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

5/78

PROJECT PAPER

Proposal and Recommendations  
For the Review of the  
Development Loan Committee

EGYPT: AG CANAL RECONSTRUCTION AND MAINTENANCE

Project No. 263-0035  
Loan No. 263-K-040

AID-DLC/P- 2263

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

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AID-DLC/P-2263  
September 19, 1977

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: EGYPT - AG Canal Reconstruction and Maintenance

Attached for your review are recommendations for authorization of a loan to the Government of Egypt ("Borrower") of not to exceed Twenty-Six Million U.S. Dollars (\$26,000,000) to assist in financing certain foreign exchange and local currency costs of goods and services required for the project. The loan is to assist the Government of Egypt to restore and maintain the irrigation supply and drainage canals which are necessary for agricultural productivity.

No meeting is scheduled for this loan proposal. We would, however, appreciate your advising us of concurrences or objections as early as possible, but no later than the close of business on Monday, September 26, 1977. If you are a voting member, a poll sheet has been enclosed.

Development Loan Committee  
Office of Development  
Program Review

Attachments:  
Summary and Recommendations  
Project Analyses  
Annexes:  
A - 0

# EGYPT: AGRICULTURAL CANAL RECONSTRUCTION & MAINTENANCE

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AGENCY FOR INTERNATIONAL DEVELOPMENT

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**8. ESTIMATED FY OF PROJECT COMPLETION**

FY

**9. ESTIMATED DATE OF OBLIGATION**

A. INITIAL FY

B. QUARTER

C. FINAL FY

(Enter 1, 2, 3, or 4)

**10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -**

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	26,000		26,000	26,000		26,000
IGRANT						
ILOAN	26,000		26,000	26,000		26,000
OTHER U.S.						
HOST COUNTRY		4,300	4,300	3,500	4,300	7,800
OTHER DONOR(S)						
<b>TOTALS</b>	26,000	4,300	30,000	29,500	4,300	33,800

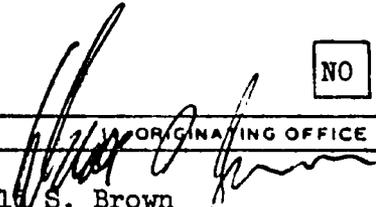
**11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)**

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY		H. 2ND FY		K. 3RD FY	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
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(3)									
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		<b>TOTALS</b>		26,000					

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(1)						26,000	<input type="text" value="MM YY"/> <input type="text" value="MM YY"/>
(2)							
(3)							
(4)							
		<b>TOTALS</b>				26,000	

**13. DATA CHANGE INDICATOR.** WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

NO 1 = NO  
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SIGNATURE  Donald S. Brown	ORIGINATING OFFICE CLEARANCE		15. DATE DOCUMENT RECEIVED IN AID/W. OR FOR AID/W DOCU- MENTS. DATE OF DISTRIBUTION
	TITLE Director, USAID/Egypt	DATE SIGNED <input type="text" value="9 15 77"/>	

EGYPT: AGRICULTURAL CANAL RECONSTRUCTION & MAINTENANCE

SUMMARY AND RECOMMENDATION

Borrower: Government of the Arab Republic of Egypt (GOE)

Implementing Agency: The Egyptian Ministry of Irrigation

Loan Amount: U.S. \$26.0 million

Terms: To Government of Egypt - Repayment within 40 years including ten years of grace; 2 percent annual interest during the grace period and 3 percent annual interest thereafter.

To Ministry of Irrigation - Repayment within 25 years including five years of grace; 8 1/2 percent per annum interest.

Purpose: Increase agricultural productivity by restoring and maintaining irrigation canals.

Project Description: Enhance capacity of two public sector companies to reconstruct and maintain irrigation canals to provide water supply and drainage. The AID loan will provide funding for new construction and transport equipment, and related services.

Total Project Cost: Total project cost in both foreign exchange and local currency is estimated at \$33.8 million. The foreign exchange component is estimated at \$29.5 million, of which this AID loan will fund \$26 million; \$3.5 million will be obtained by the GOE from other sources. The GOE will provide the balance of \$4.3 million equivalent in local currency.

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Loan Application: The Government of Egypt has requested AID to provide a \$26 million loan for this project. The application is attached as Annex A.

Mission Views: USAID/Egypt has recommended authorization of the proposed loan.

Source of U.S. Funds: Fiscal Year 1977 Security Supporting Assistance

Statutory Requirements: All Statutory criteria have been met. See Annex D.

Recommendation: Authorize a \$26.0 million loan to the Government of the Arab Republic of Egypt on terms and conditions set forth in the draft loan authorization in Annex B.

USAID Project Committee:

Thomas R. Tifft, Chairman

Philip S. Lewis, Engineer

Neil Dimick, Agricultural Engineer

James Norris, Economist

George Laudato, Program Officer

James Phippard, Attorney



I. INTRODUCTION

- 1.01 The Government of Egypt has requested a loan of \$26,000,000 to assist in financing the foreign exchange costs of providing construction and transport equipment to two public sector companies, organized under the Ministry of Irrigation, to enhance their capability to maintain irrigation water canals throughout the country. Agricultural productivity is highly dependent on maintaining the capacity of these canals.
- 1.02 This project will complement other AID assistance to the Egyptian agricultural sector. Several capital and technical assistance projects are underway: PVC Drainage Pipe Plant (Loan 263-K-034), Water Use and Management Studies (263-0017), Rice Research and Training (263-0027), Agricultural Development Systems (263-0041), Poultry Improvement (263-0060), and Managing Planning in Agriculture and Rural Development (TAB-0209). Commodity import assistance totalling approximately \$41 million is being provided to increase agricultural production, including tractor units, soybean seed and inoculants, deep well pumps, electrical parts for pumping stations, and herbicides.
- 1.03 A comprehensive study of the project was performed by the U.S. consulting engineering firm of Louis Berger International, Inc., under an AID-funded contract (No. AID/Afr-C-1132). The report of that study, reviewed by the Ministry of Irrigation and USAID, serves as the basis for this project paper.

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## II. BACKGROUND

### A. General

2.01 Egypt is a largely desert country with a total land area of approximately 1 million Km<sup>2</sup>. The populated area is 35,850 Km<sup>2</sup> (3.6%) and the cultivated area approximately 28,120 Km<sup>2</sup> (2.8%). The cultivated area per capita was estimated to be .76 feddans in 1960 and now is only about .70 feddans per person.

2.02 The entire country of Egypt lies in the temperate zone between 22° and 32° north latitude. It is part of the vast desert belt that extends in Northern Africa from the Atlantic Coast eastward through Saudi Arabia. It is a dry, arid country with subtropical temperatures prevailing throughout the land. The Nile, flowing from the southern region to the Mediterranean, forms the ribbon of life for the country. People and crops are confined to the eastern and western edges of this strip of water and the northern Delta area. The deserts on both sides of the Nile Valley provide a warm and rainless climate with pronounced diurnal changes.

2.03 Canal maintenance and restoration work is performed throughout the public canal system in Egypt, the extent of which is illustrated in Annex E.

2.04 Egypt has an estimated population of 40.0 million (1977) with a current population growth rate of 2.5% per annum. About 96% of the country is uninhabitable. The remaining 4%, located mainly in the Nile Delta and the Nile Valley, is densely populated, estimated to have over 1,000 persons per Km<sup>2</sup>. The per capita GNP for the country in 1970 was U.S. \$210 and for agriculture the per capita GNP in the same years was only U.S. \$100. In 1974, the per capita GNP for the country was U.S. \$280. The relative poverty level in rural areas of the country is estimated to be U.S. \$58 per capita.

2.05 Food import costs over the last few years have risen sharply from less than L.E. 100 million to over L.E. 500 million annually. Government subsidies to supply basic foods in urban areas at low prices and certain production inputs such as fertilizers and pesticides to farms at fixed prices have also risen from about L.E. 50 million to nearly L.E. 500 million. In spite of this, food prices have risen about 60% since 1967.

## B. Agriculture

2.06 The agriculture sector is critical to the life and economy of Egypt. It involves 57% of the population, provides employment opportunities for 46%, generates 31% of the GNP and is responsible for approximately 75 to 80% of export earnings. It is the basis for the present study and establishes the broad justification for the pumps under consideration. The Nile, flowing northward, provides two distinct agricultural regions: The Nile Delta, an alluvial fan, and the Nile Valley, formed by alluvial soils deposited annually on the east and west banks of the Nile. In general, agriculture is more advanced in the Nile Delta than in the Nile Valley.

2.07 Due to its mild and temperate climate and available water, the Nile Valley enjoys a year-round growing season. New crops are planted as quickly as old ones are harvested. Traditionally, the agricultural year begins in November and is divided into three periods: winter, summer and "nili" (the fall season, named after The Nile flood). The major winter crops are wheat, barley, Egyptian clover or berseem, broad beans, lentils, winter vegetables, winter onions and flax. These crops are usually planted during October through December and harvested from April through June. The major summer crops are cotton, maize, sorghum, millet and summer vegetables. They are generally planted from March through June and harvested from August through November. The nili crops include maize, sorghum and vegetables which are planted in July and August and harvested from October through December. Sugar cane is perennial and is usually planted in January and February and harvested about 15 months later. The subsequent ratoon cuttings are harvested a year apart afterwards. An array of fruits such as oranges and other citrus, mangoes, grapes and bananas are grown in permanent groves. Dates, the second most important fruit after oranges, are found scattered around villages and cultivated fields and along canals.

## C. Farm Practices

2.08 The general practice is a 2 or 3 year rotation. In addition, the land usually supports a variety of crops throughout the year, giving a cropping ratio of close to 1.9. The areas devoted to sugar cane and cotton are regulated by the Government and tend to be in relatively large consolidated blocks. The other crops are distributed in small plots. In the two-year rotation, the land is divided into two approximately equal blocks. One block is planted to clover in the winter and after about two cuttings, the summer cotton crop is planted. The second block is divided into two equal parts, one of which is planted to clover and the other to wheat and barley. These two blocks are subsequently planted with summer crops such as maize, sorghum, summer vegetables or millets. In the

second year, the respective crops are planted in the opposite plots in the same distributions. In the three year rotation, the land is divided into 3 equal blocks. Block one is planted to clover from which two cuttings may be obtained before planting the field in March to cotton. Block two is planted in winter to clover or beans and the third block to wheat or barley. The latter two blocks are subsequently planted with summer crops. This sequence of crops is rotated among the three blocks in the second and third year to complete the rotation. On farms where cane is grown, the sugar cane remains in the same plot for at least three years. The balance of the farmer's land is divided into plots in which winter, summer and nili crops are cultivated.

2.09 All farm plots in the project area engage in perennial irrigation made possible by the commissioning of the Aswan High Dam. Farmer's fields are provided water distributed through a vast network of irrigation and drainage canals operating under gravity. In the majority of cases, water is lifted out of the main canals to the plots by means of traditional water wheels, shadoofs, and screws. Since there is no water charge to the farmer, it is said that there is a tendency to over-irrigate, although water discipline is improving with the Ministry of Irrigation's recent efforts to match supply from the dam to actual crop production needs.

2.10 The major source of power on the farm is the buffalo and cattle. These animals are used to carry out land preparation, threshing of grain, lifting of water and in transporting goods and people. Machinery is being used to an increasing extent in some agricultural operations needing draft power such as plowing for sugar cane areas, pumping machines for irrigation and motor sprayers for pest control on cotton. The donkey is very common and is used primarily to transport goods and people. Sheep of the fat tailed, coarse wool type, and goats are found in the area, usually in herds controlled by nomads. Sheep and goat milk is used primarily for making cheese and their flesh provides the occasional meat component of the rural Egyptian's diet. The raw wool produced is used mainly for making carpets. Poultry are common, securing their foods by scavenging the cultivated fields. Organic and chemical fertilizers are used extensively and farmers are fully aware of their benefits.

#### D. Canal System

2.11 The heart of Egypt's irrigation system has been, and will continue to be, dependent on canals. To keep these canals efficient, they must be maintained regularly. Canal maintenance requirements are a function of sedimentation, bank degradation, weed formation, and its cross-section dimensions and length. In pre-Aswan High Dam days during the annual flood periods, suspended sediment discharges ranged from 59 to 136 million tons and mean concentration ranged from 1,560 to 1,810

parts per million. During the non-flood season, from December through June, the concentration was usually less than 100 parts per million. The High Dam at Aswan has greatly changed the characteristics of the Nile River. Now, nearly all of the sediment discharge of the river entering the reservoir is deposited therein. The mean annual suspended sediment discharge at Aswan is 2.2 million tons. Considering that the mean annual water discharge at Aswan is 84 billion metric tons, the suspended sediment mean concentration is now 200 parts per million.

2.12 From Aswan to Cairo, the river has eroded its channel through degradation and bank cutting to the extent that sediment discharge has increased to 4.4 million tons at Cairo, according to the Research Institute for Studies of Effects of the Aswan High Dam. With a fifty-fold decrease in suspended sediment discharge in the river after commissioning of the Aswan High Dam, there has been a substantial decrease in sediment deposition in the public canals. Nevertheless, there is some bed load sediment discharge derived mainly from bank erosion and some additional sedimentation occurs from deposit discharge from upstream reaches of the primary canals.

2.13 Current canal maintenance requirements do not originate so much from annual buildup of new deposits as from the need to clear sediments and weeds that have accumulated over the years. Canal maintenance in the past has been limited due to assignment of much of the available equipment to other priorities, resulting in insufficient cleaning and postponement of some of the needed restoration to original cross section designs. Silt deposits, canal bank degradation (sloughing) and weed growth, unless checked by a regular program of excavation maintenance, can result in deterioration of canal cross sections and thereby constrict needed water flow. The ultimate effect of the deterioration process is the decline in the ability of the irrigation systems to deliver the right quantity of water when and where needed for crop production. Deterioration of field drainage outlets caused by deposits and weed formation has an equally harmful effect on agricultural land productivity.

2.14 At the present time, there are 28,200 kms of public irrigation supply canals and 15,200 km of public drainage canals requiring annual maintenance. Maps of the canal system are attached as Annex E and a listing with lengths is attached as Annex F. Canal restoration and maintenance needs for the years 1977-1981 have been estimated by the Ministry of Irrigation at 47 million cubic meters of spoil removal in 1977, increasing to 50 million cubic meters in 1979 with the construction of new canals during the interim.

III. THE PROJECT

A. Purpose

3.01 The purpose of this project is to assist the Government of Egypt to restore and maintain the irrigation supply and drainage canals which are crucial to maintaining required levels of agricultural productivity throughout the country.

B. Description

3.02 Present and future requirements for irrigation and drainage canal restoration and maintenance cannot be satisfied by the existing capacity of Egyptian resources, public and private, devoted to this task. This project provides funding to enhance the canal maintenance capability of the two principal public sector companies engaged in this work under the aegis of the GOE Ministry of Irrigation.

3.03 Funds provided under this loan of \$26.0 million will be used for procurement of earthmoving equipment, principally draglines, backhoes, scrapers and hydraulic dredges, supporting transportation equipment, and shop and field repair and maintenance equipment. Funding provisions are also made for related engineering and management consulting services and for the training of Egyptian operating staffs.

3.04 Equipment provided will be assigned to the Egyptian Dredging Company and to ~~the~~ General Irrigation Company for Mechanical Dredging by the Ministry of Irrigation for utilization on irrigation canal maintenance projects throughout Egypt.

#### IV. CANAL MAINTENANCE COMPANIES

##### A. General

4.01 The maintenance, restoration, deepening and widening and new construction of the irrigation canal system in Egypt is accomplished by three public sector companies and some 500 private contractors ranging in size and sophistication from large firms using machine intensive methods to small rural enterprises whose labor intensive methods have changed little in 3000 years. As the cost of labor has increased substantially over the past few years, the policy of the Ministry of Irrigation has been to expand the capacity of the two principal public sector companies, Egyptian Dredging Co. and General Irrigation Co., to the point where they can perform all irrigation dredging and excavation work in Egypt.

4.02 These two public sector companies receive annual contracts through a competitive bid process; however, work assigned is also based on the Ministry's assessment of the work load and capacity of each company. Legally and operationally, the companies are official agents of the Government. One of the companies, the General Irrigation Company for Mechanical Excavation, provides services exclusively for the Ministry of Irrigation. The other, the Egyptian Dredging Company, has performed work for other ministries in the past in addition to irrigation work. Neither company is constrained by law from taking other work in Egypt or abroad. However, it is unlikely that they will have the capacity to undertake other work in Egypt, let alone abroad, in the near future because of the demands placed on them for irrigation canal maintenance and land reclamation.

##### B. Egyptian Dredging Company

###### 1. Organization

4.03 The Egyptian Dredging Company (EDC) is the largest of the three Government-owned, public sector dredging companies. Their function is to maintain existing irrigation channels, deepen and widen existing irrigation canals, and construct new dikes and irrigation canals required to expand agricultural lands. In addition, the EDC performs maintenance dredging in the Nile River. The EDC was established in 1885 as a privately-owned, British-controlled company and has operated continuously, in direct support of the irrigation system, since that date. The EDC currently employs approximately 3,000 persons: 120 administrative and management personnel in the corporate offices, approximately 540 at the main workshop area at Abu Zaabal, and the remainder, about 2,340, at the various field work sites, performing the functions of support, maintenance and repair, and operation of the production equipment.

4.04 The company is organized under a Chairman who supervises the efforts of the four Directors. The Mechanical Director is responsible for Operations of the main workshop, the stores (spare parts inventory, storage, supply and distribution), and the field maintenance program. The Director of Project Execution is responsible for field supervision, which encompasses observing and instructing field crews to insure proper work performance and for measurement of quantities for payment. The Administration Director is responsible for wage and salary administration. The Financial Director is responsible for fiscal, audit, and budget matters. The company's Board of Directors consists of a chairman and nine members; the four company directors, three elected workmen, and two individuals from outside the company. These outside members are selected on the basis of their reputations for efficiency and technical experience in company activities and/or in economic, financial, administrative or legal affairs.

## 2. Operations

4.05 The Egyptian Dredging Company is now operating under an annual contract with the Government. The contract is a guaranteed minimum contract (cubic meters per year) for various conditions and types of excavation and dredging work. EDC's total work efforts have been dedicated to the Government's requirements. The company could, but does not plan to extend its activities into the private sector either at home or abroad. Management of the EDC has indicated that the company's objective is to increase their total capability to 50 million cubic meters per year and that this objective is consonant with the GOE's current Five-Year Program.

4.06 The work of the EDC is initiated by work orders from the heads of the various Irrigation Districts throughout Egypt as well as from the Ministries of Agriculture, Transport and Industry. The work orders set forth exactly the work to be accomplished and the specifications for its performance. The performance is monitored by the requesting organization to insure compliance with the specifications and to finalize the quantities for payment.

## 3. Resources

4.07 The following table presents a summary of the current excavating and transport equipment inventory of EDC.

TABLE I

<u>Type Unit</u>	<u>Qty</u>	<u>Average Years</u>	<u>Condition</u>		
			<u>Good</u>	<u>Fair</u>	<u>Scrap</u>
Draglines	141	8	75	39	27
Dredges	22	22	5	10	7
Bulldozers	8	17	0	0	8
Trucks, all types	31	11	14	0	17
Trailers, low bed	8	11	4	0	4

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4.08 The company's administrative offices and main workshops are located in a 20-acre compound at Abu Zaabal, 30 kilometers west of Cairo. The compound includes a general repair shop, foundry, machine shop, carpenter shop, vehicle repair shop, metalworking shop and general storage. An additional heavy equipment repair shop is now under construction which will double current shop floor space. There are plans for early construction of a vehicle service center which will include fuel dispensing and pressure lubricating facilities. Presently, some 540 personnel are employed in the Abu Zaabal compound. Of this number, approximately 450 are skilled, semi-skilled and unskilled productive workers directly employed in the maintenance, repair and overhaul of equipment. The remaining 90 employees perform administrative/management functions.

4.09 The general repair shop, supporting all of the company's dredging, excavating and transport equipment deployed throughout Egypt, is divided into clearly delineated work areas. Work flows efficiently between the areas. A service canal immediately adjacent to the workshop area is equipped with heavy timber skidways for launching and retrieving of EDC dredges. This system permits ready access to the workshop areas for repair, maintenance and overhaul of the company's excavating and dredging equipment. The company possesses demonstrated capability to construct its own dredges at the site.

4.10 The primary function of the machine and foundry shops is to repair equipment parts and to manufacture new parts for old equipment units in the inventory. Shop workers have developed considerable skill in this activity. These skills are particularly important because of the obsolescence of the existing excavation equipment, the difficulties encountered in obtaining spares from Eastern bloc manufacturers, and Egypt's shortage of foreign exchange. The maintenance garage for transport equipment, unlike the excavation maintenance facilities, appears inadequate with respect to size, layout, tools and equipment support. Most of the required servicing is accomplished at outside facilities, resulting in longer down times and greater cost.

4.11 The spare parts supplies and facilities housing them while not up to U.S. and European standards, are adequate. Commercially manufactured spares and company-manufactured spare parts are sufficient for approximately 10,000 hours of operation of the existing dredges, excavating and supporting equipment. At present, there are approximately 14,000 line items in the company's spare parts inventory. The layout and arrangement of the spare parts storage areas are satisfactory. Bins are well marked in English and Arabic and each contains a control card describing the part and manufacturer. It is estimated that some \$200,000 worth of spares in the inventory are obsolete (equipment no longer exists that requires these parts). It is estimated that the total value of the company's useful spares is approximately \$3,500,000. Inventories of parts are conducted at least every six months. A random sampling and inspection of the inventory cards indicated that card files are maintained on each line item. The staff and supervision of the parts storage facilities are excellent.

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## C. General Irrigation Company for Mechanical Excavation

### 1. Organization

4.12 The General Irrigation Company for Mechanical Excavation (GIC), the second largest of the three public sector companies, performs maintenance on existing irrigation channels. The company, located at the Delta Barrage some 20 kilometers north of Cairo, was founded on June 9, 1975. The company is the successor organization to a portion of the Egyptian Irrigation Department (Ministry of Irrigation) which had controlled and operated a fleet of draglines. The Irrigation Department dragline/excavation resources were transferred to the General Irrigation Company. The company currently has approximately 3,000 employees. Of this number, some 500 work at the corporate headquarters offices and shops. The remainder are employed in the field working and maintaining the draglines performing assigned work.

4.13 The company is organized under a Chairman and a Deputy Chairman. The Director, Mechanical Department, with 1,000 employees under his purview, is responsible for the maintenance and repair work performed in both the maintenance and machine shops as well as for all equipment field maintenance activities. The Director of Project Execution has approximately 2,000 employees under him and is responsible for project execution and all other facets of the company's work in the field except maintenance and support of the equipment. The Director of Administration and Finance has 50 employees under his supervision and is responsible for all company financial and administrative matters.

### 2. Operations

4.14 The GIC is now operating under a guaranteed minimum contract with the Ministry of Irrigation calling for the removal of weeds and excavation of 10 million cubic meters per year. This contract covers the period January 1, 1976 through December 31, 1977. **At the present time, none** of the efforts of the GIC are being expended in the private sector and there are no plans for the immediate future to extend efforts into this sector. The management of GIC has indicated that their company's objective is to increase their capability from the 12 million cubic meters achieved in 1976 and expected for 1977, to 20 million cubic meters by the end of 1979 and 30 million by 1981. Of the company's anticipated expansion of 8 million cubic meters over the next three years, company management estimates that 50% of the capacity increase per year will be used for canal maintenance and the remaining 50% for construction of new canals designed to open up new areas to agriculture or to increase production on existing farmed lands.

4.15 The work of the GIC is generated by receipt of work orders from the heads of the various Irrigation Districts throughout Egypt. These work orders define the lengths of the canals and specify the cross-section to be obtained along the canal route. A GIC engineer, accompanied by an engineer from the Ministry of Irrigation, then conducts a field investigation to estimate the amount of material to be excavated. After this amount is determined and the contract unit cost applied, the work proceeds to completion. A final survey is made to insure compliance with the

4.19 The spare parts system of the GIC is, in general, satisfactory. The system has not, however, achieved the degree of refinement found in the Egyptian Dredging Company. Commercially-procured and company-manufactured parts are adequate to support present equipment for about 10,000 hours of operation. The company is now in the process of taking its first spare parts inventory. It is believed that, when completed, the inventory will show some 4,000 line items valued at approximately \$1,000,000 (\$800,000 company-manufactured parts). The layout and arrangement of the spares in open and covered storage areas is satisfactory.

D. Other Companies

4.20 A third Government-owned company, the Mosehmet El Behera Company, is under contract with the Ministry of Irrigation and is performing not only maintenance but also new work and widening and deepening of drains. This company's current contract with the Ministry stipulates that they accomplish a minimum of 3.5 million cubic meters and up to a maximum of 4.5 million cubic meters of excavation per year for the period July 1, 1972 through December 31, 1977. In the private sector, there are some 500 companies or firms which contract for excavation services, some mechanized but most shovel and bucket operations with very limited individual capacity.

4.21 In accordance with the policy of the Ministry of Irrigation, this project deals only with the expansion of Egyptian Dredging Co. and General Irrigation Co.

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specifications and to finalize the quantities for payment.

3. Resources

4.16 The following table presents a summary of the current excavating and transport equipment inventory of GIC.

TABLE II

<u>Type Unit</u>	<u>Qty</u>	<u>Average Years</u>	<u>Condition</u>		
			<u>Good</u>	<u>Fair</u>	<u>Scrap</u>
Draglines*	370	14	30	146	194
Bulldozers	42	15	0	5	37
Truck tractors	13	12	4	0	9
Trailers, low bed	13	12	4	0	9
Trucks, all types	24	13	4	3	17

\*Regarding the draglines, the principal item of equipment used for excavation, about 20 percent of the fleet consists of British units over 23 years old.

4.17 Located at the Delta Barrage, the company's main workshops include general repair shops, foundry, carpentry shop, metalworking shop, and open and covered stores. Site clearance has begun for construction of a new repair/maintenance shop for heavy and light equipment. Additionally, there are plans for expanding open storage areas and constructing a center for servicing field equipment. There are some 500 employees currently working at the Delta Barrage compound. Of these, approximately, 400 are employed in the shops. The remaining personnel perform administrative support and management functions.

4.18 The general repair shops, with some structural repairs and the addition of new flooring in some areas, would be adequate. The shops are divided into specific work or functional areas and the work flow between areas is orderly. Hand tools were found to be inadequate in type and number and the shop lacks a central tool crib. The machine and foundry shops are functioning but need structural repairs, additional equipment and new lighting. The quality of shop output is judged to be very high. The personnel are highly skilled and display a high degree of ingenuity in maintaining the range of old, non-standardized units in the equipment fleet. Service equipment, such as lubrication equipment, battery chargers, air compressors, tire repair, and fueling facilities, is inadequate and the GIC uses outside commercial facilities for vehicle servicing.

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V. TECHNICAL ANALYSIS

A. Excavation Requirements

5.01 Under the direction of the Ministry of Irrigation, two principal canal dredging/excavating activities are being concurrently conducted through the utilization of resources held by the three public sector excavation companies. The first, which presently enjoys the highest priority of the GOE, is land reclamation by the excavation of new supply canals and drains and the widening and deepening of primary drainage canals. The second is the maintenance of existing supply and drainage canals. This maintenance includes the periodic removal of silt from the canals as well as removal of vegetation and the dressing of side slopes. The following table indicates estimated excavation requirements in the Ministry's current five-year plan.

Table V-1

Five Year Plan

for Dredging/Excavating Requirements

(000 cubic meters)

<u>Year</u>	<u>New Work (Drains &amp; Canals)</u>	<u>Widening, Deepening (Drains)</u>	<u>Maintenance (Public Canals &amp; Secondary Drains)</u>	<u>Total</u>
1977	15,500	15,000	47,000	77,000
1978	18,000	15,000	47,000	80,000
1979	17,500	15,000	50,000	82,000
1980	16,000	15,000	50,000	81,000
1981	16,500	15,000	50,000	81,500

5.02 The maintenance requirement of 50 million cubic meters per year as estimated by the Ministry of Irrigation has been accepted as the target figure for this project. An analysis of the type and length of canals feasible to restore and maintain with dredging equipment indicates that approximately 6 million cubic meters of this maintenance requirement can be satisfied by hydraulic dredgers. The remaining annual requirement of 44 million cubic meters, therefore, will be excavated by draglines, backhoes or similar land-based units.

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**B. Existing Excavation Capacities**

5.03 At the present time, the productive resources of the various public and private sector companies have been allocated to the Ministry's programs as shown in the following table.

Table V-2  
 Ministry of Irrigation's  
 Current Allocation (1977)  
of Dredging/Excavating Capacity  
 (000 m<sup>3</sup> / Year)

<u>Organization</u>	<u>New Work</u>	<u>Maintenance</u>	<u>Maintenance Requirement</u>	<u>Shortfall</u>
Egyptian Dredging Company	23,500	8,500		
General Irrigation Company	4,500	7,500		
Behera Company	4,000	1,000		
Private Excavators		20,000		
<b>Total</b>	<b>32,000</b>	<b>37,000</b>	<b>47,000</b>	<b>10,000</b>

5.04 The actual productivity of the various excavation companies during the last full operational year, 1976, is shown in the following table. These production figures best reflect the overall current capacities of the companies and were used as the basis for projecting their future outputs. Although it is expected that improvements in operator and mechanic skills, transport, and maintenance facilities will result in higher efficiencies and better equipment usage, no inflation of production capacities has been allowed due to these factors.

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Table V-3

Total Work Effort in 1976

<u>Company</u>	<u>Equipment</u>	<u>Type Work</u>	<u>Million Cubic Meters</u>
Egyptian Dredging Co.	Dredges	Maintenance	3.0
Egyptian Dredging Co.	Draglines	"	5.0
General Irrigation Co.	Draglines	"	12.0
Bahara Co.	Not Known	"	1.0
Private Contractors	Handwork	"	20.0
<u>Maintenance Subtotal</u>			<u>41.0</u>
Egyptian Dredging Co.	Dredges	Land Reclam.	2.9
Egyptian Dredging Co.	Draglines	Land Reclam.	3.6
Egyptian Dredging Co.	Draglines	Widen/Deepen	13.2
Behara Co.	Not Known	New Work	4.0
<u>New Work Subtotal</u>			<u>23.7</u>
<u>Total Work</u>			<u>64.7</u>

C. Excavating Equipment Requirements

1. General Approach

5.05 Because of the priority given by the GOE through the Ministry of Irrigation to land reclamation efforts, involving new canal excavation and canal widening and deepening, it is fully expected that the current resource allocations as shown in Table V-2 will continue to obtain during the next five years. In view of Egypt's increasing population and the intensive cultivation of existing agricultural land, this paper does not question the high GOE priority placed on efforts to make available new land for cultivation.

5.06 In determining equipment requirements, it has also been assumed that the production capacities of the Behara Company (1.0 million cubic meters) and private contractors (20.0 million cubic meters), devoted to maintenance work in 1976 and currently allocated to maintenance work,

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will continue to be made available for such work during the next five years or more. This, in effect, reduces the overall canal maintenance target capacity from 50.0 million CM (cubic meters) to 29.0 million CM. This target to be met by the efforts of the Egyptian Dredging Company and General Irrigation Company concurrently with their efforts devoted to reclamation work.

5.07 As these two major public sector companies will utilize their equipment resources concurrently on maintenance work and land reclamation work, the total fleets of the companies have been upgraded by the replacement of units now categorized as in poor or scrap condition. Equivalent production capacity will be provided in such replacements, not one-for-one replacement. Additional equipment being provided to the companies is for the purpose of meeting total maintenance work requirements and will not necessarily allow the companies to meet their total objectives in land reclamation work.

## 2. Dredging Equipment Requirements

5.08 The Egyptian Dredging Company (EDG) presently has in its inventory seven dredges categorized as in poor/scrap condition. These units having a capacity of 1,328,000 CM per year, will be replaced by units of equivalent capacity. At present, EDG is performing about 3.0 million CM of maintenance dredging. As this amount should be increased to the optimum quantity of 6.0 million CM, an additional dredging capacity of 3.0 million CM will be provided. Therefore, a total of about 4,328,000 CM in dredging capacity will be added to the EDG fleet.

5.09 To meet this requirement, three portable mechanical, 14 inch suction/cutter dredges will be provided. It is estimated that each of these dredges, operating with about 250 meters of discharge pipe against a 4-meter static head, is capable of dredging between 275 and 425 cubic meters per hour of silt, clay and sandy materials. Annual production, at a rate of 325 CM per hour, 16 hours per day, 300 days per year, for each dredge would be about 1,560,000 CM per year, the three dredges totaling about 4,700,000 CM per year. To support the maintenance dredging operations, six 1-cubic yard hydraulic backhoes will be provided for weed removal along the banks and final slope dressing. Three shallow draft dredge tenders and two crew boats are being provided for support.

5.10 To summarize, the following equipment items are to be provided to the Egyptian Dredging Company:

<u>Quantity</u>	<u>Item</u>
3	Dredges, 14" Suction/Cutter
3	Tenders, Shallow Draft
2	Crew Boats
6	Backhoes, 1 cubic yard *

\* The total production capacity of these six units is 1,080,000 CM per year.

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### 3. Excavation Equipment Requirements

5.11 The EDG presently has in its inventory 27 draglines judged in poor/scrap condition and the GIC has 194 draglines in similar condition. These items will be retired as soon as possible. The productive capacity of these units is estimated to be about 8,576,000 CM per year based on estimated production rates. This capacity will be provided by replacement units having equivalent total capacity.

5.12 A review was made of other equipment in the inventories of the two companies to identify those units whose economic life would be exceeded during the next few years. In determining economic life, recognition was given to the factors, such as low labor costs, Egyptian repair practices, which lengthen the economic life of equipment in Egypt 25 - 50 percent. Items selected for early phase-out included 36 draglines owned by GIC and 9 draglines owned by EDC, having an estimated aggregate capacity of 2,295,000 CM per year. The replacement requirement for this capacity was reduced by 575,000 CM to 1,720,000 CM assuming that about half of the capacity of the six backhoes provided to EDC (see para 5.10 above) would be devoted to maintenance work.

5.13 The total annual capacity requiring replacement (in para 5.11 and 5.12 above) equals 10,296,000 CM. Units to be provided for this purpose include:

<u>Quantity</u>	<u>Item</u>
26	Draglines, 1.5 cubic yard
7	Draglines, 1.0 " "
5	Draglines, 0.75 " "
24	Backhoes, 1.0 " "

The estimated annual capacity of this equipment is about 10,590,000 CM. In calculating the reasonable expected output of new draglines and backhoes, the generally accepted formulas and procedures of the American Power Crane and Shovel Association were utilized.

5.14 In order to determine the estimated shortfall in the production capacity of the two major companies, account must be taken of recent equipment procurements. To be placed into production in 1977 are 30 - 0.6 CM RUSTON BYCYRUS draglines procured by GIC and 20 units (5 - 0.6 CM and 15 - 1.2 CM) procured by EDC. The 30 draglines, having an annual capacity of 3,720,000 CM, owned by GIC will be deployed on canal restoration and maintenance projects. The 20 draglines, having an annual capacity of 4,340,000 CM, owned by EDC will be used for new canal works.

5.15 To determine production capacity shortfall, a recapitulation of the aggregate equipment fleets, as adjusted by above cited actions, is presented in Table V-4, indicating also expected work assignments. The

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shortfall in maintenance work capacity is about 2.4 million CM per year. To meet this shortfall, the following equipment items having a total annual productive capacity of 2,349,000 CM will be provided.

<u>Quantity</u>	<u>Item</u>
5	Draglines, 1.5 cubic yard
5	Draglines, 0.75 cubic yard
5	Backhoes, 1.0 cubic yard

The shortfall in new canal construction capacity, assuming a target of 31.5 million CM per year, is about 5.0 million CM. This requirement is not satisfied by the project. It is expected that the GOE will obtain resources to achieve the new work target from other sources.

5.16 Final distribution of the excavation equipment will be the responsibility of the Ministry of Irrigation to insure it is compatible with the long-term work loads of the two companies. However, the following distribution is suggested.

<u>Egyptian Dredging</u>	<u>General Irrigation</u>
16 Draglines, 1.5 CY	15 Draglines, 1.5 CY
7 Draglines, 1.0 CY	10 Draglines, 3/4 CY
	29 Backhoes, 1.0 CY

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TABLE V-4

Adjusted Work Capacities

(000 CM/Year)

Company	Description	Total	Capacities Maintenance	New Work
<u>DREDGING</u>				
EDC	Original Capacity	5,878		
	Retired Units	(1,328)		
	Added Units	4,700		
	New Capacity	9,250	6,000	3,250
<u>DRAGLINES</u>				
EDC	Original Capacity	18,637		
GIC	" "	12,455		
Both	Total " "	31,092		
"	Retired Scrap Units	(8,576)		
"	Econ. Life Retirements	(1,720)		
"	Added Units	10,590		
EDC	Added Net Backhoe Cap	505		
EDC	New Ruston Bucyrus (20)	4,340		
GIC	New Ruston Bucyrus (30)	3,720		
Both	New Capacity	39,951	20,650	19,301
Behara	Existing	5,000	1,000	4,000
Contractors	Existing	20,000	20,000	-
	Total Capacity	74,201	47,650	26,551
	Target Capacity		50,000	N/A
	Shortfall		2,350	N/A

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4. Suggested Work Distribution

5.17 Assuming that all new equipment, dredging and excavating, will be distributed as suggested, the resulting productive capacities of the companies will be as shown in Table V-5. The Table also indicates recommended work loads for the various companies and private contractors compatible with their past operations.

TABLE V-5

Recommended Work Loads

(000 CM/Year)

<u>Company</u>	<u>Operation</u>	<u>Total</u>	<u>Capacity Maintenance</u>	<u>New Work</u>
Egyptian Dredging	Dredging	9,250	6,000	3,250
" "	Draglines	25,223	5,922	19,301
General Irrigation	Draglines	17,078	17,078	
Behara	Various	5,000	1,000	4,000
Contractors	Handwork	20,000	20,000	-
Totals		76,551	50,000	26,551

D. Earthmoving and Transport Equipment Requirements

5.18 Field operations by EDC and GIC range from sites in the Delta to Upper Egypt. From a number of observations made of field operations, it was concluded that a considerable amount of productive time of draglines is spent in preparing a level travel way along the canals. Also, the recasting of spoil previously excavated and left on the canal bank wasted dragline time. The expenditure of this non-productive effort could be eliminated by the use of bulldozers. Field observations also confirmed that the lack of adequate personnel and equipment transport trailers caused significant amounts of idle time between completion of one job and startup at the next site. Provision of mobile maintenance trucks and pickup trucks has been made to increase support services and encourage better supervision of the many work sites.

1. Earthmoving Equipment

5.19 Egyptian Dredging Company currently has 8 track type tractors with dozer blades (bulldozers) in scrap condition as its entire inventory of earthmovers. These will be retired from service and replaced by 9 - 190 HP (horsepower) units, 2 - 70 HP units and supplemented by

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6 wheeled tractor drawn scrapers of 9 CY capacity. Similarly, the entire inventory of General Irrigation Company, consisting of 22 bulldozers and 20 drawn scrapers is in scrap condition and should be immediately retired from service. Replacement by 10 - 130 HP bulldozers and 6 wheeled tractor-drawn scrapers has been provided for in loan funding.

2. Transportation Equipment

5.20 Transport equipment currently in EDC's inventory includes some 21 units in scrap condition; in GIC's inventory, some 33 scrap units. Details of units are shown in Annex H. These units will be replaced and supplemented as shown in Table V-6.

TABLE V-6

Transportation Equipment Provided

<u>Item</u>	<u>Egyptian Dredging</u>	<u>General Irrigation</u>	<u>Total</u>
Truck, Pickup, 4x4, 1 T	10	10	20
Truck, Pickup, 4x2, 1 T	3	5	8
Truck, 6 pass., Crew Cab	3	3	6
Bus, 44 pass.	0	2	2
Truck, Lubrication	6	6	12
Truck, Mechanical body	4	6	10
Truck, Flat-bed, Cargo, 29000GVW	3	5	8
Truck, Flat-bed, Cargo, 46000GVW	3	3	6
Truck, Tractor, 46000GVW, 30 T	3	4	7
Truck, Tractor, 83000GVW, 60 T	1	4	5
Trailer, Low-bed 30 T	3	4	7
Trailer, Low-bed, 60 T	0	4	4
Trailer, High-bed, 60 T	1	0	1
Trailer, Level, 4 wheel, 2 axle, 8 T	3	0	3

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E. Shop Equipment Requirements

5.21 During the course of the study of this project, detailed inventories were made of the type, quantity and condition of maintenance and repair equipment located in the principal support shops of the Egyptian Dredging and General Irrigation companies. Observations were also made of the field service facilities supporting operations on sites scattered throughout the country. From this information, estimates were made of tool requirements in direct support of canal maintenance operations and generally required to support the maintenance of equipment being furnished under the loan project. This estimation is presented in Annex I. Prior to finalizing procurement lists for this equipment, a review of requirements and recommended purchases will be made with EDC and GIC maintenance supervisions.

F. Training Requirements

5.22 Both companies have adequate numbers of well trained and skilled machinists, mechanics and equipment operators. Both companies also have adequate numbers of graduate mechanical and civil engineers as working members of their field and office staffs. With supplemental training, it is considered that both companies can adequately handle the maintenance and operation of new U.S. manufactured equipment being provided under loan financing.

5.23 In order to familiarize EDC and GIC personnel with the maintenance, repair and overhaul procedures and methods relative to the U.S. supplied heavy equipment and dredges, the following training will be provided to key service managers in each company in the related U.S. manufacturers factory or factory related schools.

Team	To Attend Training Courses	Man-Weeks Training Time
A. Team A (EDC) 1 Engineer and 1 Mechanic	1 - Draglines 2 - Dredges/ Diesel Engine	1) 12 mw 2) 4 mw
B. Team B (EDC) 1 Engineer and 1 Mechanic	1-Truck Tractors (70, 190 HP) 2-Wheel Scrapers	1) 8 mw 2) 4 mw
C. Team A (GIC) 1 Engineer and 1 Mechanic	1-Draglines	1) 12 mw
D. Team B (GIC) 1 Engineer and 1 Mechanic	1-Truck Tractors (130 HP) 2-Wheel Scrapers	1) 4 mw 2) 4 mw
<u>Total Training Time</u>		<u>48 mw.</u>

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5.24 In addition, manufacturers supplying all major mechanized equipment and vehicles will be required to provide one to two weeks of field training in operating, servicing and maintenance techniques relative to each major equipment type. This training in Egypt will be provided by the manufacturer's technical representatives concurrent with assembly, start-up and testing services prior to final equipment acceptances.

G. Consultant Services

Requirements for consultant services are discussed in Chapter X, Project Implementation.

H. Project Costs

Cost estimates for equipment are based on manufacturers' estimated costs for FOB delivery, to which 15 percent has been added for freight to Alexandria, Egypt. Import duties\* range from 13.5 percent for equipment such as backhoes, draglines, and scrapers to 63.5 percent for trailers. Training costs have been estimated by A.I.D.'s Requirements Contractor. To these costs, 15 percent has been added to cover escalation and contingencies. Table V-7 below shows the estimated Project Costs.

\* Any import duties will be paid by the GOE.

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TABLE V-7

Estimated Project Costs

Item	<u>U.S. Dollars</u>	<u>Egyptian</u>
1. <u>Equipment</u>		
a. <u>Category I - Dredging Equipment</u>	(\$1,635,000)	
3 Dredges	1,350,000	
3 Dredge Tenders	195,000	
2 Crew Boats	90,000	
b. <u>Category II - Earthmoving Eqpt.</u>	(\$2,587,000)	
2 Tracked Tractor (70 HP)	108,000	
10 Tracked Tractor (130 HP)	730,000	
9 Tracked Tractor (190 HP)	837,000	
12 Wheel Tractor w/scrapper	912,000	
c. <u>Category III - Transport Eqpt.</u>	(\$2,215,000)	
20 Pickup Truck 4 x 4	120,000	
8 Pickup Truck 4 x 2	44,000	
6 Pickup Truck 6 pass.	48,000	
10 Truck, mechanical	180,000	
8 Truck, cargo, 29000	224,000	
2 Truck, bus, 44 pass.	76,000	
12 Truck, lubrication	420,000	
6 Truck, cargo, 46000	216,000	
7 Truck, tractor 46000	245,000	
5 Truck, tractor, 83000	230,000	
7 Trailer, low 30 T	196,000	
4 Trailer, low 60 T	120,000	
1 Trailer, high 60 T	30,000	
3 Trailer, high 8 T	66,000	
d. <u>Category IV - Dragline &amp; Backhoes</u>	(\$11,366,800)	
31 Dragline 1.5 cy	4,960,000	
7 Dragline 1 cy	840,000	
10 Dragline 3/4 cy	1,000,000	
35 Hyd. Backhoe, 1 CY	4,550,000	
7 Extra Backhoe Buckets, 3/4 CY	16,800	
Dredge Discharge pipes		LE 6,864

e. <u>Category V - Shop and Field</u>	<u>U.S. Dollars</u>	<u>Egyptian Pounds</u>
Maintenance Equipment	1,291,000	
Spare parts for Categories I - IV except dredges (15%)	2,468,070	
Spare parts for dredges	240,000	
Spare parts for Category V (5%)	64,552	
Import duties		2,639,391
Freight (15% and local)	3,280,119	25,750
	<hr/>	<hr/>
Sub-total Equipment	25, 147,581	2,672,005
2. <u>Training Services</u>		
U.S. Factory Training	33,000	
3. <u>Consultant Services</u>		
U.S. Consultant	500,000	
4. <u>Contingency &amp; Escalation</u>	3,852,087	400,801
5. <u>Total Project Costs *</u>	<u>\$29,532,668</u>	<u>L.E. 3,072,806</u>

\* AID Loan will fund \$26.0 million of U.S. Dollar costs; GOE will provide \$3.5 million from other sources and all local currency requirements.

## VI. FINANCIAL ANALYSIS

### A. Financing Plan

6.01 Capital costs of the project are estimated at \$33,834,596 of which \$29,532,668 are foreign exchange costs and \$4,301,928 equivalent (LE 3,072,806) are local currency costs.<sup>1</sup> Thus, 87% of total costs are in foreign exchange and 13% in local currency.

6.02 Of the required foreign exchange costs, \$26,000,000 will be provided under this loan and the remainder is to be provided from other sources: free foreign exchange, Arab development funds, or other sources. It is possible that this \$3.5 million or a portion will be covered under the contingency fund being set aside; however, if additional foreign exchange is still necessary for equipment, we expect the Government of Egypt to seek financing from other donors. Furthermore, given the nature of this project, even if such residual financing is not made available, a reduction of certain items would not affect the overall purpose of the project. A.I.D. plans to include a covenant which would require the Government of Egypt to finance such additional foreign exchange costs that may be necessary, unless A.I.D. agrees otherwise. Local currency funds will be provided by the implementing agencies, and we will obtain covenants regarding such funds.

### B. Reloan Terms

6.03 Although the loan to the Government of Egypt will be on concessionary terms, we are recommending that the Egyptian Government reloan funds to the Ministry of Irrigation on more realistic terms: interest at 8½ percent per annum, with repayment in 25 years including 5 years grace. The Ministry is expected to pass these terms along to the two operating companies, the Egyptian Dredging Company and the General Irrigation Company, which are controlled by the Ministry and will operate and maintain this equipment. Our recommendation on reloan terms is based in our desire for a return to proper economic costing in Egypt. Money has an economic cost, reflected in interest rate. This cost should be borne by the implementing agency so that it will better appreciate its own costs of capital investment. Our selection of reloan terms is based primarily on the current lending rate of the World Bank for similar projects.

### C. User Charge

6.04 There will be no direct cost recovery which can be directly attributed to the project because farmers do not pay a user charge for water. The Ministry of Irrigation has no plans to institute such a

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<sup>1</sup> At the Parallel Market exchange rate if LE.70 equals US \$1.00

charge, claiming that such a procedure violates traditional practices. It should be noted that farmers contribute heavily to national revenues through the administrated prices for key agricultural products, which are considerably lower than international or true economic prices. For example, the controlled farm gate price of sugar cane averages LE 7 while the international price, assuming a transformation ratio of 13 tons of cane to one ton of refined sugar, is LE 9.20. For cotton, the price difference is even higher, with LE 140/MT paid to the farmer and an international price of LE 722.70/MT. Egypt is presently addressing the subsidy problem that permeates the economy, but it will take many years before all subsidies are corrected.

#### D. Implementing Agencies

##### 1. Ministry of Irrigation

6.05 The Ministry is an operating government agency, not a profit-making enterprise. Its only source of funds is allocations from the government budget. The level of annual investment in new projects for the past 5 years has ranged from LE 20-30 million, and capital costs of this project should not impose a financial burden.

##### 2. Egyptian Dredging Company

6.06 The Egyptian Dredging Company, one of five companies controlled by the Ministry of Irrigation, operates with some degree of autonomy. As previously explained it bids on and contracts for jobs let by the Ministry of Irrigation. Its financial statement, limited to an income statement, shows a healthy rate of profit on dredging revenues, averaging 33 percent over the 1970-75 period. Total revenues from dredging increased by 22 percent in 1974 over the preceding year and by 44 percent in 1975 over 1974. These increases are attributable to increases in work performed while unit prices remained constant at LE .24 per cubic meter excavated. Operating expenses during the three years 1973-75 also remained fairly constant as a percentage of revenues: wages actually decreased from 22 percent in 1973 to 19 percent in 1975; fuel and grease was 4-5 percent; spare parts and maintenance was 10 percent; and taxes were in the 9-11 percent range. The operation appears to be profitable. The financial statement is attached as Annex J.

##### 3. General Irrigation Company

6.07 The General Irrigation Company, established in June 1975, does not yet have available financial statements. The company prepares an annual budget estimate. This estimate is reviewed and approved by the Company Board. Subsequently, the Budget Estimate is presented to the "General Meeting" for review and approval. Representatives of both the Ministries of Finance and Irrigation participate in the General Meeting; the budget is forwarded directly to the Ministry of Finance for review,

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approval and incorporation into the national budget. The Company's budget must be approved by the Ministry of Planning. It is composed of the following major elements: capital investments/depreciation expense; wages; spare parts and maintenance costs; fuel consumption costs; and taxes, overhead and profit. The Company's requested budget must be balanced by company income which is represented as the product of planned work (in cubic meters) times contract unit costs.

6.08 The profits of the Company are split among the Company workers, the Ministry of Irrigation and the Company itself. Wages in Egypt are controlled by the Government and have, in general, not been permitted to rise as such. However, public sector companies may grant workers' increase called "allowances" which creates the same effect as an increase in wages. The companies recently were directed to grant an additional "allowance."

## VII. ECONOMIC ANALYSIS

### A. Project Costs and Benefits

7.01 The principal areas of project impact are: (1) increased water discharge and greater efficiency of the canal system, allowing greater cropping intensity of the available agricultural land area; and (2) inland transportation cost savings resulting from the deepening of canals to permit use of larger draft boats at lower user costs per ton/km. We have only analyzed in detail the agricultural benefits of the project; the transport benefits were not analyzed, although these are believed considerable.

7.02 Most of the irrigation canals in Egypt have experienced varying degrees of weed growth, bank erosion and siltation. Deferral of routine maintenance of the canal system since construction of the High Dam has resulted in deterioration of parts of the system to the extent that it can no longer fully service all of the cultivated areas for which it was originally intended. The effects of the degradation phenomena are most pronounced at the upper ends of the delivery canal links where reduced water discharge velocity caused by the buildup of sediments, bank erosion material and weeds prevents farmers in these areas from receiving the full complement of water needed for year round cultivation according to the crop rotation norms (planting to winter then to summer and nili crops). Areas in the upper reaches of the canals, being short of water during the critical months of May through September when demand throughout Egypt is at its highest point, cannot be farmed with the same intensity during the summer and nili cropping seasons as areas in more favorable locations.

7.03 Discussions with district irrigation officials in these areas and actual on-site visits revealed that cropping ratios (ratio of total land area to total cropping areas allocated to seasonally rotated crops) at many of these sites vary significantly depending on their proximity to the Nile River. Cultivated areas near the canal diversion points show cropping areas which are close to the averages (ranging from 1.76 to 1.96) for the respective agronomic zones, while several kilometers downstream from diversion points, the cropping ratio values were found to be between 1.15 and 1.40, although there are only slight variances in agricultural conditions and practices between the two points. Water deficit lands downstream at many locations were found to be planted mainly to winter crops with declining levels of summer and nili crop cultivation depending on the extent of the water deficiency. Farmers interviewed stated that they did not have enough water for any summer and nili crop cultivation and expressed interest in expanding the productivity of their lands should sufficient water become available.

7.04 From discussions and actual field observations, it is believed that an increase in the water supply resulting from canal restoration to original design dimensions followed by routine maintenance thereafter will cause a marginal increase in the average cropping ratios throughout Egypt. Historically, this assumption appears valid. Prior to commissioning of the High Dam, when water was not available for the practice of perennial irrigation, the average cropping ratio for Egypt was around 1.2. After

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completion of the Dam in the early 1960's, this value increased to between 1.7 and 1.9.

7.05 On the practical level, the basic assumption concerning the correlation between increased water supply and upward adjustments of the cropping ratio is further justified by the traditional industriousness of the Egyptian farmer. Egypt has one of the highest cropping intensities in the world. Farmers have traditionally sought to derive maximum productivity from their lands as is evidenced by the fact that they readily adapt to new technologies in fertilizer and pesticide application and responded quickly to increase the productivity of their lands once year round water supply became available after construction of the High Dam.

7.06 Mathematically, the cropping area (greater than land area because of rotation), can be shown as a function of water supply and the land area reserved for perennial crops. An increase in the water supply, as noted above, will result in increased cultivation of summer and nili crops on a given parcel of land in the upper reaches of the canal links. An increase in the supply of water resulting from canal restoration to deficit areas, assuming no change in the current allocation of land to perennial crops, will result in a marginal increase in the cropping area and cropping ratio, giving increased productivity during the summer and nili seasons, with greater benefits to the national economy.

7.07 The economic impact will be primarily, though not entirely, to increase production of summer and nili crops. To calculate the benefits, investigation was limited to the period of maximum water demand, or May through September. A multi-step procedure is used, summarized as:

Step 1 - Derivation of a multiple linear regression equation to plot the effect on the dependent variable, cropping area, from the interaction of two dependent variables, water supply and land allocation. The resulting equation, of the general form  $Z = a + bx + cY$ , yielded a high co-efficient of determination of  $R^2 = 0.97$ .

Step 2 - Establishment of the increase in canal system water discharge capacities, before and after restoration for the minimum and maximum periods.

TABLE VII-1

Canal System Discharge Capacities

Before and After Restoration

(m<sup>3</sup> x 10<sup>6</sup> / Day)

<u>Demand Period</u>	<u>Current</u>	<u>After Restoration</u>	<u>Daily Net Increase</u>
Feb-Apr; Oct-Dec	110	140	30
May-Sep	180	220	40

Source: Ministry of Irrigation, May 8, 1977.

7.08 These data were derived from a statistical sampling of the actual state of degradation and weed growth in the principal categories of canal links in the irrigation system. Current water discharge values were calculated from hydrological formulae measuring the effects of bed width, cross section dimensions, were used to determine the discharge rates after canal restoration. It is believed that the data are accurate and are a reliable indicator of the increase in water velocity that will result from the impact of the project.

Step 3 - Marginal increase in cropping ratio was calculated by taking the net water discharge increase for the summer and nili season (from Step 2) adjusting for conveyance losses, adding the resultant increase to current annual supply and substituting in the regression equation (from Step 1) to get total new cropping area. Then total new cropping area was divided by land area to give new cropping ratio, from which was subtracted current cropping ratio, to get marginal increase in cropping ratio of 0.01842. Marginal increase in cropping ratio was valued according to average yield and average farm gate prices to obtain gross value of benefits.

Step 4 - Net benefits are obtained by subtracting average on-farm costs from gross benefits. Results of these calculations are shown in Annex L.

B. Calculation of the Internal Economic Return

7.09 As restoration of the canal system will require five years according to the Ministry of Irrigation's calculations, the total annual benefits from the project will not be fully realized before 1984. Assuming that the proposed equipment will be delivered in 1978, and that its first year of operation will be in 1979, the first benefits will be realized in 1980. In the establishment of the benefit cost stream for the internal rate of return calculation, 20 percent of the total annual benefits after complete canal restoration are expected to be realized in 1980, 40 percent in 1981, increasing by 20 percent per year thereafter

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through 1984, the point at which benefits are considered to be constant for the remaining 33 years of the project life.

7.10 The cost and benefit streams for the project derived from cost estimates and the benefit quantification are shown in Annex M. From this Annex, the Internal Rate of Return (discount rate at which the net present value of the cash flow stream equals 0) was calculated at 19.2%.

7.11 In view of the fact that the benefits to inland waterway transportation were not included in the analysis, actual benefits of the project are considered to be higher than the internal rate of return indicates. For this reason, the various assumptions used for the sensitivity analysis have been slightly weighted in favor of higher benefits. The results of this analysis are presented below:

TABLE VII-2

<u>ASSUMPTION</u>	<u>RESULTS</u>
Primary I.R.R.	19.2%
Benefits up 10% (transport)	22.3%
Benefits up 15%	23.3%
Benefits up 15%, costs up 5%	21.2%
Benefits up 15%, costs up 10%	20.2%
Benefits up 15%, costs up 20%	18.2%

## VIII. ENVIRONMENTAL ANALYSIS

### A. Project Description

8.01 This project consists of enhancing the equipment resources of two public sector companies responsible for maintaining irrigation water supply and drainage canals and for constructing new canals and enlarging existing canals. While increasing the firms' capacity to perform both functions, the project focuses on the canal maintenance function, providing sufficient dredging and excavating equipment to permit the firms to accomplish their full share of the estimated workloads in the coming five years.

### B. Land Use

8.02 At the present time, there are 28,200 kilometers of public irrigation water supply canals and 15,200 kilometers of public drainage canals throughout Egypt which require maintenance by the GOE. The maintenance of these canals, i.e., periodic restoration of their originally designed cross-section by removal of accumulated silt and vegetation for the purpose of maintaining their required waterway area, is crucial to agricultural production. The project, therefore, is instituting no change in current land use by virtue of its principal purpose. To the extent to which it is increasing the overall capacity of the two public sector firms (EDC and GIC) to accomplish additional new works, including the construction of new canals, it will have the effect of helping to bring desert lands into irrigated agricultural production. The irrigation of land does not preempt its use in the future for alternate purposes.

8.03 The productivity of agricultural lands in Egypt has stagnated since 1965 because of the twin effects of waterlogging and salinity. This situation has become more critical since construction of the High Dam at Aswan as water has been made available for perennial irrigation. A high priority has been accorded to improving drainage conditions by the GOE. The Egyptian Public Authority for Drainage Projects (EPADP), of the Ministry of Irrigation, has launched with IBRD financing two field drainage projects, using concrete tile pipe, covering 950,000 feddans in the Nile Delta and 300,000 feddans in Upper Egypt. In addition, the EPADP is presently initiating a second drainage project jointly funded by IBRD and AID (Loan No. 263-K-034) involving the installation of PVC perforated underdrain pipe in 500,000 feddans (520,000 acres) of agricultural land in Upper and Middle Egypt, as well as the construction or remodelling of related main and branch drains. As the EPADP is planning to extend the coverage in Upper and Middle Egypt by follow-on PVC pipe drainage projects, ultimately all of the irrigated lands will be served by improving drainage systems. The installation of field drains is expected to raise present crop yields per feddan by 12 to 25 percent. By maintaining the water carrying capacity of the main public drainage canals, this project contributes to the amelioration of the waterlogging and salinity problems in Egypt.

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8.04 Dragline spoil is often piled on the edge of canal banks where it both hinders future passages of the draglines and frequently sloughs off into the canal or drain. Earthmoving equipment (bulldozers and scrapers) being provided under the project will help alleviate this problem to some extent by spreading and compacting the spoil along the banks. Very limited amounts of the spoil are presently being removed by local farmers and spread on adjacent agricultural lands. However, until methods are developed to return greater quantities to the land, most of the nutrient value present in the spoil will remain unutilized.

### C. Water Quality

8.05 Nile River water, being low in saline and alkaline concentrations, is ideally suited for irrigation of the crops actually produced in Egypt. Water from Aswan to Cairo rates low in salinity hazard for most of the year and is rated at medium hazard during occasional periods in fall and winter. In this regard, Nile River water quality is superior to that of other rivers in the region, such as the Tigris and Euphrates Rivers in Iraq, the Karun and Dez Rivers in Iran, and the Indus River in Pakistan. Nile River water also rates low in alkalinity hazard. However, as noted above some soils in Egypt have undergone salinity buildup in the absence of a regular leaching maintenance program and, under the new regimen of perennial irrigation, rising water tables have aggravated the waterlogging problem. The field drainage program being implemented by the EPADP, in conjunction with the adequate maintenance of the main drainage canals, will alleviate this problem.

8.06 Insofar as the availability of irrigation water is increased by the adequate maintenance of supply canals and results in additional cropping cycles per year, accompanied by the increased use of fertilizers and pesticides, drainage water returning to the Nile will carry traces of such substances in increased amounts. Due to the size of the Nile (average annual flow at Aswan of 84 billion cubic meters), no measurable change in river water quality will result from this project.

8.07 The hazard of land and water pollution by spillage or leakage of fuels and oils is always present in the close proximity of construction equipment. Only careful and proper handling of petroleum products by field servicing personnel can preclude such incidents. To the extent that this project reduces the heavy equipment inventories of the EDC and GIC (from 563 units to 380 units), hazards of this type are reduced over 60 percent.

### D. Atmospheric

8.08 The usual problem of dust control associated with construction operations is not present in this project as the principal activity is excavation of saturated materials from irrigation canals. Noise-levels at construction sites will rise but be tolerable and temporary.

### E. Natural Resources

8.09 Nile River water resources used in agricultural irrigation are perpetually restored by the natural hydrological cycle of evaporation and precipitation. The magnitude of Nile River flow as regulated by the High Dam at Aswan permits concurrent use of this resource for irrigation and the maintenance of river stages for navigation purposes from Aswan to the Mediterranean Sea.

8.10 Those nutrients removed from the soil by intensive cultivation require replacement through application of suitable natural or chemical fertilizers if crop yields are to be increased or maintained at present levels. One presently underutilized source of plant nutrients is the spoil removed from the canals during the maintenance operations as discussed in para 8.02 above.

### F. Cultural

8.11 This project introduces no activities or elements detrimental to the cultural heritage or practices of the Egyptian people. Canal maintenance activities are conducted along GOE right-of-ways, precluding damage to or destruction of any archeological or historical sites, buildings or artifacts.

### G. Socio-Economic

8.12 A discussion of socio-economic impacts is presented in Chapter VII, Social Analysis, herein.

### H. Health

#### I. Bilharzia Control

8.13 Bilharzia, or schistosomiasis, is endemic in the entire irrigated area between Aswan and Cairo. Existing since the time of the Pharaohs, it continues to affect an extremely large portion of the population. The highest prevalence rates reported are 53.5 percent in the 5-14 year age group and 48.5 percent in the 15-20 year age group. School children and farm workers are highly susceptible because of their more frequent contact with water.

8.14 The type of irrigation (basin vs perennial) has an important bearing on the rate of infection. Data from the Ministry of Health indicates that for Asyut, Sohag and Qena Governorates, the overall prevalence rate for areas with perennial irrigation was 63.9 percent, whereas it was only 16.2 percent in the basin-irrigated areas. Commissioning of the High Dam at Aswan has led to a shift from basin to perennial irrigation throughout Egypt. It is recognized that, to the extent that this project encourages perennial irrigation, it correspondingly increases the hazard of bilharzia infection.

8.15 An integrated snail control program, coupled with chemotherapy for infected people, has been launched by the GOE covering over a million feddans in Upper Egypt. It is expected that this program will continue to expand and eventually cover all agricultural lands in Egypt. The most effective control measure is elimination of the vector snail by use of molluscicides. Experiments in El Fayoum, using the molluscicide Bayluscide for Spring, Summer and Autumn application yearly in the Bahr Youssef Canal, dropped the overall prevalence rate from 45.7 percent in 1968, to 23.3 percent in 1971, and to 9.1 percent in 1974. It is recognized that these experiments were performed under controlled conditions not replicable throughout rural Egypt.

8.16 Although Bayluscide may kill some fish in the water when first applied, the effect is temporary and the fish population should restore itself. The fish can be eaten by humans without harmful effects. Bayluscide is biodegradable, and when compared to other molluscicide such as copper sulfate sodium pentachlorophenate, it creates a minimum alternation to the ecological balance (microflora and microfauna) of a fresh water habitat.

8.17 Elimination of the snail intermediate host is at present the most effective single method of controlling bilharzia. Snails can be killed by using molluscicides, as above discussed, or the aquatic environment can be modified so as to disfavor their continued propagation. The periodic maintenance of irrigation canals by dredging and dragline excavation has a two-fold positive effect: such operations dislodge and remove snails along with the spoil, and the removal of vegetation destroys a favorable snail habitat. This environmental control of bilharzia also enhances the effectiveness of the primary chemical control methods.

## 2. Polluted Spoil

8.18 A potential environmental problem exists in those areas where the spoil from drainage canals may be polluted with industrial or sewage wastes. Although chemical and biological analyses of the spoil are not available, such polluted conditions may exist in the Bilbeis Drain which receives much of the waste from Cairo. Indiscriminate use of its spoil in adjacent fields could cause crop failure or contamination of food crops. In instances where industrial or domestic waste pollution is suspected, the appropriate analyses should be performed before use of spoil on agricultural lands.

## IX SOCIAL ANALYSIS

### A. Income Effect on Rural Poor.

9.01 The project will increase the constant free flow of irrigation water to existing agricultural lands throughout the year, enabling an increased cropping ratio. Each year an additional crop will be produced on approximately 97,000 acres or 2% of the country's cultivated land.

These lands, due to their interior location, were generally given up by large landowners and distributed to the landless after the promulgation of the 1961 Land Reform Law.

9.02 The distribution of land ownerships in Egypt has not materially changed since the enactment of the 1961 Land Reform Law, which limited landholdings per person to about 100 acres. 1965 statistics show that 66.6% of the land was owned by 94% of the landholders. The average land holding of this large group of landowners was 1.3 acres. It is conservatively estimated that the increased cropping ratio brought about by this project will benefit 2% of the small landowners or about 74,000 rural farm families.

9.03 The Economic Analysis of this paper evaluated and justified this project on the net revenue per acre which is obtained by the increased cropping ratio. Basically the same analysis is utilized to determine the social impact of the project, except the local (domestic) price for cotton has been used. The net revenues to the agricultural sector as a whole would approximate \$9,200,000 per annum. Assuming that this increased net income, then approximately \$9.2 million would annually flow to 75,000 rural poor families cultivating an average of only 1.3 acres of land.

9.04 The project would thus increase the net income of 74,000 families by \$124 per annum. Considering that the average agricultural family is 5.5 persons, then slightly more than 400,000 Egyptians would benefit through increased incomes. On the commonly used per capita basis, the incremental increase would be \$23 per year.

9.05 In summary, the equipment financed by this loan will allow small landowners, tenants and renters of small plots of agricultural lands to increase their cropping ratio by assuring these farmers of a constant source of irrigation water throughout the year. The statistics used to quantify these benefits are dated, but still relevant. The above calculations have been reviewed by both the Ministry of Irrigation and the consultant; both feel that the benefits are conservative and that the project will have a greater impact upon raising the income of small farmers and thus raising their quality of life.

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B. Other Benefits

9.06 Discussions with the above two entities and within the USAID Mission have indicated several other social benefits which although they cannot be quantified by statistics should be mentioned.

9.07 Since the project will maintain and rehabilitate existing irrigation and drainage canals, preventing weed clogging and silt filling, current agricultural production will be able to be maintained on all of Egypt's scarce cultivated lands. Agriculturalists at the Ministry of Irrigation believe that if existing canals and drains are not adequately maintained, weed clogging and silting would reduce overall agricultural yields by 6% per annum. This figure also reflects the importance of the maintenance of drainage canals, which if allowed to deteriorate, would accelerate water-logging and siltation of land. Therefore, the project prevents a real loss of land productivity which would adversely effect the income of Egypt's rural population.

9.08 The equipment purchased with this loan will also enable the Ministry of Irrigation to direct some of their existing equipment to land reclamation. Currently the G.O.E. has a high priority on the reclamation of new agricultural lands; however, the existing dredging and maintenance equipment capacity in million cubic meters per annum does not allow them to expend this amount for equipment on land reclamation. New equipment will be urgently required by 1979. The new U.S. equipment will allow time for the G.O.E. to rebuild and repair obsolete (scrap) equipment to eventually be utilized for land reclamation. It is envisioned by the G.O.E. that with time and local currency costs, equipment that is now considered scrap could be reconditioned to allow up to 15 million cubic meters per annum of dredging capacity. In terms of new canals and drains this could be about 620 miles of new agricultural canals and drains. This increased agricultural infrastructure should nominally irrigate and drain about 130,000 acres of new cultivated land per annum. By allowing the Ministry of Irrigation to devote more of their own resources to land reclamation, available cultivated lands should increase by about 2.4% per annum. These new lands will be available to the landless.

9.09 Other social benefits which have not been quantified are significant as they impact on Egypt's highly developed and utilized inland water transportation sector. Currently there exists almost 1,000 miles of navigable irrigation and drainage canals which are also utilized for the transportation of people, produce and commerce. There exists almost 1,500 miles of canals and drains which, with minimal deepening and widening, could be made and maintained as navigable. This addition of possibly up to 1,500 miles of navigable

canals would have a profound beneficial effect on transportation costs. Almost doubling the navigable inland waterways throughout Egypt would allow not only more rural areas serviced by water transportation but also more direct routes of travel. The vast majority of inland transportation is done by sail powered boats. Such travel is extremely economical for all sectors of the rural population. Needless to say the mode of transport is non-polluting.

9.10 Certain health benefits arising from this project should be recognized. Any reduction in the amount of weeds and grass growing in and along the canals will remove the habitat of the dreaded freshwater mollusks which transmit schistosomiasis (bilharzia). This project which ensures the free flow of water through the entire water system will increase water currents (velocity) which will hinder the breeding of malaria bearing mosquitoes. In general, increased natural water currents prevent water stagnation, a condition highly associated with the incubation of diseases.

9.11 Although laboratory analysis shows that silt obtained from dredging is not high in nutrients, it is adequate for cultivation. The project will supply equipment (trucks & trailers) to dispose of this silt in useful areas either onto existing lands or onto marginal lands for agriculture. Building materials land fill and dike repair will also benefit from this by-product.

9.12 In summary, this project will reach the rural population of Egypt; the most salient feature is in raising farm family income levels allowing an improved quality of life. Nutritional defects should be reduced with increased food crop production and new agricultural lands will be opened for heretofore landless rural inhabitants. Economical transportation for people and goods will be expanded to service the isolated rural population. Health benefits though probably marginal will be realized in the rural areas.

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## X. PROJECT IMPLEMENTATION

### A. Implementing Agencies

#### 1. Ministry of Irrigation

10.01 The Ministry of Irrigation is the agency of the Egyptian Government which will implement this project. This Ministry is responsible for all matters relating to Egypt's irrigation systems. An organization chart for this Ministry is attached as Annex N. Under contracts awarded by the Ministry, public sector companies and private contractors perform the tasks of maintaining existing canals and constructing new canals.

10.02 While the Ministry exercises close control over the performance of field work - in the sense that surveys are made of work quantities and adherence to specifications, there does not appear to be any element of the Ministry directly responsible for the overall planning, coordination and monitoring of the operational aspects of work undertaken by the public sector firms. Program effectiveness and efficiency could be improved by the creation of such an organizational element to: prepare annual and five year work programs for canals maintenance and restoration; identify each element of work in the program; review engineering aspects of work to be performed; establish work priorities; estimate resource requirements and prepare annual budgets; monitor and report on the execution of the annual program. The scope of work of the U.S. consultant will include provision of assistance to the Ministry in establishing such a control unit.

#### 2. Public Sector Dredging Companies

10.03 Commodities and services to be provided under this project are to be utilized by the two major public sector dredging companies: Egyptian Dredging Company and General Irrigation Company. The companies are discussed in Chapter IV, Canal Maintenance Companies, and Chapter VI, Financial Analysis, herein.

10.04 The lack of a formal organizational entity for workload evaluation, planning and scheduling was noted. The Chairmen of both companies should give consideration to establishing a small unit within their companies to perform work evaluation and planning and to coordinate the scheduling of equipment to the individual jobs. This unit would initially receive and analyze the Annual Work Program of the Ministry and would receive, evaluate, plan and control the individual work orders as they are received by the companies. Of particular importance would be this unit's coordination and control

over assignment and dispatch of equipment to the individual jobs. The unit would produce work analyses and equipment management and utilization reports. Such reports would be extremely beneficial to management in monitoring the efficiency of their field operations, determining the optimum economical numbers and mix of equipment to accomplish required work loads for the Ministry and in controlling the standards of company work. The U.S. consultant will be requested to assist the companies establish such evaluation units.

10.05 There is a considerable commonality of functions and similarity of work performed by the two companies in their land excavations. The operations of both companies are often spread throughout all of Egypt. On occasion, company work sites are in close proximity to each other. It would be possible and desirable for service facilities belonging to each of the companies to support each other where common functions and close proximity of work sites would result in greater efficiency and savings to the Government of Egypt. The ground rules and rates for the cross-servicing support could be worked out by the company Chairmen. The Minister of Irrigation, in cooperation with the Chairmen might consider instituting a formal cross-servicing arrangement between the two companies in all areas of common support requirements such as those discussed above.

## B. Implementation Plan.

### 1. Current Status

10.06 Under its contract (No. AID/AFR-C-1132) for study of this project, the contractor, Louis Berger International, Inc., prepared specifications for the equipment and tools to be provided under this project. These specifications will be thoroughly reviewed and approved by the Ministry, the two companies (EDC and GIC), and USAID prior to their incorporation into the Invitations for Bid (IFB). Minor adjustments may be made in types and quantities of equipment and tools if warranted by further review.

### 2. Consulting Services

10.07 The Ministry will contract for consulting engineering services to be funded under this project. Services will include assistance to the Ministry in preparation of final equipment specifications and IFEs, evaluation of awards, contract execution, monitoring of procurement and final acceptance of equipment. The consultant shall also provide assistance in formulating and administering training programs in the U.S. suppliers' factory schools and in Egypt, in improving spare parts inventory and control,

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and in establishing modern equipment management systems within each company, including a record-keeping system covering O&M costs, operating times and performance.

10.08 The Ministry of Irrigation has indicated its desire to utilize the firm of Louis Berger International for the above engineering services. The firm worked very closely with the Ministry in preparing the initial study of this project (and the Irrigation Pumping Project) under Contract No. AID/AFR-C-1132 (Egypt). In accordance with the provisions of Section IB2K of AID Handbook 11, Country Contracting, AID will review the Ministry's desire to select Louis Berger International for these services.

### 3. Procurement

10.09 The Ministry will procure all equipment, tools, etc., from U.S. suppliers utilizing AID approved IFBs and Handbook 11 procedures. Like units, i.e., trucks, bull dozers, will be grouped in separate IFBs to be bid and awarded as entire packages to ensure maximum standardization of equipment.

10.10 Procurements will be phased to ensure earliest receipt of transportation and maintenance support equipment, vehicles and shop tools to ensure early and proper utilization of construction equipment upon receipt and acceptance. Training will be scheduled to coincide with heavy equipment arrivals.

### 4. Facility Improvements

10.11 As previously discussed (Chapter VI), both Companies have improvement projects planned and/or underway. For example, Egyptian Dredging Company has construction of a new building for heavy equipment maintenance and overhaul underway and has plans for construction of a transport/vehicle service center which should eliminate the need to send vehicles out to the local market for electrical, tire and body repairs. Plans are being prepared for rearranging and improving areas for the storage and issue of spare parts. The General Irrigation Company has plans to construct a new equipment storage area and has started construction of a new heavy equipment workshop for maintenance, repair and overhaul. The Company also intends to improve and rearrange the spare parts storage and issue areas and the central tool room. Both companies will be encouraged to expedite completion of these plant improvements, and GOE priority relative to allocation of scarce building materials will be requested in support of such efforts.

C. Implementation Schedule.

10.12 The implementation schedule is shown in bar chart format in Annex O. Key dates will be as follows:

Loan Authorization	Sept. 1977
Loan Agreement with GOE	Sept. 1977
Loan CPs Met	Jan. 1978
Consultant Services Start	Mar. 1978
Transport/Tools Awards	July 1978
Excav. Equipment Awards	Sept. 1978
Equipment Deliveries Complete	Aug. 1979

D. Terminal Dates.

10.13 The terminal date for meeting conditions precedent will be 120 days after the date of signing of the loan agreement.

10.14 The Project Assistance Completion Date (same as the terminal date for requesting the opening of letters of commitment) will be June 30, 1979. The terminal date for disbursement will be 12 months thereafter, or June 30, 1980.

E. Monitoring.

10.15 USAID/Cairo will monitor this project by maintaining close liaison with the Ministry of Irrigation, Egyptian Dredging Company and General Irrigation Company management personnel, and with the U.S. consultant of the Ministry. The implementation of the entire equipment procurement process will be under control of USAID and all related documents will require USAID approvals. Monthly reporting, covering project activities, status of procurement and shipping, problems, etc., will be required from the Ministry. USAID staff will make frequent field trips to the companies' workshops and work sites to assess conditions and validate reporting.

F. Evaluation.

10.16 The GOE is undertaking a wide range of projects in irrigation, drainage, and general water management for agricultural lands. Initial indications support the thesis that water supply is not the

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single major constraint but it is an important one to increased production and that the lack of proper water management is also a major problem. The GOE/USAID Project 263-0017 Water Use and Management will address the problem of proper water management. Major projects for improved field drainage in the Nile Delta and Upper Egypt are underway and others are being planned. The Canal Maintenance Project is a discrete activity which will help restore and maintain the existing irrigation system in Egypt. As such, it assumes that whatever problems are identified concerning water management in Egypt, there still remains a need to drain irrigation water from producing land, and in doing so, if other cropping improvement practices are undertaken, an increase in production will result.

10.17 The evaluation of this project will be based on a canal maintenance schedule which will be developed by the Ministry of Irrigation. This schedule will provide for the upgrading and maintenance of all of the public canals and secondary drainage canals in Egypt. It will project the work load for a 4 to 8-year period. Upon the completion of the schedule, all the public canals and secondary drainage canals should be functioning at their design capacity. One of the initial tasks of the consulting engineering firm will be to assist the Ministry develop this schedule and establish a system to monitor accomplishment under the program.

10.18 Other than normal monitoring during procurement, the only other evaluation planned is an on-going evaluation which will require the Ministry of Irrigation to submit to AID, after the consulting engineering firm has left, bi-annual reports which will indicate progress toward meeting the schedule which has been developed. Upon completion of the initial 4 to 8-year cycle of canal maintenance, USAID will consider the project complete.

XI. RECOMMENDATION, CONDITIONS AND COVENANTS

A. Recommendation.

11.01 Subject to the conditions and covenants listed below, we recommend that AID authorize a loan to the Government of Egypt (GOE) in the amount of \$26 million for the financing of equipment and services for the Ministry of Irrigation.

11.02 We will seek GOE concurrence in relending the funds to the Ministry of Irrigation at an annual interest rate of 8 1/2 with the principal to be repaid over a 25-year period, including a 5-year grace period for the repayment of principal.

B. Conditions Precedent to Disbursement.

11.03 Prior to the first disbursement or to the issuance of the first Letter of Commitment under the loan, the GOE shall furnish to AID in form and substance satisfactory to AID:

a. An opinion of the Egyptian Minister of Justice or other legal counsel satisfactory to AID that the loan agreement and the re-loan agreement have been duly authorized and/or ratified by, and executed on behalf of the GOE and the Ministry of Irrigation and are a valid and legal, binding obligation of the GOE and the Ministry in accordance with their terms.

b. The names of the persons who will act as the representatives of the GOE and the Ministry of Irrigation, together with evidence of their authority and the specimen signature of each.

c. Evidence that the loan proceeds will be made available to the Ministry of Irrigation on terms and conditions acceptable to AID.

d. Evidence that all Egyptian currency required for the first fiscal year in which funds will be required, in an amount based on the estimate of the project, have been budgeted by the GOE and are available for expenditure by the Ministry of Irrigation.

e. An executed contract acceptable to AID with a consulting engineering firm acceptable to AID for services relative to the project.

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C. Covenants.

11.04 The GOE will be required to covenant:

a. Execution of the Project

i. To carry out the project with due diligence and efficiency and in conformity with sound engineering, construction, financial and administrative practices.

ii. To cause the project to be carried out in conformance with all the plans, specifications, contracts, schedules, and other arrangements, and with all modifications therein, approved by AID pursuant to this agreement.

iii. To submit for AID approval prior to implementation, issuance, or execution, all plans, specifications, schedules, bid documents, documents concerning solicitation of proposals relating to eligible items and contracts, and all modifications of these documents.

iv. Equipment purchased with AID funds must be used exclusively in Egypt.

b. Funds and Other Resources to be Provided

i. To make available on a timely basis all Egyptian currency and all other resources required for the timely and effective carrying out of construction, maintenance, repair and operation of the project.

ii. To make available on a timely basis all foreign currency in addition to the loan to finance project foreign exchange costs, unless A.I.D. agrees otherwise.

c. Operation and Maintenance

To operate, maintain and repair the project equipment in conformity with sound engineering and management practices and in such a manner as to insure the continuing and successful achievement of the purposes of the project.

d. Management

To provide qualified and experienced management for the project and to train such staff as may be appropriate for the successful maintenance and operation of the project.

e. Work Assignments

To make its best efforts, through appropriate allocation of public and private sector construction resources, to fully satisfy annual requirements for restoration and maintenance of existing public irrigation canals and drains.

f. Continuing Consultation

To cooperate fully with AID to assure that the purpose of the loan will be accomplished. To this end the GOE, Ministry of Irrigation and AID shall, from time to time, at the request of any party, exchange views through their representatives with regard to the progress of the project, the performance of the GOE and Ministry of Irrigation of its obligations under the loan agreement, the performance of consultants, contractors and suppliers engaged on the project, and other matters relating to the project.

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MINISTRY OF ECONOMY  
AND ECONOMIC COOPERATION

ANNEX A

Mr. Donald S. Brown  
AID Director  
U.S.A. Embassy  
Cairo.

Cairo, 5 Sept. 1987.

Dear Mr. Brown,

One of the problems Egypt is facing is the declining water flow in the irrigation canals caused by canal silting and weed growth. If the 26,000 miles of canals and drains are not continually maintained this will cause a serious decline in food production.

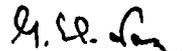
Our government has, therefore, established irrigation canal maintenance as one of its priorities and is replacing and rehabilitating dredging, earth moving and similar equipment.

This requires substantial foreign exchange expenditures. An AID-funded study, "Agricultural Canal Maintenance Study", completed in June of this year, recommended the purchase of approximately \$29 million worth of equipment and related services.

In order to implement this Agricultural Canal Maintenance Project we request a loan for \$26 million from the Agency for International Development to finance the foreign exchange costs of the project. Other funds will be obtained from other sources to finance the remaining foreign exchange expenditures.

The Government of the Arab Republic of Egypt will supply the estimated LE 3.1 million required to meet the local cost expenditures of this project.

Sincerely yours,



GAMAL EL-NAZER  
Deputy Chairman

For Investment Authority  
In Charge of Economic Cooperation

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## PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

## PART II

Name of Country/Entity:  
Arab Republic of Egypt

Name of Project: Canal Maintenance

Number of Project: 263-0044

Pursuant to Part 2, Chapter 2, Section 532 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan to the Arab Republic of Egypt, ("Cooperating Country") of not to exceed Twenty-Six Million United States Dollars (\$26,000,000) ("Authorized Amount") to help in financing certain foreign exchange costs of goods and services required for the project as described in the following paragraph. The project consists of assistance to the Government of the Arab Republic of Egypt to provide the foreign exchange costs of material, equipment and services in order to improve the capacity to restore and maintain agricultural irrigation canals (hereinafter referred to as the "Project"). The authorized amount will be made available by reloan to the Ministry of Irrigation of the Borrower. The entire amount of the A.I.D. financing herein authorized for the project will be obligated when the Project Agreement is executed. I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D.

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regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions; together with such other terms and conditions as A.I.D. may deem appropriate:

a. Interest Rate and Terms of Repayment.

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source and Origin of Goods and Services.

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

c. Conditions Precedent to Initial Disbursement.

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement Borrower shall, except as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

(1) An opinion of the Egyptian Minister of Justice, or other legal counsel satisfactory to A.I.D., that the Loan Agreement and the Reloan Agreement have been duly authorized by, and executed on behalf of the Arab Republic of Egypt and the Ministry of Irrigation and that they constitute valid and legally binding obligations in accordance with their terms:

(2) A statement of the names of the persons who act as the representatives of the Borrower and the Ministry of Irrigation, together with a specimen signature of each.

(3) Evidence that the Loan proceeds will be made available to the Ministry on terms and conditions acceptable to A.I.D.

(4) Evidence that all Egyptian currency required for the first fiscal year in which funds will be required, in an amount based on the estimate of the project, have been budgeted by the Borrower and are available for expenditure by the Ministry of Irrigation.

(5) An executed contract acceptable to A.I.D. with a consulting engineering firm acceptable to A.I.D. for services relating to the Project.

d. Additional Condition Precedent.

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement for procurement of materials or equipment, Borrower shall, except

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as A.I.D. may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D. a contract for the procurement of such materials or equipment acceptable to A.I.D. with a firm acceptable to A.I.D.

e. Covenants

i. The Borrower shall agree to all covenants contained in the A.I.D. standard form Project Loan Agreement.

ii. The Borrower will make available all foreign currency in addition to the loan to finance this project, unless A.I.D. agrees otherwise.

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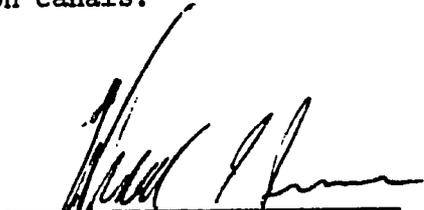
Administrator

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EGYPT - AGRICULTURAL CANAL RECONSTRUCTION AND MAINTENANCE PROJECT

CERTIFICATION PURSUANT TO SECTION 611 (e)  
OF THE FOREIGN ASSISTANCE ACT OF 1961 AS AMENDED

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



---

Donald S. Brown  
Director, USAID/Egypt

September 5, 1977  
Date

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6C(2) - PROJECT CHECKLIST

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

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

GENERAL CRITERIA FOR PROJECT.1. App. Unnumbered; FAA Sec. 653(b)

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

(a) The Agricultural Canal and Maintenance project was included in the FY 1977 Congressional Presentation.

(b) The intended obligation for the project is within the level of funds appropriated for Egypt for FY 1977.

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

(a) Yes.

(b) Yes.

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

No further legislative action is required to implement the project.

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

Not Applicable.

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 the country's capability effectively to maintain and utilize the project?

The Mission Director so certified. See Annex C.

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## A.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?
- The project is not susceptible of execution as part of a regional or multilateral project. Egypt is not a newly independent country.
7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
- This project will improve the capability of a part of the Ministry of Irrigation to more effectively maintain irrigation water canals throughout Egypt. Consequently, the project will improve the technical efficiency of industry, agriculture and commerce.
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
- The great majority of funds expended will be for goods and services from private U.S. concerns.
9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.
- The agreement will so provide.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?
- Yes. Release by the GOE is not a problem at present.

B. FUNDING CRITERIA FOR PROJECT

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

Not Applicable.

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

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

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

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

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

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

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

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

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

2. Development Assistance Project Criteria (Loans only)

**Not Applicable.**

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

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

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

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

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

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

3. Project Criteria Solely for Security Supporting Assistance

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

4. Additional Criteria for Alliance for Progress

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

a. FAA Sec. 251(b)(1), -(3). Does assistance take into account principles of the Act of Bogotá and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

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

This assistance will promote economic and political stability by enhancing GOE's capability to maintain water canals. Agricultural productivity is highly dependent on maintaining the capacity of these canals.

Not. Applicable.

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6C(3) - STANDARD ITEM CHECKLIST

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

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

A. Procurement

- |   |  |
|---|--|
| 1. <u>FAA Sec. 602</u> . Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?  | Procurement of goods and services will be pursuant to established A.I.D. regulations.                        |
| 2. <u>FAA Sec. 604(a)</u> . Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him?  | Yes.   |
| 3. <u>FAA Sec. 604(d)</u> . If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?   | Yes.   |
| 4. <u>FAA Sec. 604(e)</u> . If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?  | Not Applicable.  |
| 5. <u>FAA Sec. 604(a)</u> . Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?   | Consideration will be given to the use of excess property when practical.                                    |
| 6. <u>ICMA Sec. 901(b)</u> . (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates. | Yes.   |
| 7. <u>FAA Sec. 621</u> . If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized,   | Technical assistance, to the greatest extent practical, will be from private enterprise on a contract basis. |

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

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

Yes.

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

B. Construction

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

Yes.

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

Yes.

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

Not Applicable.

C. Other Restrictions

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

Not Applicable.

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

Not applicable.

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

The Loan Agreement will so stipulate.

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

Financing is not permitted to be used for such purposes.

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5. Will arrangements preclude use of financing:

- a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions? **Yes.**
- b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property? **Yes.**
- c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs? **Yes.**
- d. FAA Sec. 662. for CIA activities? **Yes.**
- e. App. Sec. 103. to pay pensions, etc., for military personnel? **Yes.**
- f. App. Sec. 106. to pay U.N. assessments? **Yes.**
- g. App. Sec. 107. to carry out provisions of FA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending). **Yes.**
- h. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress? **Yes.**





LENGTH OF IRRIGATION CHANNELS OF PUBLIC SUPPLY CANAL SYSTEM OF NILE RIVER BASIN IN EGYPT (km)

Region	Irrigation District	B E D W I D T H						
		More than 10 Meters			From 5 to 10 Meters	From 2 to 5 Meters	Less than 2 Meters	Total
		Navigable	Unnavigable	Total				
South Delta	Nobaria	119	211	330	118	328	649	1425
	El Behera	216	36	262	167	675	794	1898
	Total:	335	257	592	285	1003	1443	3323
Middle Delta	Kafr El Sheikh	23	92	115	266	693	375	1449
	El Gharbiya	92	92	184	51	480	719	1434
	El Minufiya	164	68	232	267	450	811	1760
	South Dakhaliya	74	133	207	135	330	494	1166
	Total:	353	385	738	719	1953	2399	5809
East Delta	East Dakhaliya	126	106	232	258	1057	561	2108
	El Sharkiya	116	100	216	150	504	1342	2212
	El Kalioubiya & Ismailia	165	98	263	320	663	598	1844
	Total	407	304	711	728	2224	2501	6164
LOWER EGYPT	TOTAL	<u>1095</u>	<u>946</u>	<u>2041</u>	<u>1732</u>	<u>5180</u>	<u>6343</u>	<u>15296</u>
Middle Egypt	El Giza	42	109	151	127	408	714	1400
	El Fayoum	0	72	72	161	429	607	1269
	Beni Suef	55	27	82	157	154	1086	1479
	El Minia	118	107	225	142	579	1375	2321
MIDDLE EGYPT	TOTAL	<u>215</u>	<u>315</u>	<u>530</u>	<u>587</u>	<u>1570</u>	<u>3782</u>	<u>6469</u>
Upper Egypt	A.siuat	61	95	156	162	505	485	1708
	Sohag	0	224	224	182	873	463	1742
	Qena	0	274	274	149	1481	218	2122
	Aswan	0	30	30	68	629	96	823
UPPER EGYPT	TOTAL	<u>61</u>	<u>623</u>	<u>684</u>	<u>561</u>	<u>3888</u>	<u>1262</u>	<u>6395</u>
GRAND TOTAL:		<u>1371</u>	<u>1884</u>	<u>3255</u>	<u>2880</u>	<u>10638</u>	<u>11387</u>	<u>28160</u>

Source: Water Distribution and Irrigation Systems Research Institute  
Ministry of Irrigation, February 16, 1977

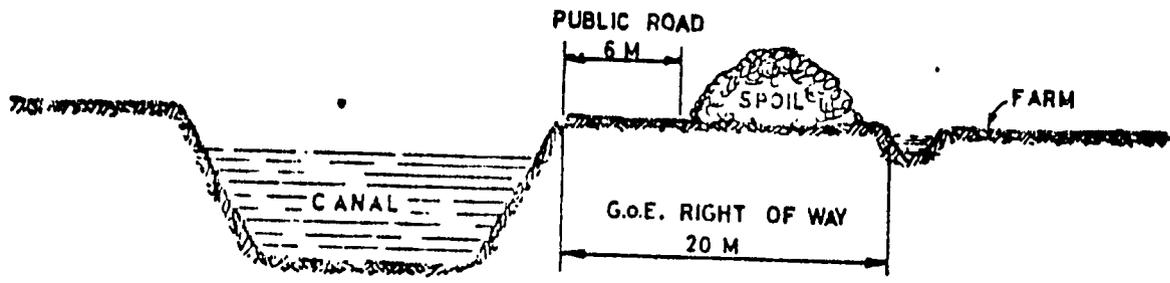
LENGTH OF CHANNELS OF PUBLIC DRAINAGE SYSTEM OF NILE RIVER BASIN IN EGYPT (km)

Region	Irrigation District	B E D W I D T H						Total
		More than 10 Meters			From 5 to 10 Meters	From 2 to 5 Meters	Less than 2 Meters	
		Navigable	Unnavigable	Total				
South Delta	Nobaria	0	0	0	25	532	329	886
	El Behera	0	93	93	241	883	415	1632
	Total:	0	93	93	266	1415	744	2518
Middle Delta	Kafr El Sheikh	39	91	130	119	502	327	1078
	El Gharbiya	15	0	15	59	206	620	900
	El Minufiya	0	0	0	48	230	680	958
	South Dakhaliya	0	39	39	87	192	583	901
	Total:	54	130	184	313	1130	2210	3837
East Delta	East Dakhaliya	64	114	178	126	1069	50	1423
	El Sharkiya	51	119	170	98	482	605	1355
	El Kalioubiya & Ismailia	0	57	57	114	349	434	1044
	Total:	115	290	405	338	1990	1089	3822
LOWER EGYPT	TOTAL	<u>169</u>	<u>513</u>	<u>682</u>	<u>917</u>	<u>4535</u>	<u>4043</u>	<u>10177</u>
Middle Egypt	El Giza	0	103	103	72	50	584	809
	El Fayoum	0	0	0	68	120	763	951
	Beni Suef	0	23	233	101	158	880	1162
	El Minia	0	33	33	46	208	607	894
MIDDLE EGYPT	TOTAL	<u>0</u>	<u>159</u>	<u>159</u>	<u>287</u>	<u>536</u>	<u>2834</u>	<u>3816</u>
Upper Egypt	Assiut	0	0	0	27	28	133	188
	Sohag	0	0	0	112	128	134	374
	Qena	0	0	0	17	55	88	160
	Aswan	0	0	0	73	290	75	438
UPPER EGYPT	TOTAL	<u>0</u>	<u>0</u>	<u>0</u>	<u>229</u>	<u>501</u>	<u>430</u>	<u>1160</u>
GRAND TOTAL:		<u>169</u>	<u>672</u>	<u>841</u>	<u>1433</u>	<u>5572</u>	<u>7307</u>	<u>15153</u>

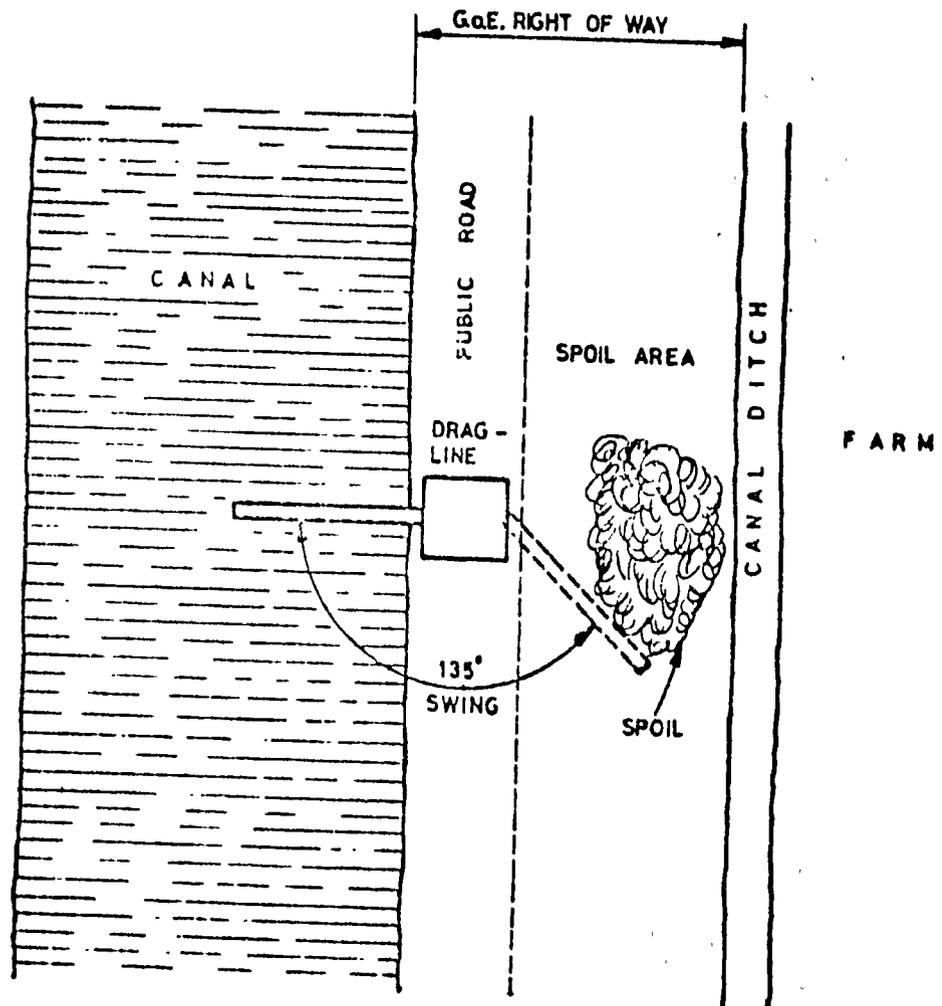
Source: Water Distribution and Irrigation Systems Research Institute, Ministry of Irrigation, February, 1977

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TYPICAL CANAL MAINTENANCE



SECTION



EXAMPLE OF TYPICAL CONDITION ON PROJECT



SUMMARY OF INTENSITY, CONDITION, COST OF MAINTENANCE AND OPERATION AND ECONOMIC LIFE OF  
EQUIPMENT OF THE EGYPTIAN DREDGING AND THE GENERAL IRRIGATION COMPANIES

Owned By	No. of Pieces	Description- Make & Model Capacity	Year of Mfg (Age)	Present Condition Code	Hrs. Per Day/Days Per Year of Operation	Average 1975 Annual Production Per Unit (M <sup>3</sup> /Yr)	1976 Total Annual Production (M <sup>3</sup> /Yr)	Company Reported Average 1976 Annual Cost in U.S. \$ Per Unit For		Normal Economical Life-Egypt Hrs. Of Oper/Yrs	Extended Economical Life (Egypt) Hrs. Of Oper/Yrs	Year Of Replacement Based on Ext. Econ. Life or Present Condition	Year Replacement Recommended	
								Maintenance	Operation					
<b>B. TRANSPORT EQUIPMENT/EARROWING EQUIPMENT</b>														
General	2	Low Bed/Trailer	60T Pauen(Germ)	1975	Good	5/250	100loads/yr	NA	Not	Available	20000/10	14	1989	1989
Irrigation	2	"	"	30T Berliet(Fr)	1975	Good	"	"	"	"	"	14	1989	1989
Company	1	"	"	20T Kraz(USSR)	1963	Poor/Scrap	"	"	"	"	"	14	1989	1989
"	2	"	"	20T Int'l(USA)	1959	"	"	"	"	"	"	14	1977	Now
"	2	"	"	40T Kraz(USSR)	1960	"	"	"	"	"	"	14	1973	"
"	4	"	"	8T Maz(USSR)	1962	"	"	"	"	"	"	14	1974	"
Egyptian	4	"	"	40T Kraz(USSR)	1960	"	"	"	"	"	"	14	1976	"
Dredging	4	"	"	60T Fraun & Lunhart(Ger)	1972	Good	"	"	"	"	"	14	1974	"
Company													1986	1986
General	2	Truck	Tractor	60T Pauen(Ger)	1975	Good	"	"	817	4,049	"	12	1987	1987
Irrigation	2	"	"	30T Berliet(Fr)	1975	Good	"	"	1,194	2,507	"	12	1987	1987
Company	1	"	"	20T Kraz (USSR)	1963	Poor/Scrap	"	"	3,829	4,028	"	12	1975	Now
"	2	"	"	20T Int'l (USA)	1959	"	"	"	"	"	"	12	1971	Now
"	2	"	"	40T Kraz (USSR)	1960	"	"	"	"	"	"	12	1972	Now
"	4	"	"	8T Maz (USSR)	1962	"	"	"	3,425	3,690	"	12	1972	Now
Egyptian	4	"	"	83000 GVW (Wger)	1972	Good	"	"	2,740	4,028	"	12	1974	Now
Dredging	4	"	"	40000 GVW (USSR)	1960	Poor/Scrap	"	"	Not	Available	"	12	1984	1984
Company	4	Truck	Flatbed Cargo	15T Kraz (USSR)	1960	"	"	"	"	"	"	12	1972	Now
"	2	"	"	"	10T (Czech)	1964	"	"	"	"	"	12	1972	Now
"	7	"	"	"	7T NasrEgypt	1962	"	"	"	"	"	12	1976	Now
"	6	"	"	"	7T " "	1972	Good	"	"	"	"	12	1974	Now
"	4	"	Pickup	XT Chevrolet(Ger)	1974	Good	"	"	"	"	"	12	1984	1984
General	8	Track	Type Tractors	W/Bulldozer	1962	Poor/Scrap	"	"	"	"	10000/5	8	1982	1982
Irrigation	14	"	"	W/Scrapper	1962	"	"	"	"	"	18000/9	13	1975	Now
Company	20	Towed	Type Scrapers	USSR	1962	"	"	"	"	"	18000/9	13	1975	Now
E.Dred.Co;	8	Track	Type Tractor	W/Bulldozer	1962	"	"	"	"	"	16000/8	12	1974	Now
General	4	Truck	Mech.	5T Nasr(Egypt)	1975	Good	"	"	"	"	"	"	"	"
Irrigation	1	"	"	5T " "	1969	Pair	"	"	"	"	12000/6	10	1985	1985
Company	1	"	"	5T W.G.Tienz	1959	Poor/Scrap	"	"	"	"	"	10	1979	Now
"	2	"	"	8T Maz (USSR)	1962	Pair	"	"	"	"	"	10	1969	Now
"	1	"	"	8T Maz	1962	Poor/Scrap	"	"	"	"	"	10	1972	Now
"	1	"	"	7T Skoda(Czech)	1965	"	"	"	"	"	"	10	1972	Now
"	1	"	Fuel	3T Zel	1962	"	"	"	"	"	"	10	1975	Now
"	6	"	Mech.	3T Zel	1962	"	"	"	"	"	"	10	1972	Now
"	2	"	"	USA Ford	1956	"	"	"	"	"	"	10	1972	Now
													1966'	Now

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Shop Support and Field Maintenance Equipment

<u>Item</u>	<u>EDC</u>	<u>GIC</u>	<u>Total</u>
Air compressor 85 c.f.m.	3	1	4
Air compressor 60 c.f.m.	0	3	3
Heavy duty valve refacing machine	3	2	5
Heavy duty valve seat grinding set	3	2	5
Hydraulic pin and bushing press	1	1	2
Automatic welding machine	1	1	2
Flux recovery grinding machine	1	1	2
Heavy duty portable jet-steam cleaner and pressure washer	3	3	6
Tire demounter	3	3	6
Battery charger 8 to 24 volt	3	3	6
Brake drum lathe for drums up to 30" diam.	2	1	3
Hydraulic in-line tester	3	3	6
Hydraulic gear and bearing puller, capacity 17.5 tons	0	2	2
Hydraulic gear and bearing puller set capacity 50 tons	3	1	4
Hydraulic shop press with roll bed floor mounted, capacity 75 tons	3	2	5
Hydraulic mobile floor crane, cap. 4000lbs	3	3	6
Transmission repair stand	3	1	4
Universal motor repair stand	3	3	6
Lubrication unit stationary, electric drive	3	3	6
Portable sprocket puller and installer for track type tractor with attachment, capacity 80 tons	1	1	2
Hydraulic engine cylinder sleeve puller and installer, capacity 12.5 tons	1	2	3
Universal fuel injector tester and pump calibrating stand for diesel engine, 2 to 12 cylinder engine	1	1	2
Fuel pump tester for diesel engine	3	1	4

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Shop Support... cont.

<u>Item</u>	<u>EDC</u>	<u>GIC</u>	<u>Total</u>
Water pump tester for diesel and gasoline engine	1	1	
Torque wrench, 1/2 inch square drive	3	3	
Torque wrench, 3/4 inch square drive	3	3	
Torque wrench, 1 inch square drive	1	1	
Air impact wrench 1/2 inch square drive with impact socket set and 50 ft air hoses with each wrench	3	3	
Air impact wrench 3/4 inch square drive with impact socket set	4	3	
Air impact wrench 1 inch square drive with impact socket set and 50 ft air hose with each wrench	3	3	6
Tap and die set national coarse and national fine threads 1/4-1.5 inches	3	3	6
Hexagon rethreading die set national coarse and national fine threads 1/4 to 1.5 inches	3	3	6
Heavy duty hydraulic jack, cap. 12 tons	3	4	7
Heavy duty hydraulic jack, cap. 30 tons	3	4	7
Heavy duty hydraulic jack, cap. 50 tons	10	2	12
Hydraulic wire rope cutter	3	3	6
Shop master tool set for general automotive service and tool chest	3	3	6
Industrial maintenance tool set, and chest	3	4	7
Mechanic general purpose tool set, chest	5	6	11
Heavy duty socket wrench set 3/4 inch square drive and box	3	3	6
Heavy duty socket wrench set 1 inch square drive and box	3	3	6
Heavy duty box-socket wrench 15° off set type, 1 to 3-1/8 inches, tubular handle	2	1	3
Hand hoist ratchet-action type, cap. 1.5T with 10 ft lift	4	4	8
Hand hoist ratchet-action type cap. 3 T with 10 ft lift	3	3	6
Ignition timing light	3	3	6

Shop Support...cont.

<u>Item</u>	<u>EDC</u>	<u>GIC</u>	<u>Total</u>
Swivel grip oil filter wrench	4	3	7
Ring compressor piston engine rebuild	3	3	6
Ring spreader piston engine rebuild, 2-5"	3	3	6
Giant adjustable wrench 24 inches long, jaw capacity 1-3/8 to 2-15/16 inches	3	3	6
Giant adjustable wrench 36 inches long, jaw capacity 2-15/16 to 4-3/4 inches	1	1	2
Heavy duty surface grinder disc minimum 7 inch diameter with 100 coarse grit and 100 fine grit disc with each grind	1	4	5
Electric drill 1/4 inch with 2 sets drills in 64ths and index case with each drill	4	4	8
Electric drill 1/2 inch with 2 sets drills in 64ths, index case with each drill	4	4	8
Electric drill 3/4 inch with 2 sets drills in 64ths, index case with each drill	4	3	7
Easy tool socket wrench 7/16 straight, retap 1/8 inch	8	8	16
Fork lift truck capacity 3 tons with pneumatic tires front and rear, lift minimum 12 feet high	1	0	1
Wire metal spraying machine single head type for crank shaft rebuild with two tons wire	1	1	2
Cylinder honing machine for vehicle hydraulic brake repair with 3 sets of stone for each machine	3	3	6
Portable cylinder boring machine for cylinder 2 to 5 inches diameter	1	1	2
Connection rod honing machine	1	1	2
Fork lift truck capacity 3 tons with pneumatic tires front and rear	2	3	5
Heavy duty hydraulic cylinder honing machine for cylinders 3-7 inches diame- ter, 48 inches long, with 4 extra sets of stone, expanding type honer	1	1	2
Ridge reamer engine cylinder for 2-5 inch diameter cylinder	3	3	6

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Shop Support...cont.

<u>Item</u>	<u>EDC</u>	<u>GIC</u>	<u>Total</u>
Fluid lubricant gun with hydraulic coupler	4	4	8
Electric welders 400 amp with electric drive skid mounted with leads 100 ft	4	4	8
Portable sand blasting machine with sand blast hose non-abrasive type, capacity 600 lbs sand, hopper sand blasting hood, 2 size nozzles, 3/16 and 1/4 inch	1	1	2
Dynamometer engine tester 60-400HP, single head unit	0	1	1
Dynamometer engine tester 60-800HP, single head unit	1	0	1
Bench grinder min. 6 inch diam. grinding wheels 60 and 36 grit, 3 each extra 60 and 36 grit grinding wheels with each	3	3	6
Heavy duty pedestal grinder min. 12 inch diam. grinding wheels 30 and 46 grit with extra grinding wheel, 30 and 46 grit, with each	3	3	6
Heavy duty hook spanner wrench	3	2	5
Line boring machine 10 ft long	0	1	1
Oxygen and acetylene cutting and welding set with twin hoses 100 ft long	4	4	8
Power hacksaw minimum 10 inch	2	2	4
Gear cutting machine with attachment	0	1	1
Lathe with 24 inch gap 48 inch swing, bed 12 ft	2	1	3
Heavy duty hydraulic lift for service station type, for service on larger trucks 83,000 GVW and smaller	1	1	2
Motorite for diesel and gasoline engines compression tester with adapters	3	3	6
Combination punch shear machine punch up to 5/8 inch hole in 1/2-inch plate, shear to cut 5/8 inch angle and strap iron	0	1	1
Turret lathe, 40 inch swing	2	0	2
Radial drill press with 72-inch arm	2	0	2

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Shop Support...cont.

<u>Item</u>	<u>EDC</u>	<u>GIC</u>	<u>Total</u>
Universal milling machine, horizontal travel 72 inches, vertical 20 inches, cross travel 12 inches	2	0	
Mobile hydraulic crane 10 ton capacity, 4 wheel drive	2	0	
Wire rope, 6x19 preformed wire center right long lay improved plow steel:			
4 each spool 1.25 inch diam. in 400 ft each spool	1	0	1
4 each spool 1.5 inch diam. in 400 ft each spool	0	1	1
4 each spool 1- 1/8 inch diam. in 1000 ft each spool	1	1	2
4 each spool 1 inch diam. in 1000 ft each spool	1	1	2
10 each spool 7/8 inch diam. in 1000 ft each spool	1	1	2
10 each spool 5/8 inch diam. in 1000 ft each spool	1	1	2
Manganese electrodes 3/16 inch, 5000 ft	1	1	2
Manganese electrodes 1/4 inch, 5000 ft	1	1	2

**FINANCIAL STATEMENT OF EGYPTIAN DREDGING COMPANY**  
**1 JANUARY 1970 - 31 DECEMBER 1975**

Description	<u>L.E.</u>				
	1 Jan 1970- 30 Jun 1971	1 Jul 1971- 31 Dec 1972	1 Jan 1973- 31 Dec 1973	1 Jan 1974- 31 Dec 1974	1 Jan 1975- 31 Dec 1975
<b><u>INCOME</u></b>					
a. Value of Executed Work	2,158,711	3,524,300	2,918,534	3,568,999	5,156,475
b. Other income	97,846	42,352	40,300	111,738	178,349
<b>Total Income</b>	<b>2,256,557</b>	<b>3,566,652</b>	<b>2,958,834</b>	<b>3,680,737</b>	<b>5,334,824</b>
<b><u>EXPENSES</u></b>					
a. Wages	539,223	852,482	655,373	789,042	1,010,558
b. Fuel and Grease	146,485	220,048	153,953	175,637	238,057
c. Depreciation, fixed assets	322,913	476,180	285,155	411,408	704,613
d. Spare parts & Maintenance	231,723	318,411	262,870	302,587	486,891
e. Other Expenses	164,635	379,361	377,428	341,462	579,167
f. Taxes	161,274	305,940	263,805	363,897	519,749
g. Net Profit	690,304	1,014,230	960,050	1,296,604	1,795,759
<b>Total Expenses</b>	<b>2,256,557</b>	<b>3,566,652</b>	<b>2,958,834</b>	<b>3,680,737</b>	<b>5,334,824</b>
<b>Total Cubes of Work Executed</b> (cubic meters)	<b>12,264,853</b>	<b>18,496,439</b>	<b>12,977,664</b>	<b>15,056,403</b>	<b>21,740,077</b>
<b>Percent Profit to Value</b> <b>of Work</b>	<b>32%</b>	<b>28.8%</b>	<b>32.9%</b>	<b>36.3%</b>	<b>34.8%</b>

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PROJECT COST SUMMARY

CAPITAL COSTS										ANNUAL O & M			REPLACEMENT		
Grp No.	Item	Quan.	Equipment	US\$ CIF	Contin-gency US\$ Total	LE Costs	Contin-gency	LE Total	Fuel <sup>1</sup> (US\$) Financial	Fuel <sup>2</sup> (US\$) Economic	Spares, Lub,tires <sup>3</sup> misc. US\$	Total US\$ Financial	Total US\$ Economic	Depreciation US\$	
=	<b>CATEGORY I</b>			1,880,250	282,037	2,162,287			=	=	=	=	=	=	
1	1	3	Dredges	-	-	-			29,952	89,856	148,896	178,848	238,752	82,800	
	2	3	Dredge Tender	-	-	-			7,488	22,464	30,398	37,886	52,862	11,520	
2	1	2	Crew Boat	-	-	-			3,456	10,320	8,371	11,827	18,691	3,120	
=	<b>CATEGORY II</b>			2,975,050	446,258	3,421,308			=	=	=	=	=	=	
1	1	2	Truck Tractor 70HP	-	-	-			2,184	6,576	18,850	21,034	25,426	13,536	
2	2	10	Truck Tractor 130	-	-	-			15,600	46,800	131,088	146,688	177,888	89,760	
3	3	9	Truck Tractor 190	-	-	-			19,656	58,968	152,496	172,152	211,464	104,544	
2	1	12	Wh Trac w/scraper	-	-	-			22,464	67,392	162,346	184,810	229,738	110,304	
=	<b>CATEGORY III</b>			2,547,250	382,088	2,929,338			=	=	=	=	=	=	
1	1	20	Pickup Truck 4x4	-	-	-			64,320	171,360	36,144	100,464	207,504	23,424	
	2	8	Pickup Truck 4x2	-	-	-			25,728	68,544	13,613	39,341	82,157	8,525	
	3	6	Pickup " , 6 pass.	-	-	-			19,296	51,408	13,363	32,659	64,771	9,504	
	4	10	Truck,mechanical	-	-	-			41,520	110,880	44,112	85,632	154,992	28,320	
2	1	8	Truck,cargo,29000	-	-	-			7,680	23,232	35,789	43,469	59,021	35,520	
	2	2	Truck,bus 44 pass.	-	-	-			1,920	5,808	11,453	13,373	17,261	12,144	
	3	12	Truck,lubrication	-	-	-			11,520	34,848	62,640	74,160	97,488	67,104	
3	1	6	Truck,cargo,46000	-	-	-			7,488	22,464	48,024	55,512	70,488	28,411	
	2	7	Truck trac 46000	-	-	-			8,736	26,208	54,852	63,588	81,060	31,920	
	3	5	Truck trac 83000	-	-	-			7,800	23,400	45,516	53,316	68,916	30,360	
	4	7	Trailer,low 30T	-	-	-			-	-	25,385	25,385	25,385	21,672	
	5	4	Trailer,low 60T	-	-	-			-	-	14,890	14,890	14,890	13,382	
	6	1	Trailer,high 60T	-	-	-			-	-	3,720	3,720	3,720	3,346	
	7	3	Trailer,high 8 T	-	-	-			-	-	10,080	10,080	10,080	7,272	
=	<b>CATEGORY IV</b>			13,071,820	1,960,773	15,032,593			=	=	=	=	=	=	
1	1	31	Dragline 1.5 cy	-	-	-			58,032	174,096	772,272	830,304	946,368	488,808	
	2	7	Dragline 1 cy	-	-	-			10,920	22,760	145,824	156,744	178,584	93,744	
	3	10	Dragline 3/4 cy	-	-	-			12,480	37,440	167,760	180,240	205,200	111,960	
2	1	35	Hyd.Backhoe 1 cy	-	-	-			54,600	163,800	672,756	727,356	836,556	508,956	
	2	7	4cyBackhoe buckets	-	-	-			-	-	-	-	-	-	
<b>CATEGORY V Fields&amp;Shop</b>															
	Main. Equip.			1,484,696	222,704	1,707,400			18,312	18,312	11,712	30,024	30,024	210,216	
	Spare Parts,Categ. I thru V			3,188,515	478,277	3,666,792			-	-	-	-	-	-	
	Dredge Discharge Pipe						6,864	1,030	7,894	-	-	-	-	-	
	Local Freight						25,750	3,862	29,612	-	-	-	-	-	
	Import Duties, Categories I-V						2,639,391	395,909	3,035,300	-	-	-	-	-	
<b>Totals</b>				<b>25,147,581</b>	<b>3,772,137</b>	<b>28,919,718</b>	<b>2,672,005</b>	<b>400,801</b>	<b>3,072,806</b>	<b>451,152</b>	<b>1,266,936</b>	<b>2,842,350</b>	<b>3,293,502</b>	<b>4,109,286</b>	<b>2,150,172</b>

<sup>1</sup>Diesel Fuel @ US\$ .13/gal    <sup>2</sup>Diesel Fuel @ US\$ .39    <sup>3</sup>Lubrication oil @ US\$ 1.50/gal  
 Gasoline @ US\$ .446/gal    Gasoline @ US\$ 1.19

Annex X

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DERIVATION OF PROJECT BENEFITS

Crop	Current Cropping Area in Feddans (Tab.II-2)	Marginal Increase in Crop. Area after Canal Restoration (Feddans)	Average Yield MT/Fed. (Tab. II-1)	Average Farmgate Price in LE/MT (Tab.II-1)	Total Revenue Per Fed. in LE (4x3)	Total Cost Per Fed. in LE (Appen.4-1)	NET REVENUE LE/FEDDAN (5-6)	NET REVENUE from increased Cropping Ratio, in LE 000 (7 x 2)
	1	2	3	4	5	6	7	8
MAIZE	1,830,000	33,700	1.57	50.8	79.76	59.00	20.76	699.61
SORGHUM	377,000	6,943	1.36	47.5	64.60	55.66	8.94	62.01
RICE	1,061,000	19,541	2.04	42.2	86.09	70.13	15.96	311.87
COTTON	1,346,000	24,789	0.81	722.0*	584.82	103.30	481.52	11,936.39
GROUNDNUTS	32,000	589	0.71	191.6	136.04	63.39	72.65	42.79
SESAME	33,000	608	0.50	185.0	92.50	39.80	52.70	32.04
VEGETABLES	585,000	10,774	6.60	33.8	223.08	84.50	138.58	1,493.06
<b>TOTAL</b>	<b>5,264,000</b>	<b>96,944</b>						<b>14,578.00</b>

\*International price for cotton used

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ECONOMIC COST AND BENEFIT STREAMS

(LE 000)

C O S T S							B E N E F I T S				
Project Year	Calendar Year	Investment	O & M	Replacement	Other	Total Costs	Scrap <sup>1</sup>	Benefits from water savings	Total Benefits	Net Cash Flow	Net Present value at 19.234230 %
1	1978	21,147	-	1,569	205	22,921	756	0	756	(22,165)	(18,589.46)
2	1979		2,999	1,569	164	4,732		0	0	( 4,732)	( 3,326.46)
3	1980		2,999	1,569		4,568		2,915	2,915	↓ 1,653)	( 975.15)
4	1981		2,999	1,569		4,568		5,831	5,831	1,263	624.88
5	1982		2,999	1,569		4,568		8,746	8,746	4,178	1,733.66
6	1983		2,999	1,569		4,568		11,662	11,662	7,094	2,468.80
7	1984		2,999	1,569		4,568		14,578	14,578	10,010	2,921.64
8	1985		2,999	1,569		4,568		14,578	14,578	10,010	2,450.34
9	1986		2,999	1,569		4,568		14,578	14,578	10,010	2,055.06
10	1987		2,999	1,569		4,568		14,578	14,578	10,010	1,723.55
11	1988		2,999	1,569		4,568		14,578	14,578	10,010	1,445.52
12	1989		2,999	1,569		4,568		14,578	14,578	10,010	1,212.34
13	1990		2,999	1,569		4,568		14,578	14,578	10,010	1,016.76
14	1991		2,999	1,569		4,568		14,578	14,578	10,010	852.75
15	1992		2,999	1,569		4,568		14,578	14,578	10,010	715.18
16	1993		2,999	1,569		4,568		14,578	14,578	10,010	599.82
17	1994		2,999	1,569		4,568		14,578	14,578	10,010	503.05
18	1995		2,999	1,569		4,568		14,578	14,578	10,010	421.91
19	1996		2,999	1,569		4,568		14,578	14,578	10,010	353.84
20	1997		2,999	1,569		4,568		14,578	14,578	10,010	296.77
21	1998		2,999	1,569		4,568		14,578	14,578	10,010	248.89
22	1999		2,999	1,569		4,568		14,578	14,578	10,010	208.74
23	2000		2,999	1,569		4,568		14,578	14,578	10,010	175.07
24	2001		2,999	1,569		4,568		14,578	14,578	10,010	146.83
25	2002		2,999	1,569		4,568		14,578	14,578	10,010	123.14
26	2003		2,999	1,569		4,568		14,578	14,578	10,010	103.28
27	2004		2,999	1,569		4,568		14,578	14,578	10,010	86.62
28	2005		2,999	1,569		4,568		14,578	14,578	10,010	72.65
29	2006		2,999	1,569		4,568		14,578	14,578	10,010	60.92
30	2007		2,999	1,569		4,568		14,578	14,578	10,010	51.09
31	2008		2,999	1,569		4,568		14,578	14,578	10,010	42.86
32	2009		2,999	1,569		4,568		14,578	14,578	10,010	35.94
33	2010		2,999	1,569		4,568		14,578	14,578	10,010	30.14
34	2011		2,999	1,569		4,568		14,578	14,578	10,010	25.28
35	2012		2,999	1,569		4,568		14,578	14,578	10,010	21.20
36	2013		2,999	1,569		4,568		14,578	14,578	10,010	17.78
37	2014		2,999	1,569		4,568		14,578	14,578	10,010	14.91
38	2015		2,999	1,569		4,568		14,578	14,578	10,010	12.51
39	2016		2,999	1,569		4,568		14,578	14,578	10,010	10.49
40	2017		2,999	1,569		4,568		14,578	14,578	10,010	8.86
											<u>0.00</u>

<sup>1</sup> Scrap: Salvage value of replaced equipment

987

MINISTRY OF IRRIGATION

MINISTER

DEPUTY  
MINISTER

PUBLIC  
SECTOR  
COMPANIES (5)

SURVEY  
AUTHORITY

DRAINAGE  
PROJECTS  
AUTHORITY

HIGH DAM &  
ASWAN DAM  
AUTHORITY

WATER  
RESEARCH  
CENTER

MECHANICAL &  
ELECTRICAL  
DEPARTMENT

IRRIGATION  
DEPARTMENT

ADMINISTRATION  
DEPARTMENT

EGYPTIAN  
DREDGING  
COMPANY

MECHANICAL  
DREDGING  
COMPANY

HIGH DAM  
CIVIL  
COMPANY

IRRIGATION  
WORKSHOPS  
COMPANY

EGYPTIAN  
DRAINAGE  
PROJECTS CO.

ACTIVITIES

1977

1978

1979

1980

1981

A. Loan Agreement

1. Signing

2. Conditions Precedent

B. U.S. Consultant

1. Contract

2. Services

C. Procurement

1. Finalize IFBs

2. Advertise

3. Award

4. Transport/Tool Deliv.

5. Excav. Equip. Deliv.

D. Facility Improvements

E. Training

1. U.S. Factory

2. On Site O & M

PROJECT IMPLEMENTATION SCHEDULE

Annex 0