Bank Collection Project. These pumping stations along with the facilities proposed to be furnished at each pumping station site, are presented in the following Table 1. The relative location of each pumping station site is shown on Figure 4.1 of the main report.

All pumping stations will be of the screw type. Because of the lift required at both Zenein and Abu Rawash, these stations will have two pumping stages. All other stations will have one pumping stage.

Standby pumping capacity will be provided at each pumping station in accordance with the following policy:

- Up to and including five duty pumps of any one size; one standby pump of that size.

- Six or more duty pumps of any one size; two standby pumps of that size.

Item	Embaba	Boulac	South Muheit	Zenein	Pyramids	Junction	Abu Rawash
Initial Capacity (CMD)	220,000	600,000	600,000	220,000	400,000	850,000	850,000
Ultimate Capacity (CMD)	220,000	827,000	856,000	394,000	694,000	1,500,000	1,500,000
Approx. Lift (m)	7.8	6.4	5.9	6.1 per stage	5.0	5.9	5.9
Screw Diameter (m)	2.6	3.0	3.0	2.6	3.0	3.0	3.0
Number of Stages	1	1	1	2	1	1	1
Number of Screws per Stage (Duty/ Standby):							
Initial	2/1	3/1	3/1	2/1	2/1	4/1	4/1
Ultimate	2/1	4/1	4/1	3/1	4/1	8/2	8/2
Transformer Structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electric Substation	Yes	Yes	Yes	(5)	Yes	Yes	Yes
Standby Generator	Yes	Yes	Yes	(5)	Yes	Yes	(4)
Services Building	Yes	Yes	Yes	No	Yes	Yes	(4)
Inlet Manhole	No	No	Yes	Yes	No	Yes	Yes
Outlet Manhole	No	Yes	Yes	Flume	Yes	Yes	(4)
Site Access	Exist.Road	Exist.Road	New Road	Exist.Road	Exist.Road	Exist.Road	Exist.Road
Culverted/Piped Crossing of Drainage Canal	No	No	No	No	No	(1)	No
Site Security:							
Permanent Wall	Yes	Yes	Yes	Exist.	Yes	Yes	(1)
Temporary Fence	No	No	No	No	No	No	(1)
Gatehouse	Yes	Yes	Yes	Exist.	Yes	Yes	(4)
Manager's House	Space	Space	Space	No	Space	Space	(4)
Staff Housing	Space	Space	Space	No	Space	Space	(4)
Flow Measurement	Yes	Yes	Yes	Yes	Yes	Yes	(4)

(1) To be verified later.
(2) Provision is dependent upon the arrangement of conveyance conduits relative to the site.
(3) A bypass will be provided.
(4) To be provided through construction at the new treatment plant.
(5) To be provided through rehabilitation of existing treatment plant.

Except at Abu Rawash, each pumping station will be designed such that the ultimate number of screw pumps can be installed without expanding or duplicating the structure in the future. At Abu Rawash, the ultimate station capacity will be provided in the future by duplicating the pumping station provided under Stage I.

Except at Zenein, each pumping station will be equipped with communication/control devices linking it with upstream stations to annunciate high water level in the inlet bay, so as to warn operations personnel tending the upstream station that the downstream station is incapable of accepting further flow.

Major support facilities to be provided at each pumping station site are as follows:

- o Transformer Building. A separate transformer building will be constructed. The size of the building is expected to be somewhat smaller than that provided for Kossous and Khalag Pumping Stations on the East Bank since, for the West Bank situation, it is considered more cost-effective to locate the 3150/380 volt transformers adjacent to the motor control center within each pumping station than to place them within the Transformer Building.

- o Electrical Substation. Except possibly at Zenein, space will be provided for construction of an electrical substation by CEDEC (Cairo Electric Distribution Company).

- o Services Building. A services building, consisting of administration offices, prayer room, kitchen/canteen, toilet and locker facilities, shops, and storage facilities, will be provided at each site except Abu Rawash and Zenein, where such facilities either already exist or should be provided as part of the wastewater treatment facility.

o Site Access. Except at Abu Rawash, access to each site will be provided via a paved roadway system. At Abu Rawash, the paved site access road should be provided as part of the wastewater treatment facilities.

Except for the South Muheit site, a paved adjacent roadway already exists nearby, and only a short length of paved drive linking the roadway to each site will be required. In the case of South Muheit, the nearest paved roadway is located some 1.1 km to the south, and thus, additional road work will be necessary.

Culverted/piped crossings of existing canals and drains will be necessary at both South Muheit and Kirdassah.

o Site Security. A permanent wall, complete with gatehouse, will be provided at all sites except at Zenein.and Abu Rawash. At these two sites, a permanent wall either already exists or should be provided as part of the wastewater treatment facility.

A temporary fence will be provided at the Abu Rawash site until such time as the permanent perimeter wall is constructed.

o Site Housing. Except at Zenein and Abu Rawash, space will be provided at each pumping station site for a manager's house and for staff housing. Space for housing will not be required at Zenein, since such facilities already exist. At Abu Rawash, space for housing should be provided as part of the wastewater treatment plant design.

- o Flow Measurement. Flow measurement, in the form of a venturi flume or Parshall flume, will be provided at all sites except at Abu Rawash where such facilities should be provided as part of the wastewater treatment facility. A flow measuring flume will be located immediately downstream of the pumping station outlet bay.

DESCRIPTION OF PROPOSED CULVERTS

General. Culverts in general will follow existing roads and canals as much as possible to minimize land acquisition problems. Locations of the proposed culverts are shown on Figure 4.1. The basic design information is summarized in the following Table 2.

Culverts will be constructed of cast-in-place concrete, will be of rectangular cross-section, will be of the two-barrel design, and will be provided with blue brick linings on the walls and PVC linings on the ceiling.

Northwest Project. Wastewater flows from the proposed Boulac Pumping Station will be conveyed westerly to the South Muheit Pumping Station in a 6000 m ± long culvert. This culvert will cross the Muheit Canal and the Lebbeni Drain just before reaching the South Muheit Pumping Station. the Northwest culvert extends about 2800 m from the South Muheit Pumping Station to the junction point with the Pyramids Culvert. The combined flows of both systems will then be conveyed to the proposed pumping station at Abu Rawash approximately 2500 m of culverts. These culverts will together have the necessary capacity to convey the expected ultimate peak flow to be handled at the Abu Rawash facility.

TABLE 2

PROPOSED CULVERTS

LOCATION	APPROXIMATE LENGTH (m)
Abu Rawash WWTP to Junction of Northwest and Pyramids Project Culverts	2500
From the Junction to South Muheit P.S.	2800
South Muheit P.S. to Boulac P.S.	6000
From the Junction to Pyramids P.S.	8100

Pyramids Project. New sewers and collectors in this area, upstream from the Pyramids Pumping Station, are being designed by GOSD consultants.

Wastewater flows from the Pyramids Pumping Station will be discharged into a new 8100 m long culvert which will run along the Mansouriya Canal to discharge into junction with Northwest culvert.

DESCRIPTION OF PROPOSED COLLECTORS AND SEWERS

General. A brief description of the collectors and sewers being proposed on this project is presented below. The basic design information is summarized in Table 3.

Piping materials will include clay pipe through 600 mm size and concrete pipe with 270 degree PVC lining from above 600 mm through approximately 2500 mm in size.

Giza Collector. This project will be designed to allow flow from portions of Boulac El Dakrour, South Giza, and El Ahram to be diverted away from the presently overloaded collectors draining to the Giza Pumping Station and to accept flow in the future from presently unsewered areas. All flow resulting from this work will enter the proposed pumping station at the Zenein Wastewater Treatment Plant.

The construction of two prime collectors and several branches will be required. The east collector (parallel to the drainage area east boundary) is to be constructed initially (Stage I improvements), while the west collector (parallel to the drainage area west boundary) is to be constructed at a time in the future when area development so demands.

TABLE 3

PROPOSED SEWERS AND COLLECTORS

AREA	SIZE (m)	LENGTH (km)
Northwest Project		
Embaba	225 to 1600	9.7
Embaba	225 to 2500	14.4
Awkaf, Mohandessin	1800 to 2800	4.3
Awkaf, Mohandessin	700 fm*	0.8
Dokki, Mohandessin, & Boulack El Dakrour	500 to 2200	6.3
Giza Project		
South Giza, El Ahram & South Boulac El Dakrour	1400 to 2200	4.3
(same)	500 to 700 fm*	2.3

* fm denotes force main.

A new 1400 to 2500 mm east collector will be installed northward along the Zomor Canal, starting about 500 m south of Pyramids Road. A branch to the collector will permit Nasr El din Pumping Station to be taken out of service. Flow from pumping stations at Abu Horiera, Omraniya, and Studio Nahas will be transmitted to the collector by force main. That wastewater flow which is directly tributary to El Ahram Pumping Station and which is generated from within the subject drainage area will not be diverted to the east collector, but will continue to be carried by force main from the El Ahram Pumping Station to the Zenein Wastewater Treatment Plant. The main collector will continue along Zomor Canal about 700 m north of Pyramids Road, then west and north about 3200 m to the Zenein Pumping Station.

Northwest Collectors and Sewers Project. This project will partially serve the presently unsewered developed areas of Embaba and urban Embaba Markaz; provide relief sewers in Mohandessin, Awkaf, Dokki, Embaba, and Boulac El Dakrour; and convey the wastewater from these areas to the Abu Rawash Pumping Station.

New sewers up to 1800 mm in diameter will be constructed for Warraq El Arab and Warraq El Hadar.

All flow from Warraq El Arab and Warraq El Hadar will be carried to the new Embaba Pumping Station. This pumping station will discharge into a proposed main collector running southwards alongside the former Sawahel Canal, and then west along the Cairo/Aswan railway. Branch sewers will drain into this collector and will serve some parts of unsewered Embaba and will allow several existing pumping stations to be removed from service: El Tahrir (new and old), Talat Harb (new and old), El Gorn, and Salam (new). About 14.4 km of sewers and collectors will constructed for these areas.

120

The new 1800 mm collector leaving the proposed Embaba Pumping Station will increase in size to 3000 mm at the proposed Boulac Pumping Station located 200 m west of the present Moualemeen Pumping Station (which will be taken out of service). A new 1800 mm collector will be constructed to collect all flows from the present Awkaf Pumping Station, allowing it and the Salam (old) stations to be removed from service. About 4.3 km of new collector, will be constructed; 0.8 km of 700 mm force main will be constructed to redirect the discharge of Willcocks Pumping Station into this system.

A new 1200 mm collector will be constructed from the proposed Boulac Pumping Station ot the Mohandessin Pumping Station, allowing it to be removed from servi. A new 1800 mm collector will be provided in Dokki to intercept sewers which will be cut off by the proposed Metro. This collector will be one block north ot Tahrir Street, running generally west to the railway and then north to the proposed Boulac Pumping Station. Branches to this collector will allow two pumping stations to be taken out of service: Nayha and Nadi El Seic. The new collectors serving Boulac El Dakrour, Mohandessin, and Dokki comprise about 6.2 km of collectors.

II. Summary of Core Cost Estimates

The estimated construction costs for the Cairo Wastewater System-West Bank Project were made prior to the preparation of most of the drawings and specifications, and represent AMBRIC's estimates of the total project cost based on the information available at the time of preparation. Included are 'raw' construction and non-construction costs, plus an allowance for contingencies and omissions.

These cost estimates were produced for present day prices (June 1984) and then escalated to reflect the probable cost at mid-points of construction, the assumed bid prices.

Unit and lump costs of the various components of the projects were, whenever possible, prepared using cost curves and other parameters developed from data for similar types of projects on the East Bank of the Nile. Contractor's overhead and profit were built into each construction unit cost while non-constructional expenses, provisional sums and quantities, and contingencies were added mainly as percentages of the raw cost.

Assumed inflation rates used in preparing the cost estimates were as follows:

- Cost of civil works in $: 10% per annum
- Cost of mechanical and electrical works in $: 8.7% per annum
- Cost of civil works in LE: 20% per annum

Assumed currency exchange rates were

$ = 1.12 LE
St. = 1.68 LE
St. = 1.50 $

The following assumptions were made regarding the cost estimates and major construction materials:

- Reinforcement bars imported from the U.S.A.
- Structural steel and steel sheet piling imported from the U.S.A.
- Timber imported but bought locally
- Local cement
- Local reinforced concrete pipes and manholes
  Ductile iron pipes imported from the U.S.A.
- Flexible vitrified clay pipes imported from the U.S.A. since local production is not due to start before 1985

In addition, all mechanical and electrical equipment was assumed to be imported from the U.S.A., and part of the construction plant was assumed to be locally purchased or hired.

The following are some of the items included under non-constructional cost:

- Mobilization/Demobilization of Contractor's plant and equipment.
- Providing performance and labor and material payment bonds.
- Insurance of works, third party insurance and insurance against accidents etc. to workmen.
- Providing offices, cars, instruments and assistance to Engineer's representative and his staff.
- Providing materials, laboratory and testing equipment and undertaking all factory, laboratory and field tests.
- Providing Contractor's offices, workshops and stores.
- Providing equipment and materials storage facilities.

12V

In costing of the West Bank Project the following procedure was applied:

- Arrive at a raw estimate.
- Add the non-constructional cost, provisional sums and percentages of the raw estimate to arrive at the Engineer's probable cost at a certain base date.
- Using the split between foreign and local currency components, apply the appropriate inflation rates.
- At a particular date indicated, the construction cost estimates are rounded up to the nearest million and given as $ and LE and also as all in $ using the 1.12 rate.

Pumping Stations Complexes

The costing of the pumping stations was based on a direct physical comparison of the proposed structures with their counterparts within the America Pumping Station Complex (Contract No. 1) on the East Bank. The rates used to price the West Bank's structures were produced using modified rates of an America P.S. mid-range tender.

The estimated cost of all mechanical and electrical equipments at all pumping stations sites was compiled in the U.S. offices of Black and Veatch and Camp, Dresser & McKee. After consultations with manufacturers and included, in addition to material cost, the cost of shipping, freight, installation and contractors overhead and profit.

Culverts

An East Bank Tender for Contract No. 6 (Culverts-America Pumping Station to Urban Boundary and Matareya Branch) was employed in assessing the probable cost of the West Bank culverts. The choice of the tender used was based on the following criteria:

- A mid-range tender.
- A tender with a small foreign currency portion.
- A tender that contained a small but reasonable proportion of non-constructional cost to the total tender sum.

Most of the culvert's quantities were taken off and priced using unit rates from Contract No. 6. The cost of minor items was allowed for as a percentage of major item costs. Structures on the culverts such as interconnection chambers and the inverted siphone were priced as lump sums by comparing them with similar structures in Contract No. 6.

The Contract No. 6 unit rates used in costing he West Bank's culverts were, by and large, found to conform with East Bank Contract No. 8 (Culverts-Kossous P.S. to Khalag P.S. to Gabal el Asfar Wastewater Treatment Plant) unit rates.

Sewerage Systems

A number of sewerage projects within Egypt were considered as a basis for comparison for the costing of the West Bank sewerage elements. These were:

- Alexandria General Organization for Sanitary Drainage Ras el Soda Sewerage System.
- Helwan Wastewater Top Priority - Tender 1, Main Sewers and Lifting Station 2.
- National Organization for Potable Water and Sanitary Drainage Construction of Gravity Sewers, Force Mains and Pump Stations at Port Said Ismailia and Suez.

Information from the above projects could not be fully utilized due to the following:

- Use of a small number of pipe sizes and different pipe materials to those on the West Bank.
- Limited lengths of sewers
- Lump sum contract with few sewers priced as additional quantities.
- Different ground conditions.

It was therefore decided to price the West Bank sewers using a set of cost curves developed by applying the most up to date data available.

General costing of sewers and in particular the costs of excavation and dewatering will be further explored to present better figures for the detailed Opinions of Probable Construction Cost.

The cost of sewers to be pipe jacked were arrived at by applying unit rates obtained from a local pipe jacking contractor.
Manholes were assumed to be lined, cast in place reinforced concrete with precast concrete ring access shafts and heavy duty manhole covers. Quantities were based on assumed manholes dimensions and each type of manhole was therefore accordingly priced.

COST SUMMARY - CONTRACT NO. 20

Pipelines:

Diameter/ Material mm	Total length m	Depth m	Unit rate LE/m	Raw cost LE
300VC	735	less than 2	100	73 500
300VC	1515	2-4	325	492 375
375VC	1385	less than 2	132	182 820
375VC	3260	2-4	406	1 323 560
375VC	115	4-6	525	60 375
450VC	1280	less than 2	175	224 000
450VC	2870	2-4	475	1 363 250
600RC	110	less than 2	242	26 620
600RC	2120	2-4	545	1 155 400
600RC	1315	4-6	719	945 485
750RC	1025	2-4	650	666 250
750RC	575	4-6	850	488 750
900RC	915	2-4	768	702 720
900RC	1070	4-6	989	1 058 230

1000RC	70	2-4	838	58 660
1000RC	800	4-6	1075	860 000
1200RC	2130	4-6	1251	2 664 630
1200RC	3370	6-8	1979	6 669 230
1200RC	90	greater than 8	2093	188 370
1400RC	620	greater than 8	2350	1 457 000
1500RC	110	2-4	1172	128 920
1500RC	70	4-6	1510	105 700
1500RC	530	6-8	2290	1 213 700
1500RC	735	greater than 8	2430	1 786 050
1600RC	430	6-8	2450	1 053 500
1800RC	1130	4-6	1875	2 118 750
1800RC	1575	6-8	2700	4 252 500
1800RC	200	greater than 8	2865	573 000
2000RC	420	4-6	2094	879 480
2000RC	350	6-8	2968	1 038 800
2250RC	1050	4-6	2375	2 493 750
2250RC	3075	6-8	3300	10 147 500
2500RC	705	6-8	3608	2 543 640
2500RC	465	greater than 8	3838	1 784 670
2750RC	150	6-8	4075	611 250
2750RC	2130	greater than 8	4325	9 212 250
		Total raw cost of sewers		LE. 60 604 685

VC: Vitrified Clay
RC: Reinforced Concrete

Manholes:

Applicable sewer pipe diameter mm	Number of manholes	Depth m	Average Unit Rate LE/manhole	Raw cost LE
300,375	46	less than 2	1356	62 376
and 450	98	2-4	1575	154 350
	2	4-6	2021	4 042
600,750	2	less than 2	3697	7 394
and 900	47	2-4	5211	244 917
	36	4-6	5841	210 276
1000,1200	2	2-4	6413	12 826
and 1400	37	4-6	7093	262 441
	37	6-8	8062	298 294
	9	greater than 8	8392	75 528
1500,1600	2	2-4	8081	16 162
and 1800	11	4-6	8835	97 185
	19	6-8	9875	187 625
	8	greater than 8	10241	81 928
2000 and	7	4-6	10634	74 438
2250	15	6-8	11769	176 535
2500 and	5	6-8	13442	67 210
2750	10	greater than 8	13908	139 080
		Total raw cost of manholes		LE. 2 172 607

Pipe Jacking:

The total estimated length of sewers, of all sizes, to be jacked was 300m, at eleven different locations. The cost of pipe jacking included the cost of:

- Excavation of jacking and reception pits.
- Sheet piling and strutting.
- Pipe manufacturing and transport.
- Jacking of pipes.
- Dewatering.

Total raw cost of piping jacking LE. 4 626 000

Thus,
Total raw cost (including minor items not shown above) LE. 69.80 million

Non-constructional cost (15% of raw cost)	LE. 10.47 million
Provisional sums and quantities (10% of raw cost)	LE. 6.98 million
Contingencies and omissions (20% of raw cost)	LE. 13.96 million
	LE.101.21 million

Currency split - Foreign LE.50.605 million
- Local LE.50.605 million

This currency split is based on the estimated proportional costs of local labor, material and plant to the total cost.

Probable cost on 1st June 1984 is
- $ 46.0 million
-LE 51.0 million
Equivalent $ 91.5 million

Applying the appropriate inflation rates
Probable cost on 1st April 1987 is
- $ 60.0 million
-LE 86.0 million
Equivalent $136.8 million

COST SUMMARY - CONTRACT NO. 21

Culvert	Length, m	Raw cost, LE (Base date, October 1983)
Boulac to South Muheit	5833	24.74 million
South Muheit to Junction	2830	12.39 million
Pyramids to Junction	7595	34.48 million
Junction to Abu Rawash	1680	6.58 million
	Total	LE. 78.19 million

Other works, LE:	
Interconnection and access chambers and inverted siphon	2.28 million
Site clearance and removal and reinstatement of road along Mansoureyah Canal	2.43 million
Mechanical equipment	0.59 million
Canal and drain crossings, and relocation of services	0.58 million
Total raw cost	LE. 84.07 million

Non-constructional cost (17.6% of raw cost)	LE. 14.80 million
Provisional sums & quantities (5% of raw cost)	LE. 4.20 million
Contingencies and omissions (15% of raw cost)	LE. 12.61 million
	LE.115.68 million

Currency split - Foreign LE 70.22
- Local LE 45.46

This currency split is based on the estimated proportional costs of local labor, material and plant to the total cost.

Applying the appropriate exchange and inflation rates
Probable cost on 1st June 1984 is
- $ 67.0 million
- LE 52.0 million
Equivalent $113.4 million

And
Probable cost on 1st April 1987 is
- $ 88.0 million
- LE 86.0 million
Equivalent $164.8 million

COST SUMMARY - CONTRACT NO. 22

	Structure Cost, x 1000		
Base Date:	Aug.83	Aug.83	May84
	LE	ST	$
At Embaba P.S. Complex			
Screw pumping station	1359	973	
Standby generator building	249	44	
Transformer building	185	33	
Services building	454	64	
Gatehouse	43	6	
Delivery channel and feed culvert	188	44	
Boundary wall and site clearance	343	-	
Roads	90	-	
Other works	76	5	
Mechanical and electrical equipment	-	-	2710
Embaba P.S. Complex total raw cost	2987	1169	2710
	LE	ST	$
At Boulac P.S. Complex			
Screw pumping station	1902	1362	
Standby generator building	384	68	
Transformer building	185	33	
Services building	454	64	
Gatehouse	43	6	
Delivery channel and feed culvert	685	194	
Boundary wall and site clearance	475	-	
Roads	91	-	
Other works	77	5	
Mechanical and electrical equipment	-	-	3826
Boulac P.S. Complex total raw cost	4296	1732	3826

At Junction P.S. complex			
Screw pumping station	1902	1362	
Standby generator building	384	68	
Transfomer building	185	33	
Services building	454	64	
Gatehouse	43	6	
Delivery channel and feed culvert	1311	471	
Boundary wall and site clearance	560	-	
Roads	118	-	
Other works	76	5	
Mechanical and electrical equipment	-	-	4194
Junction P.S. Complex total raw cost	5033	2009	4194
	LE	ST	$
At South Muheit P.S. Complex			
Screw pumping station	1812	1297	
Standby generator building	384	68	
Transfomer building	185	33	
Services building	454	64	
Gatehouse	43	6	
Delivery channel and feed culvert	363	108	
Boundary wall and site clearance	468	-	
Roads	491	-	
Other works	76	5	
Mechanical and electrical equipment	-	-	3782
South Muheit P.S. Complex total raw cost	4276	1581	3782
At Abu Rawash P.S. Complex			
Screw pumping station	1526	1291	
Transformer building	185	33	
Gate house	43	6	
Delivery channel and feed culvert	357	130	
Boundary wall and site clearance	126	-	
Roads	60	-	
Other works	28	2	
Mechanical and electrical equipment	-	-	2784
Abu Rawash P.S. Complex total raw cost	2325	1462	2784
	LE	ST	$
At Pyramids P.S. Complex			
Screw pumping station	1902	1362	
Standby generator building	384	68	
Transfomer building	185	33	
Services building	454	64	
Gatehouse	43	6	
Delivery channel and feed culvert	436	106	
Boundary wall and site clearance	606	-	
Roads	105	-	
Other works	76	5	
Mechanical and electrical equipment	-	-	3551
Pyramids P.S. Complex total raw cost	4191	1644	3551
Grand total raw cost, all pumping stations	23108	9597	20847

Non-constructional cost (7.9% of LE raw cost)	1825	-	-
Non-constructional cost (13.4% of ST raw cost)	-	1286	-
Provisional sums & quantities (5% of raw cost)	1155	480	1042
Contingencies & omissions (15% of raw cost)	3466	1440	3127
	29554	12803	25016

Using assumed exchange rates:
Engineer's probable cost is
LE 51.0 million (Base date Aug. 1983)
$ 25.0 million (Base date May 1984)
Currency split (Civil Works) - Foreign LE 25.6 million
- Local LE 25.4 million
This currency split is based on the estimated proportional costs of local labor, material and plant to the total cost.

Using assumed inflation rates:
Probable cost on 1st June 1984 is:
- $25.0 million (civil)
- $27.0 million (M & E)
-LE30.0 million (civil)
Equivalent $78.8 million

And on 1st Janjuary 1987
- $32.0 million (civil)
- $34.0 million (M & E)
-LE48.0 million (civil)
Equivalent $108.9 million

COST SUMMARY - CONTRACT NO. 23
Zenein P.S. Complex

	Structure Cost, X1000		
Base date:	Aug. 83	Aug. 83	May 84
	LE	ST	$
Screw pumping station	3262	2335	
Transformer building	185	33	
Delivery channel & feed sewer	292	109	
Site clearance	12	-	
Roads	32	-	
Other works	3	1	
Mechanical and electrical equipment	-	-	2567
Zenein P.S. Complex total raw cost	3786	2478	2567
Non-constructional cost (7.9% of LE raw cost)	299	-	-
Non-constructional cost (13.4% of ST raw cost)	-	332	-
Provisional sums & quantities (5% of raw costs)	189	124	128
Contingencies & omissions (15% of raw cost)	568	372	385
	4842	3306	3080

Using assumed exchange rates:
Engineer's probable cost of Zenein P.S. complex is:
LE 10.4 million (Base date Aug. 1983)
$ 3.1 million (Base date May 1984)

Currency split (civil works) - Foreign LE. 5.2 million
- Local LE. 5.2 million

This currency split is based on the estimated proportional costs of local labor, material and plant to the total cost.

Using assumed inflation rates:
Probable cost on 1st June 1984 is:
- $ 5.0 million (civil)
- $ 3.2 million (M & E)
- LE6.0 million (civil)

Equivalent $13.7 million

And on 1st July 1986
- $ 6.3 million (civil)
- $ 3.9 million (M & E)
- LE9.2 million (civil)

Equivalent $18.4 million

Giza Relief Sewerage

Pipelines:

Diameter/ Material mm	Total length m	Depth m	Unit rate LE/m	Raw cost LE
750 RC	133	4-6	850	113 050
1200 RC	376	2-4	977	367 352
1200 RC	226	4-6	1251	282 726
2000 RC	965	4-6	2094	2 020 710
2000 RC	2441	6-8	2968	7 244 888
2000 RC	194	greater than 8	3155	612 070
300 DI	130	less than 2	98	12 740
300 DI	40	4-6	448	17 920
500 DI	469	less than 2	227	106 463
500 DI	696	2-4	422	293 712
700 DI	550	2-4	650	357 500
	Total raw cost of sewers & force mains			LE.11 429 131

RC: Reinforced Concrete
DI: Ductile Iron

Manholes:

Applicable sewer diameter,mm	Number of manholes	Depth m	Average unit rate LE/manhole	Raw cost LE
750	4	4-6	5841	23 364
1200	4	2-4	6413	25 652
1200	2	4-6	7093	14 186
2000	6	4-6	10634	63 804
2000	15	6-8	11769	176 535
2000	3	greater than 8	12190	36 570
		Total raw cost of manholes		LE.340 111

Pipe Jacking: The total estimated length of pipes, of all sizes, to be jacked was 105m, at two different locations.

The cost of pipe jacking included the cost of:
- Excavation of jacking and reception pits.
- Sheet piling and strutting
- Pipe manufacturing and transport
- Jacking of pipes
- Dewatering

Total raw cost of pipe jacking LE.1 137 000

Thus,

Total raw cost of sewerage system (including minor items not shown above)	LE. 13.26 million
Non-constructional cost (15% of raw cost)	LE. 1.99 million
Provisional sums & quantities (5% of raw cost	LE. 0.66 million
Contigencies & omissions (20% of raw cost)	LE. 2.65 million
	LE. 18.56 million

Currency split - Foreign LE 9.28 million
- Local LE 9.28 million

This currency split is based on the estimated proportional costs of local labor, material and plant to the total cost.

Probable cost on 1st June 1984 is:
- $ 8.3 million
- LE 9.3 million
Equivalent $16.6 million

And on 1st July 1986
- $ 10.7 million
- LE13.8 million
Equivalent $23.0 million

And therefore, the probable cost of Contract No. 23 is:

1st June 1984 $ 14.0 million (civil)
$ 4.0 million (M & E)
LE.16.0 million
Equivalent $32.3 million

1st July 1986 $ 17.0 million (civil)
$ 4.0 million (M & E)
LE.23.0 million (civil)
Equivalent $41.6 million

III Operations and Maintenance of Core System Components

Illustrative O & M costs of the major construction elements are summarized in the following tables. These costs, estimated by AMBRIC, are based on comparable US systems and adjusted to local labor conditions and costs.

O & M costs for the culverts, collectors and laterals are expected to be minimal and therefore have not been included.

Costs are shown in dollars, and escalated to the mid-date of the two five-year periods using a 7.5% annual factor.

WASTEWATER TREATMENT PLANTS
AVERAGE ANNUAL OPERATIONS AND MAINTENANCE
COSTS

	FIRST FIVE YEARS	SECOND FIVE YEARS
ABU RAWASH		
- Operations Labor Cost	$178,000	$331,000
- Maintenance Labor Cost	112,000	266,000
- Power Cost	1,063,000	2,329,000
- Chemical Cost	587,000	1,285,000
- Material and Supply Cost	2,367,000	4,835,000
- Total Costs	$4,307,000	9,245,000
ZENEIN		
- Operations Labor Cost	$281,000	$404,000
- Maintenance Labor Cost	235,000	421,000
- Power Cost	831,000	1,193,000
- Chemical Cost	495,000	711,000
- Material and Supply Cost	1,112,000	1,607,000
- Total Costs	$2,954,000	4,336,000

SEWER PUMP STATIONS
AVERAGE ANNUAL OPERATIONS AND MAINTENANCE
COSTS

	FIRST FIVE YEARS	SECOND FIVE YEARS
EMEABA		
- Operations and Maintenance Labor Costs	$13,000	$19,000
- Power Cost	63,000	94,000
- Material and Supply Costs	63,000	94,000
- Total Costs	$139,000	207,000
Boulac		
- Operations and Maintenance Labor Costs	$24,000	$36,000
- Power Cost	119,000	178,000
- Material and Supply Costs	119,000	178,000
- Total Costs	$262,000	392,000

SEWER PUMP STATIONS
AVERAGE ANNUAL OPERATIONS AND MAINTENANCE
COSTS

	FIRST FIVE YEARS	SECOND FIVE YEARS
S. MUHEIT		
- Operations and Maintenance Labor Costs	$24,000	$37,000
- Power Cost	122,000	186,000
- Material and Supply Costs	122,000	186,000
- Total Costs	$268,000	409,000
ZENEIN		
- Operations and Maintenance Labor Costs	$28,000	$41,000
- Power Cost	140,000	206,000
- Material and Supply Costs	140,000	206,000
- Total Costs	$308,000	453,000

SEWER PUMP STATIONS
AVERAGE ANNUAL OPERATIONS AND MAINTENANCE
COSTS

	FIRST FIVE YEARS	SECOND FIVE YEARS
PYRAMIDS		
- Operations and Maintenance Labor Costs	$20,000	$30,000
- Power Cost	99,000	148,000
- Material and Supply Costs	99,000	148,000
- Total Costs	$218,000	326,000
ZENEIN		
- Operations and Maintenance Labor Costs	$40,000	$59,000
- Power Cost	199,000	296,000
- Material and Supply Costs	199,000	296,000
- Total Costs	$438,000	651,000

SEWER PUMP STATIONS
AVERAGE ANNUAL OPERATIONS AND MAINTENANCE
COSTS

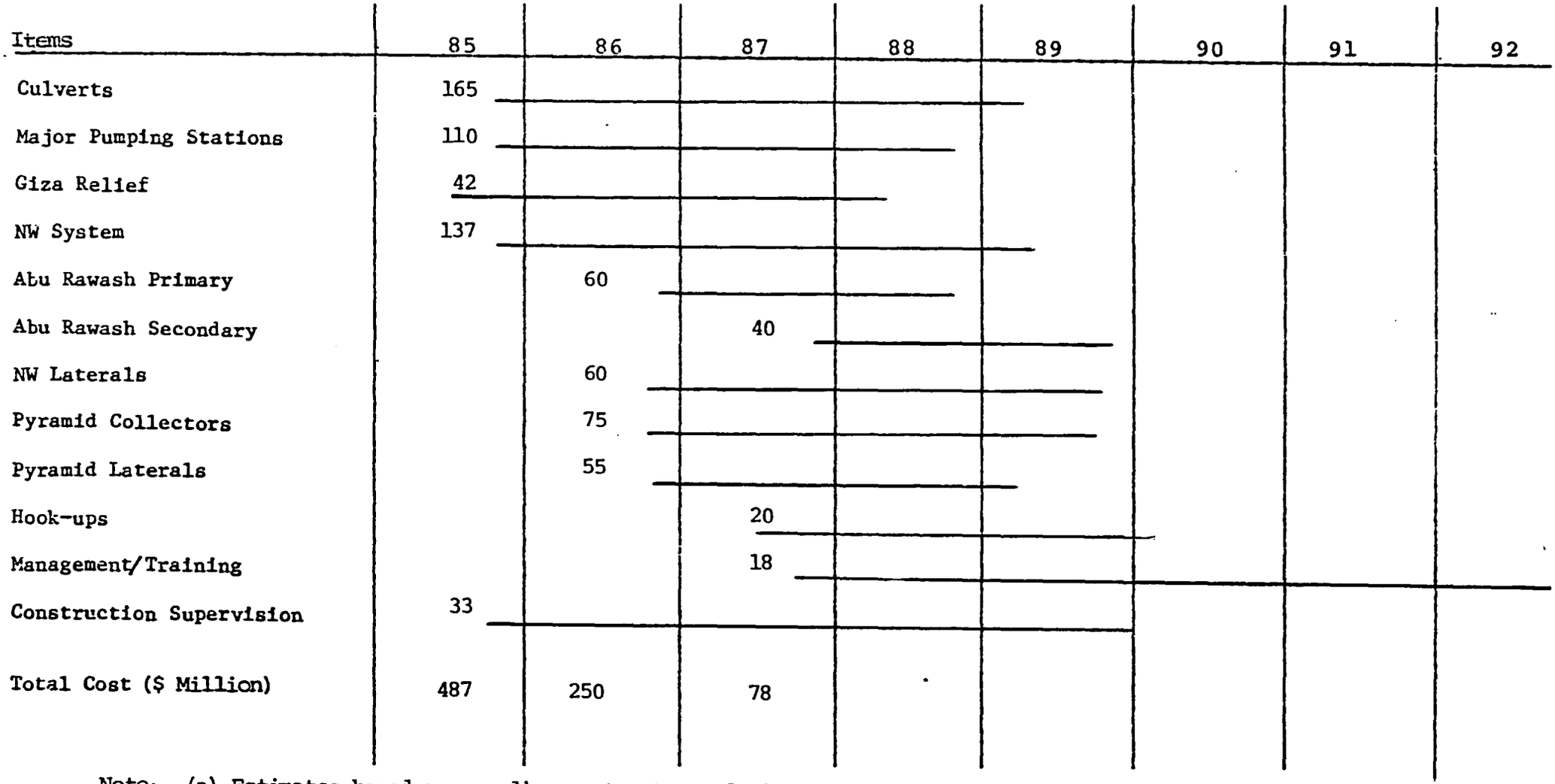
	FIRST FIVE YEARS	SECOND FIVE YEARS
ABU RAWASH		
- Operations and Maintenance Labor Costs	$40,000	$59,000
- Power Cost	199,000	296,000
- Material and Supply Costs	199,000	296,000
- Total Costs	$218,000	651,000

IV Construction Schedule based on various funding alternatives

General:

Various funding options discussed in Section 9 are shown in the following illustrative obligation and construction schedules. All figures assume a FY 1984 $150 million obligation which is additive to proposed 1985 levels.

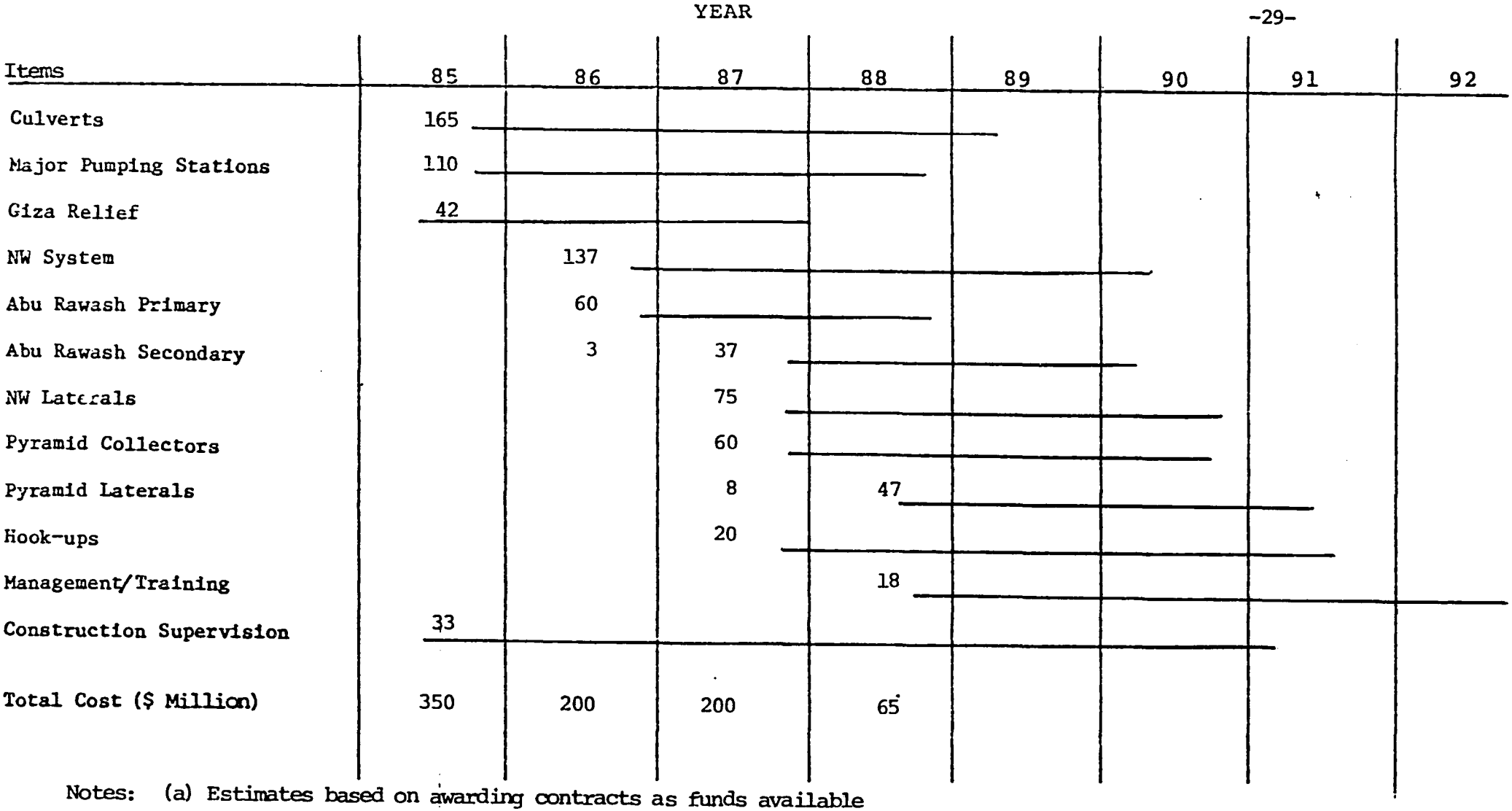
Figures show actual anticipated construction periods. Start times allow for the necessary lead time for advertizing and award of constructon packages. All assume that basic core design will be completed in Dec. 1984 with Abu Rawash and lateral design activities continuing until 1986. No allowance has been made for inflation except for alternative 1c.



Note: (a) Estimates based on awarding contracts as design completed and assumes funds available.

(b) All construction complete by end of 1989 with first household hookups in late 1987

Alternative 1a
"Front End Funding"
Maximum Schedule



Notes: (a) Estimates based on awarding contracts as funds available

(b) All construction complete by end of 1991 with first household hookups in early 1988

Alternative 1b
"Front End Funding"
$200 m/yr. obligation Rate

Items	YEAR 85	86	87	88	89	90	91	92
Culverts	165							
Major Pumping Stations	38	72						
Giza Relief	42							
NW System			40	97				
Abu Rawash Primary			60					
Abu Rawash Secondary					40			
NW Laterals					60			
Pyramid Collectors						75		
Pyramid Laterals							55	
Hook-ups						20		
Management/Training				3		5	10	
Construction Supervision	5	28						
Total Cost ($ Million)	250	100	100	100	100	100	65	
(inflation est.)			6	45	13	31	40	

Notes: (a) Schedule based on inflation costs being funded in addition to basic $100 million

(b) First house connections in 1990 with construction complete in 1994

(c) Inflation figures keyed to construction awards, based on 10% per year rate and includes construction supervision extensions.

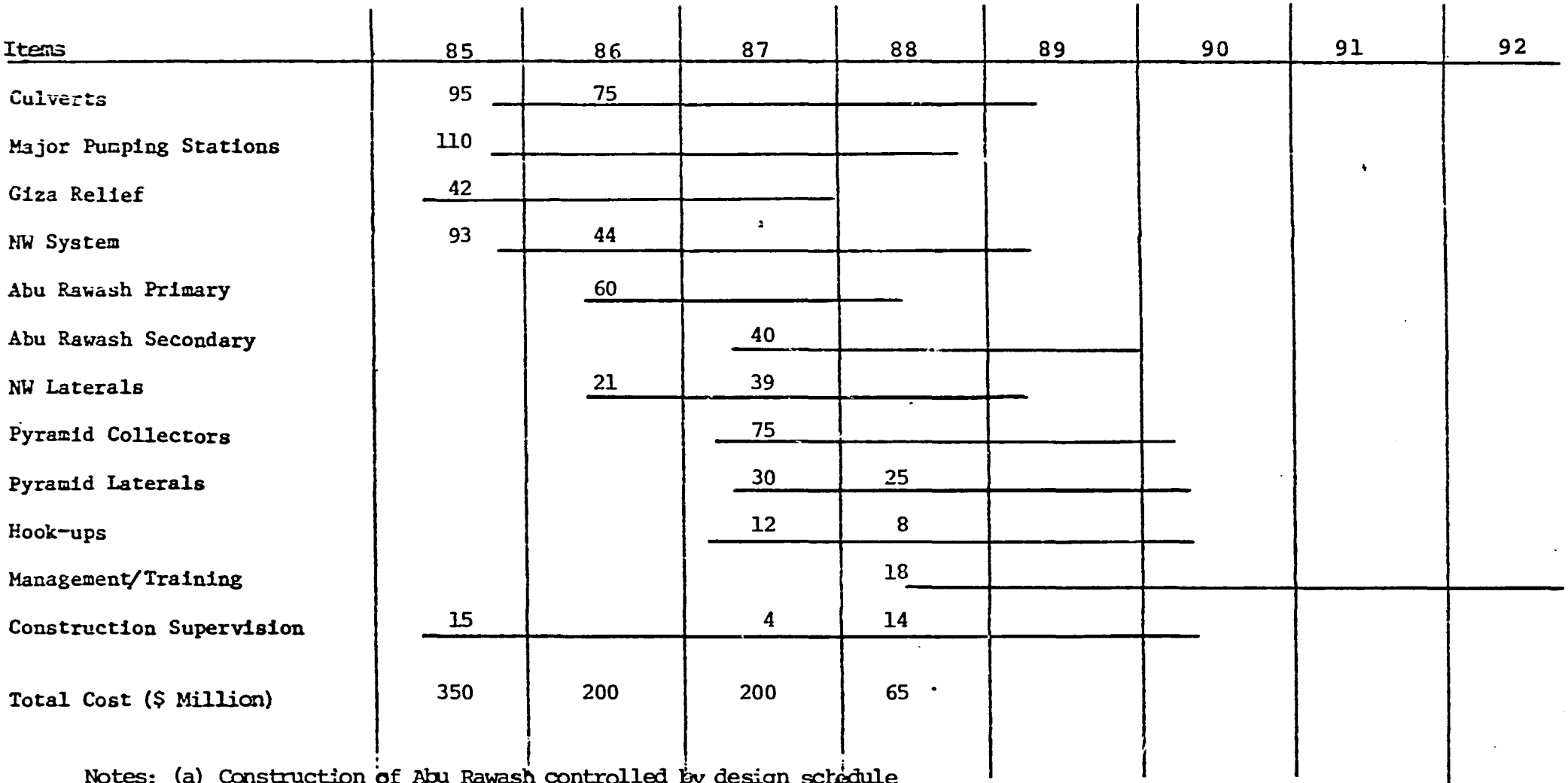
Alternative 1c
"Front End Funding"
$100 m/yr. Obligation Rate

Items	YEAR 85	86	87	88	89	90	91	92
Culverts	45	33	33	33	21			
Major Pumping Stations	30	25	25	30				
Giza Relief	20	11	11					
NW System	37	25	25	25	25			
Abu Rawash Primary		15	20	25				
Abu Rawash Secondary			10	15	15			
NW Laterals		15	15	15	15			
Pyramid Collectors		20	20	20	15			
Pyramid Laterals		15	15	15	10			
Hook-ups			4	8	8			
Management/Training			6	6	6			
Construction Supervision	9	6	6	6	6			
Total Cost ($ Million)	141	165	190	198	121			

Notes: (a) Funding required based on 25% advance/mobilization with proportionate drawdown over construction period with an allowance for retainage.

(b) Construction schedule is equivalent to alternative 1a

Alternative 2
Multiple Year Construction Funding



Notes: (a) Construction of Abu Rawash controlled by design schedule
(b) Construction of laterals phased to coincide with available discharge point in new system
(c) Construction service est. to cost $5.0 million in FY 85 and 7.0 million annually thereafter.
(d) Construction showing funding over 2 years based on "Additive Item" concept.
(e) First house connections in 1988 with construction complete in 1990

Alternative 3
"Additive" Construction
Approach

Annex H

Use of the Joint Housing Project to Provide House Connections for The Cairo Wastewater II Project

In order to ensure that collector sewers and other components of the Cairo Wastewater Project are fully utilized as soon as possible it will be necessary to provide house connections. This will be a difficult task because many of the "informal housing" areas have narrow streets and high population densities. The record of Cairo/GOSD in providing sewer service in such areas has not been good. One means to assure that households are connected to the collection system in a timely and efficient manner would be to utilize the Joint Housing Project Agency (JHP) to implement the necessary house connection program. The JHP is, like C/GOSD, a part of the Ministry of Housing, currently implementing a program of comprehensive urban upgrading in six informal housing areas of Helwan. This work is funded by AID Grant 263-0066, Housing and Community upgrading for Low Income Egyptians. A major component of the JHP's urban upgrading program is the provision of water and sewer house connections in these areas.

Use of the JHP, rather than reliance on Cairo/GOSD, takes advantage of the special expertise which the JHP has developed in dealing with informal, low income communities. The JHP has developed a procedure for area upgrading outlined below. They have also invested heavily in the training of their staff and the development of improved contracting procedures.

Stage 1; Initial Contact and Planning

A social services team from the JHP contacts area residents, community groups and community leaders to explain the upgrading program. The JHP then contracts for an urban plan of the community, specifying the needed infrastructure (water, sewers, power, roads) and public facilities (schools, clinics, community centers) and discusses the plan with area residents prior to approval by Cairo Governorate.

Stage 2; Engineering Design, Community Organization and Credit Program Initiation

Based on the approved plan, JHP contracts for infrastructure design and construction supervision services from a local engineering firm. At the same time, JHP initiates its Home Improvement Loan Program (HILP) along with the Credit Foncier Egyptien (CFE Bank). This credit program is used by area residents to amortize the cost of both home improvements and water/sewer connection charges as their needs develop. The HILP is the core of the JHP's cost recovery program. JHP's social services team concentrates on helping community groups organize solid waste collection, cesspit emptying services, health and educational programs.

Stage 3; Infrastructure and Facilities Construction

Once the designs are complete the JHP tenders for local, private contractors to construct the infrastructure networks and public facilities. Construction of water and sewer lines (including house connections) as well as road works is let as a single construction package for the entire area supervised by the local design engineer. Schools and other public facilities are let as separate

contracts. Upon completion of the works the systems are turned over to Cairo/GOSD (sewers), GOGCWS (water) and the district government (roads) for operation and maintenance. Area residents are billed for a one-time "special assessment" based on JHP's costs and resident's abilities to pay as indicated in planning studies and JHP's social services team surveys. These charges can be amortized using HILP credit.

Expansion of the JHP's urban upgrading program to the areas served by the Cairo wastewater project is a logical extension of the JHP program. The JHP has indicated a strong desire to expand their program. Funds from the Cairo Wastewater Project reserved for house connections could be used to finance the JHP implemented sewer construction on a fixed amount or fixed percentage reimbursement basis.

Use of the JHP has additional advantages. Sewer improvements could be linked to solid waste collection efforts and local health education programs run by the JHP as part of its comprehensive program. A working credit program has already been developed to recover costs. JHP is familiar with AID procedures and the use of reimbursement agreements. Most importantly, the JHP is an institution whose primary purpose is to improve low income urban areas, and sewage system improvements have been at the core of their Helwan program since 1980.

ANNEX I

5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3. applies to projects funded from ESF.

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

Yes

Yes

A. GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

   (a) Describe how authorizing and appropriations committees 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 amount)?

   (a) Formal Congressional Notification (CN) will be submitted

   (b) Yes

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,00, will there be

	(a) engineering, financial or 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?	None Required
4.	FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.)	Yes
5.	FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	Yes

6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

No

7. FAA Sec. 601(a). 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; and (c) encourage development and use of cooperatives, and 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.

Project will not impact significantly on items a through f

8. FAA Sec. 601(b). Information and conclusions 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).

Project funds will have major impact on US trade and investments abroad through procurement of US source and origin goods and services provided by US private sector firms and suppliers.

9. FAA Sec. 612(b), 636(h); FY 1982 Appropriation Act Sec. 507. 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 in lieu of dollars.

Egypt is contributing local currency toward the project estimates at approximately 1/3 of the costs.

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

Egypt is no longer an excess currency area.

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes

12. FY 1982 Appropriation Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

N/A

13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does

Yes

the project or program take into consideration the problem of the destruction of tropical forests? N/A

14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)? N/A

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and (a) N/A

(b) N/A

otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

(c) N/A

(d) N/A

(e) N/A

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

Yes

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

N/A

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activitiy with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?

N/A

e. 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, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character." N/A

f. FAA Sec. 122(b). 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? N/A

g. 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 N/A

institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, 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? N/A

c. ISDCA of 1981, Sec. 724 (c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)? N/A

3. Economic Support Fund Project Criteria

a. FAA Sec. 531(a). Will this assistance promote economic or politica\ Yes

stability? To the extent possible, does it reflect the policy directions of FAA Section 102?	Policy directions have been included to the extent possible.
b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?	No
c. FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?	No
d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	N/A

ANNEX J

AID 1020-28 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1985 to FY 1994
Total U.S. Funding $700 million
Date Prepared: July, 1984

Project Title & Number: Cairo Sewerage II (263-0173)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Improve living conditions (health, transit, aesthetic) for the population on the West Bank of Cairo	**Measures of Goal Achievement:** 1. Reduction of enteric diseases 2. Elimination of raw sewerage from the human environment	1. Ministry of Health records 2. Visual inspection	**Assumptions for achieving goal targets:** That reduction in sewage flooding will improve the public health environment, remove obstacles to transit, and better the aesthetic conditions on the West Bank of Cairo
Project Purpose: Improve, expand and assure the proper management of the wastewater collection and treatment system on the West Bank of Cairo	**Conditions that will indicate purpose has been achieved: End of project status.** 1. Elimination of flooding of sewage related to surcharging of a) the collection system and b) household vaults 2. Effluent discharged into drains treated to secondary level 3. Conduits, pump stations and treatment plants on the West Bank operate as designed	1. C/GOSD records of flooding incidents 2. Applications to C/GOSD for new household connections 3. Treatment records at wastewater facilities 4. C/GOSD records and employee performance as determined by field inspection	**Assumptions for achieving purpose:** 1. System elements have been properly designed 2. Construction is undertaken according to design 3. Long-term expatriate contract for operations, maintenance and training is properly designed and implemented
Outputs: 1. Capacity of the West Bank sewage collection system is increased 2. Households have access to the system through lateral collection network 3. Zenein and Abu Rawash Treatment Plants function at secondary treatment level 4. C/GOSD employees operating, maintaining and managing West Bank system	**Magnitude of Outputs:** 1. System carries flow of 480,000 cmd by 1990 2. Access to collection system provided to 8,000,000 residents by 2020 3. Combined output of treated effluent 770,000 cmd by 1990 4. C/GOSD staff numbers and performance sufficient to operate, maintain and manage the West Bank systems	1. C/GOSD records of system flow levels 2. C/GOSD records of households served by system and new connections 3. Treatment plant records 4. Field inspection of system components and C/GOSD records 5. Interim performance evaluations	**Assumptions for achieving outputs:** 1. Cooperation and support of CWO/GOSD 2. Consultants, contractors, CWO and C/GOSD perform their roles satisfactorily 3. Funds, materials, equipment and manpower are provided in a timely manner 4. C/GOSD employees are available and willing to participate in training
Inputs: 1. Construction services 2. Technical services 3. Materials 4. Equipment 5. Training 6. Operations services	**Implementation Target (Type and Quantity)** USAID: $700 Million GOE: $495 Million	USAID - GOE Project Agreements GOE Budgets	**Assumptions for providing inputs:** Conditions Precedent are met Bids are within estimated costs FX and LE are available

ANNEX K

Date:

From: NE/PD/PDS, Stephen F. Lintner, Bureau Environmental Coordinator

Subject: Egypt, Cairo Sewerage II (263-0173) Environmental Clearance

To: NE/PD/Egypt

I have reviewed the Project Paper for the subject proposed project and the Environmental Assessment prepared in 1982 for Project 263-0091 and covering the activities proposed for inclusion in Project No. 263-0173 and I concur with the recommendation in that a "Negative Declaration" be given.

ANNEX L

Waiver of Competition to permit amendment of contract with AMBRIC to provide construction engineering, supervision and management services.

Problem: To approve non-competitive amendment of contract between AMBRIC and the Cairo Wastewater Organization to procure construction engineering, supervision and management services for the Cairo Sewerage II Project activities on the East and West Banks.

Discussion: AMBRIC, a consortium of British and American firms, is currently providing design and construction management services for expansion of the sewerage system on the East and West Banks of the Nile under the Cairo Sewerage Project (AID Project No. 263-0091). The design services contract was first entered into in April 1979 and has been amended fourteen times since.

Because the design services have been financed by both the American and British governments, no waiver of US nationality rules has been required: the British government has financed, on a cost-reimbursement basis, the services provided by the two British firms which form a part of AMBRIC - Binnie and Partners and John Taylor and Sons (Taylor-Binnie), and the U.S., through AID, has financed the services of the two US components - Camp Dresser and McKee (CDM) and Black and Veatch International (BVI). The US and Great Britain have financed the overhead cost of the consortium in proportion to the US and British services, respectively, provided by AMBRIC. To date, major designs have been developed by AMBRIC for the central and branch tunnels on the East and West Bank collection and culvert systems and the main

collector and conduit systems under Project 263-0091. Construction of a portion of this work is currently underway on both banks with projects being independently funded by USAID and the U.K. All, however, have retained AMBRIC as the construction manager/supervisor. Additional construction of collection and conduit systems designed by AMBRIC under the 0091 project on the West Bank planned for funding by AID under the Cairo Sewerage II Project is also proposed by the Mission for construction management and supervision by AMBRIC.

Construction supervision by the designer is standard in the American as well as international development fields. This approach is based, in part, on the fact that the designer has a legal responsibility for the adequacy of his work. In order to undertake this he must play an integral role during the construction process to assure that work is accomplished as specified and that required changes and modifications are compatible with the initial design effort. The alternative of shifting to a new construction supervision team would result in either absolving AMBRIC of their design responsibility or in duplicating supervision services with another consultant while AMBRIC still played a role adequate to assure satisfactory construction in accordance with their design. The first approach would require a costly and complete review of all of AMBRIC's design work by their replacement, while the second would result in a duplication of staff at the site. Both approaches would be much more costly, cause delays, and would be more troublesome for both CWO and USAID to manage. The GOE and the Mission have been pleased with the quality of AMBRIC's work to date and for this reason alone would be reluctant to change consultants to this time.

The continuity need between the design and construction stages was clearly recognized and provided for in the Request for Technical Proposals in 1978. The Scope of Work of the RFP includes management of design construction for all of Greater Cairo . The Scope of Work in the RFP is incorporated in AMBRIC's initial contract signed in 1979. Both clearly defined a joint design-construction management phase as well as other phases related to studies, rehabilitation and training. The construction phase was also clearly established to be one of construction management rather than a lessor construction supervision role.

However, the scope of services noted in the RFP and AMBRIC's initial contract is not identical to the scope of services advertised in the CBD prior to prequalification in 1978. The CBD notice, which was prepared prior to the decision to jointly finance the project with Great Britain, contemplated construction supervision as a relatively minor part of the services to be performed ("1. Recommendations for the repair and rehabilitation of essential parts of existing sewerage system ... 2. Training in operations and maintenance to maximize the utilization of the existing system. 3. Analyze and evaluate the proposed expansion of the system, and prepare and compare feasible alternative solutions for this expansion work. 4. Preparation of final engineering designs, cost estimates, and contract documents for the approved expansion plan developed; and related construction supervision.") The RFP notes the expansion of the scope of services to be provided from that included in the CBD notice: "... 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 managment of design construction has been added. Furthermore, ... all of Greater Cairo (excluding Helwan) is now included in the PROJECT." It is clear that the CBD notice did not clearly give potential bidders

notification as to the total magnitude of the costs or the timing to implement the program. Previous amendments have increased the original AMBRIC contract from $5,326,000 to approximately $23,583,000; additional increments under the 0091 project will increase the contract to approximately $35,300,000. The additional services to be provided under the Cairo Sewerage II Project would increase the contract by an additional 33 million dollars or so.

Therefore, because of doubt that firms responding to the notice of March 29, 1978 were or could reasonably have been expected to be aware of the full range of services now contemplated, a waiver to permit non-competitive amendment of the AMBRIC contract is being requested.

Recommendation: Competition in the procurement of services may be waived and a single-source negotiated procurement authorized by the Administrator if the value of the procurement exceeds $500,000, when the Grantee desires to utilize a contractor previously engaged in the project for follow-on work and the contractor clearly has special capability by virtue of previous experience in the work but the Grantee did not advise all competing firms that a follow-on contract might result. It is recommended that you permit a waiver of competition in the procurement of construction engineering, supervision and management services from AMBRIC.

No waiver of the US and Egyptian nationality rules need be made, since the US will continue to finance, on a cost reimbursement basis, only the services of the two US components of AMBRIC, and a percentage of the consortium's overhead representating the US firms' percentage of ownership.

ID#0095A