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ARAB REPUBLIC OF EGYPT

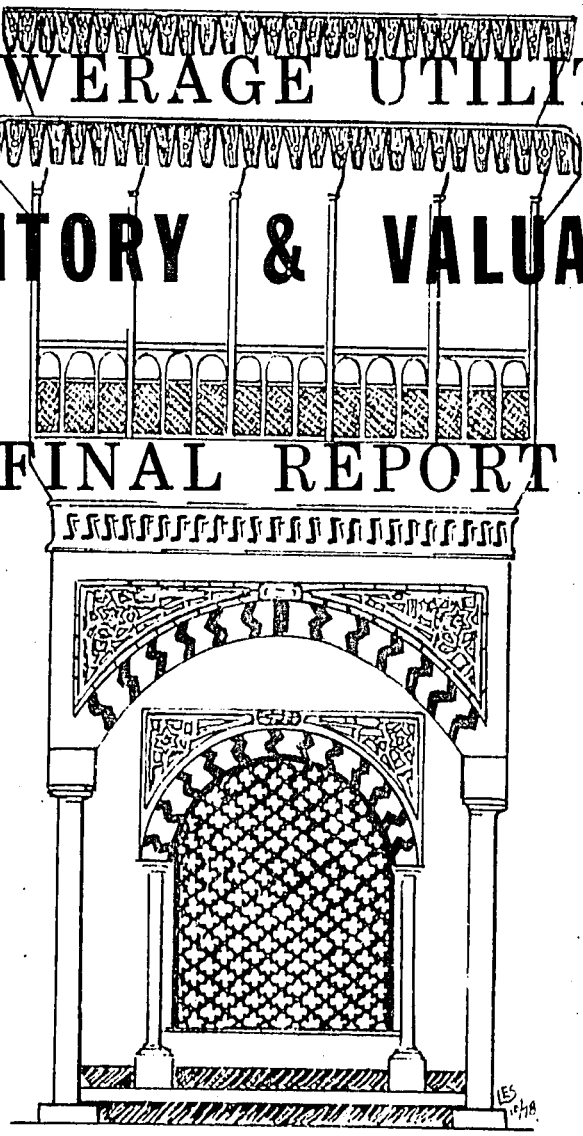
MINISTRY OF DEVELOPMENT
AND NEW COMMUNITIES

MANAGEMENT AND TARIFF STUDIES
RELATIVE TO WATER/SEWERAGE SYSTEMS

WATER AND SEWERAGE UTILITY

INVENTORY & VALUATION

FINAL REPORT



بسم الله الرحمن الرحيم

وجعلنا من الماء كل شيء حي

صدق الله العظيم

BVI-ATK ASSOCIATES WITH SABBOUR ASSOCIATES

BLACK & VEATCH INTERNATIONAL
CONSULTING ENGINEERS

A.T. KEARNEY, INC.
MANAGEMENT CONSULTANTS

SABBOUR ASSOCIATES
CONSULTING ENGINEERS

OCTOBER 1979

U.S.A.I.D. GRANT NO. 263-0025

WATER AND SEWERAGE UTILITY

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FINAL REPORT

The Story of Our Cover:-

On our cover is a sketch of a sybil, which is a fountain. During the Ottoman Empire these were a common source of drinking water. A well is located at ground level and a balcony on the second level where children were taught the Koran. Usually located near mosques, sybils were built and then donated to the public by various benefactors.

Beneath the sketch is a quote from the Koran, "We made from water all living things".

BLACK & VEATCH INTERNATIONAL
CONSULTING ENGINEERS

A. T. KEARNEY, INC.
MANAGEMENT CONSULTANTS

WITH SABBOUR ASSOCIATES
CONSULTING ENGINEERS

بلاك أندفيتش العالمية
استشارات هندسية

أ. ت. كارني
استشارات إدارية

المكتب الهندسي الاستشاري « صبور »
استشارات هندسية

OUR REF.: 79-248
YR REF.:
DATE: October 3, 1979

Engineer Soliman Abd El Hai
Chairman
Advisory Committe for Reconstruction
Ministry of Development and New Communities
1, Ismail Abaza Street
Cairo, A.R.E.

Dear Engineer Abd El Hai:

Pursuant to the provisions of Paragraph 6.7 of Appendix 1 to the Contract dated April 6, 1978 between the Ministry of Housing and Reconstruction and BVI-ATK Associates for Management and Tariff Studies Relative to Water and Sewerage Systems, we are pleased to submit the Final Report on Water and Sewerage Utility, Inventory and Valuation. It is responsive to the provisions of Paragraph 5.4.4, 5.4.6 and 5.4.17 of Appendix 1 to the Contract and incorporates, as appropriate, material related to the review comment on the Interim and Draft Final Reports.

Your attention is directed to Section 0.0 of this report, Executive Summary, where a brief synopsis of the findings and recommendations may be found.

We wish to acknowledge the assistance and cooperation of the many individuals, agencies and organizations contacted during the course of the study.

We appreciate the opportunity to serve the Ministry on this important assignment.

Very truly yours
BVI-ATK ASSOCIATES

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Appendix 1, Inventory and Valuation, Greater Cairo/Helwan Water Utility

Appendix 2, Inventory and Valuation, Greater Cairo/Helwan Sewerage Utility

Appendix 3, Inventory and Valuation, Alexandria Water Utility

Appendix 4, Inventory and Valuation, Alexandria Sewerage Utility

Appendix 5, Inventory and Valuation, Ismailia Water and Sewerage Utility

Appendix 6, Inventory and Valuation, Port Said Water and Sewerage Utility

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List of Commonly Used Expressions

ACR	Advisory Committee for Reconstruction
AWGA	Alexandria Water General Authority
ARE	Arab Republic of Egypt
CAPMAS	Central Agency for Public Mobilization and Statistics
GOGCWS	General Organization for Greater Cairo Water Supply
GOSSD	General Organization for Sewerage and Sanitary Drainage
IBRD	International Bank for Reconstruction and Development (World Bank)
MODANC	Ministry of Development and New Communities
MOHR	Ministry of Housing and Reconstruction
SCA	Suez Canal Authority
USA	United States of America
USAID	United States Agency for International Development
WHO	World Health Organization
NARUC	National Association of Regulatory Utility Commissioners, Washington, D.C.

Abbreviations

AC	Alternating current
acre	4047 m^2
BOD	Biochemical oxygen demand
cm	Centimeter
cmd	Cubic meter per day
cmh	Cubic meter per hour
COD	Chemical oxygen demand
DC	Direct current
ea	Each
Feddan	4,200 m^2
ha	Hectare or 10,000 m^2
hp	Horsepower
hr	Hour
hz	Hertz
kg	Kilograms
km	Kilometer
kVa	Kilovolt amperes
kW	Kilowatt
kWh	Kilowatt hour
l	Liter
lcd	Liter per capita per day
LE	Egyptian pound
Lot	Lot or group, normally of a similar type of property
mH	Mega hertz
m_2	Meter
m^2	Square meter
m^3	Cubic meter
mg	Milligrams
mg/l	Milligrams per liter
mm	Millimeter
mms	Milliemes
NA	Not available or not applicable
OC	Original cost
/	per
%	percent
pt	piastre
RC	Reproduction cost
RCLD	Reproduction cost less depreciation
rpm	Revolutions per minute
SS	Suspended solids
v	volt
yr	year

0.0 EXECUTIVE SUMMARY

This report presents the findings and recommendations of BVI-ATK Associates relative to the development of an inventory and valuation of utility plant in service of water and sewerage utility in:

- Greater Cairo/Helwan
- Alexandria
- Ismailia
- Port Said
- Suez

This report is part of the Final Report on Water and Sewerage Utility Tariffs. It is responsive to Sections 5.4.16 and 5.4.4 of the contract dated April 6, 1978 by and between The Ministry of Housing and Reconstrution and BVI-ATK Associates for management and tariff studies relative to water and sewerage systems.

This report contains revisionary clarifications, amendments and refinement of the material presented in the Interim Report and Draft Final Report on Water and Sewerage Utility Inventory and Valuation. These changes include appropriate responses to review comments received on the two preliminary reports.

0.1 FINDINGS

The principal findings contained in this report are:

- A valuation of the utilities has been made which reflects estimates of original costs, estimated reproduction cost and reproduction cost less depreciation. The results of the valuations are shown in the seven appendices that are a part hereof.

- Based upon the studies, the estimated remaining life of each water and sewerage system has been computed. This data has been used to determine the depreciation that has been sustained in the property.

- Estimates of depreciation reserves are based on this remaining life concept, applied to the estimate of original cost. Recommended depreciation reserves are shown in the appendices.

- Rates of depreciation recommended by the Standard Egyptian Accounting System do not provide sufficient details for use by major water and sewerage utilities. Recommended rates of depreciation are shown in Tables 6.4 and 6.6.

- The value of each utility system is summarized by utility plant account using the Uniform System of Accounts for Class A and B Water Utilities and the Uniform System of Accounts for Class A and B Sewer Utilities. Both systems are prescribed by the National Association of Regulatory Utility Commissioners, Washington, D.C.

- With the exception of AWGA, none of the utilities maintain adequate property records. Currently the sewerage utility property records consist only of a summary of annual capital expenditure.

0.2 RECOMMENDATIONS

The following recommendations should be implemented as soon as possible:

- Property records of the water utilities should be revised and expanded.
- The sewerage utilities should establish and maintain property records.
- A system of property accounts should be adopted which will meet national requirements as well as provide details of investment by functional category.
- A system of retirement accounting should be adopted.
- Depreciation rates recommended herein should be established and revised periodically.

1.0 INTRODUCTION

This report is submitted under the provisions of the contract dated April 6, 1978 by and between the Ministry of Housing and Reconstruction and BVI-ATK Associates for management and tariff studies relative to water and sewerage systems in Cairo/Helwan, Alexandria, Ismailia, Port Said and Suez. As a result of the recent reorganization in the Egyptian Government, the responsibility for administration of the contract now is with the Ministry of Development and New Communities.

This report is one of three reports being issued as the Final Report on Tariff Studies. It complies with Section 5.4.17 and Section 5.4.4 of Appendix I of the above referred to contract. The reports that make up the Final Report on Tariff Studies are:

- Water and Sewerage Utility, Inventory and Valuation (This Report)
- Water Utility, Tariffs.
- Sewerage Utility, Tariffs.

1.1 PURPOSE

This report has been prepared to meet the following objectives:

- To provide a basis for measuring or computing annual revenue requirements based on the return on investment concept.

- To provide each utility with a basis for establishing a record of its investment in utility plant in service.

- To develop and recommend depreciation rates to be applied to existing facilities and proposed new facilities; and to determine appropriate depreciation reserves.

The material in this report is designed primarily to meet the stated purposes. In addition, it becomes a base upon which future management decisions can be made. The property record that may evolve from the information contained herein, and in the appendices which are a part hereof, should be considered as one of the major tools available to management. The valuations may also be used to establish the Fixed Asset portion of any investment equity that is assigned to existing or future organizations operating water or sewerage utilities.

1.2 SCOPE

The material presented herein is limited to the water and sewerage systems owned and operated by:

- The General Organization for Greater Cairo Water Supply in Greater Cairo/Helwan.

- The Alexandria Water General Authority in Alexandria.

- The Suez Canal Authority in Ismailia, Port Said and Suez.

- The General Organization for Sewers and Sanitary Drainage (GOSSD) in Greater Cairo/ Helwan and Alexandria.

- The Governorate of Ismailia in Ismailia.

- The Governorate of Port Said in Port Said.

- The Governorate of Suez in Suez.

The report includes for each of the above systems:

- An inventory of the major units of utility plant in service.
- An estimate of the cost of construction when first dedicated to public use.
- An estimate of the reproduction cost and reproduction cost less depreciation.
- An estimate of the reserve for depreciation applicable to the water and sewerage facilities.

1.2.1 Inventory

The inventory was taken from records of the operating utilities and reports by other consultants. This inventory was confirmed to the extent considered necessary. It includes all major facilities but should not be considered as an exact detailed listing of all property units. General plant property in particular was not checked on a unit by unit basis. As a result of the methods used, and specified in Section 5.4.4 of Appendix I of the contract, it is entirely probable that the inventory contains omissions.

1.2.2 Cost of Construction

As used in this report cost of construction means any of the following:

- Amount expended to construct or purchase a property unit.
- The book value as reported on books of the utility.
- Estimated value at time of acquisition.

The actual investment in water and sewerage properties is not known. The cost reflected herein is a reasonable estimate of the value of major conponents. Minor components of property have been given only nominal values. No audit procedure was attempted to trace detailed costs.

1.2.2.1 Water utilities. Book cost of the water systems in Greater Cairo/Helwan and in Alexandria was obtained from the general books and records of GOGCWS and AWGA respectively.

No comfirmable book cost for the SCA properties was available. Tests of reported additions by year could not be reconciled with physical property units. Cost of SCA properties was estimated.

1.2.2.2 Sewerage utilities. No record exists of the actual cost of sewerage properties. Neither GOSSD nor the Governorates have property records. As a result, most cost values of sewerage properties have been estimated.

1.2.3 Reproduction Cost

Reproduction cost was computed by trending known or estimated cost, by developing unit costs, or by using construction cost estimates prepared by others. The trend factors used were developed for this study. A common trend factor was used for all types of property.

1.2.4 Condition

The present condition of plant property was evaluated by field inspection and from reports of other consultants. Representative inspections were made but all facilities were not visited. No underground properties were inspected.

Condition of mass properties was developed by using frequency, probable life and survivor curves. Nominal remaining life was assigned to general property units. Functional allowances were considered where remaining life exists but the facility is no longer capable of meeting daily loads.

1.2.5 Land

BVI-ATK Associates are not land appraisers. This requires special skills and knowledge of the current market conditions in various parts of a community. Land values reported herein are based on original cost where known. In the absence of known cost, estimated average cost per square meter, has been used. No appreciation of land cost has been used. The value of land reported in the appendices is the same for original cost and reproduction cost.

This procedure understates the actual value of the utilities. For example, the value of the land upon which the Giza Water Treatment Plant is located in Cairo probably far exceeds the original cost reported by GOGCWS. Nevertheless the impact of such increased values is not considered significant when measured by the total value of each utility.

2.0 UNIFORM SYSTEM OF ACCOUNTS

In a well managed and operated water or sewerage utility, a basis must exist for maintaining an inventory and valuation record of the utility plant used or useful in providing water to customers of the utility. Normally the basis is referred to as a System of Accounts. The accounts used to record cost or value of the utility are referred to as Detailed Plant Accounts.

2.1 PROPERTY ACCOUNTS

The Egyptian Central Body of Accounts has established a Uniform System of Accounts which is intended to be used by all domestic agencies. Under this system, utility plant costs or values are to be entered into the following categories:

Account Number	Description
111	Land
112	Buildings and construction
113	Machinery
114	Means of transport
115	Loose tools and meters
116	Furniture

These accounts may be adequate for many activities. However, they do not provide sufficient flexibility for the classification of a water or sewerage utility property. For example, the cost of water mains or sewers does not readily fit in one of the above classifications.

The GOGCWS and the AWGA use this system of accounts in their accounting system. The SCA has an independent

accounting system that does not conform to the Central Body of Accounts methods. The SCA did not provide information to indicate the classification to which the cost or value of the water utility is entered. Water utility costs apparently are co-mingled with other property costs of the SCA.

Neither GOSSD nor the Governorates maintain accounts in which property values are recorded.

2.2 ALTERNATE PROPERTY ACCOUNTS

A more refined system of property accounts classifies water and sewerage utility plant by its functional use. The system permits the development of similar detail to the system described in Section 2.1 and at the same time eliminates the possible confusion as to where a charge should be entered. The system of accounts recommended herein is based upon the Uniform System of Accounts for Class A and B Water Utilities, and the Uniform System of Accounts for Class A and B Sewer Utilities. These systems were developed by the National Association of Regulatory Utility Commissioners, Washington, D.C., U.S.A. (NARUC)

2.2.1 Detailed Plant Accounts

Utility Plant Accounts recommended in the NARUC Uniform System of Accounts are divided into various classifications

as follows:

Water Utilities

- Intangible plant
- Source of supply plant
- Pumping plant
- Water treatment plant
- Transmission and distribution plant
- General plant

Sewerage Utilities

- Intangible plant
- Collection plant
- Pumping plant
- Treatment and disposal plant
- General plant

Each classification is sub-divided into several detailed accounts. A complete listing of water utility plant accounts is shown in Table 2.1. A similar listing for sewerage utilities is shown in Table 2.2.

2.2.1.1 Water utilities. In a water utility, intangible plant consists of accounts in which are recorded costs associated with organizing a water utility and putting it in readiness to do business. The use of this account is not recommended. No practical application for its use has yet been determined for the water utilities in Egypt.

The principal accounts to be used in the source of supply category are land, structures, river intakes, wells and supply mains. These accounts contain the physical assets needed to remove water from the River Nile, from canals, and from wells, and to transport the water to treatment facilities or, in the case of some wells, directly to the

distribution system.

Pumping plant accounts are used to record the investment for all pumping facilities. This includes the low service pumps associated with river intakes, well pumps, the high service pumps used to move water from plants to the distribution systems, and the booster pumping on the distribution systems.

The water treatment plant classification contains only three accounts. One, Account 332, Treatment Equipment, may be subdivided into as many sub-accounts as desired.

Transmission and distribution plant includes the investment in pipes, tanks, meters, service connections and fire hydrants is recorded in this classification. Account 343, Transmission and Distribution Mains is often subdivided into separate sections by pipe size and type.

A distinction should be made between Transmission Mains and Distribution Mains. The actual use, when known, should be the basis for dividing mains between the two categories. Normally Transmission Mains are large pipes that move water from the treatment plants to areas where the smaller distribution lines transfer it to users. As a guideline for management use, it is suggested that all mains of 300 mm diameter or larger be considered as Transmission Mains. The exception should be for mains that, as a result of engineering studies, can be properly classified.

General plant contains all accounts for property not classified elsewhere. Among the more common elements of general plant are office, warehouse and shop structures, furniture and equipment, autos and trucks, tools, work equipment and laboratory equipment.

2.2.1.2 Sewerage utilities. Intangible plant in a sewerage utility consists of accounts in which are recorded costs associated with organizing the utility and putting it in to readiness to do business. The use of this account is not recommended. No practical applications for its use has yet been determined for the sewerage utilities in Egypt.

The principal accounts to be used in the collection plant category are land, structures, collection sewers and customer connections.

Pumping plant accounts are used to record the investment for all pumping facilities. This includes the pump station structures and wet and dry wells. In Cairo it would also include the ejection stations and air mains.

Treatment and disposal plant accounts include land and structures and the variety of basis, tanks, lagoons and equipment that are required for the sewage treatment process.

General plant contains all accounts for property not classified elsewhere. Among the more common elements of general plant are office, warehouse and shop structures, furniture and equipment, autos and trucks, tools, work equipment and laboratory equipment.

2.2.2 Typical Plant Components

A utility system contains a large variety of facilities and equipment that make up the units defined in Section 2.2.1 and shown in Tables 2.1 and 2.2. Common to all classifications are land and structures.

2.2.2.1 Land and land rights. These accounts contain the cost of land including land rights and improvements. Such items as easements, rights of way, cost of public improvements assessed against the land and similar charges are also entered in this account.

2.2.2.2 Structures and improvements. These accounts include the cost of all buildings and facilities to house, support or safeguard property or persons. It includes all fixtures that are permanently attached.

2.2.2.3 Plant account components. Tables 2.3 and 2.4 contain detailed listings of typical components of water and sewerage utility plants respectively.

2.3 ADOPTION OF PROPOSED SYSTEM

There should be no difficulty in converting the Egyptian Uniform System of Accounts prescribed by the Central Body of Accounts to the systems recommended in Section 2.2. The proposed systems include all the categories required in the existing system.

2.3.1 Consolidation of Proposed Accounts

If, for audit purposes, regulations require the reporting of accounts under the Egyptian Uniform System of Accounts, a simple consolidation will permit compliance with such rules. Tables 2.5 and 2.6 contain a grouping of the accounts in the proposed system under the classification in the existing system.

An examination of the groupings shown in these tables demonstrate the inadequacy of the existing system. Water utility property such as reservoirs, mains, services and hydrants just do not fit in any of the six classifications of the existing system. Meters are not properly grouped with tools.

Similarly sewer utility properties such as sewers and services have no comparable classification in the Egyptian systems. Nor does General Plant property such as power operated equipment, stores equipment, laboratory, communications and miscellaneous equipment have a comparable classification.

2.3.2 Implementation of the Proposed System

This report contains a reasonably detailed inventory of the properties in each of the water and sewerage systems in Cairo/Helwan, Alexandria, Ismailia, Port Said and Suez. The inventory for each utility system is listed under the

classifications contained in the proposed Uniform System of Accounts.

These inventories can be used as the basis for establishing an inventory and valuation record of Utility Plant in Service. A discussion of the methods used to obtain the inventory is contained in Section 3 of this Report. Where it was possible to do so, the original cost of plant facilities was indicated with units of property in the inventory. A discussion of valuation of property is set forth in Section 4.

To establish an adequate property record will require that each utility:

- Convert existing systems to the proposed system described herein.
- Tabulate in the property record the detailed inventory contained in the Appendix to this Report.
- Identify each known item of original cost or value at a selected date with each entry in the inventory.
- Footnote each inventory item without a value that the original cost was not known at the date of the inventory.
- Establish in each property record an account described as "Original Cost Value Not Classified at Date of Inventory".
- Transfer from the above account to the detailed account any costs that are subsequently confirmed.

- Establish a system of retirement accounting as described in Section 5.4 hereof. Credit all retirements against the "Original Cost Value Not Classified Account" unless they can specifically be identified with a classified unit.

- Record all units of property and cost of purchase or construction in the appropriate account for all improvements, additions, betterments and purchases after the date of implementation of the detailed inventory and valuation.

The establishment of a property record would be the responsibility of an Asset Accounts Group as recommended in Section 3.3 of the Report on Management Information Systems. The property record will also require the establishment of proper Project Monitoring Programs and Maintenance Job Order Systems as set forth in Section 2.3.4 of the Managment Information Systems Report, and Section 2.2 and 3.6 of the Report on Methods and Procedures. Establishment of a property record is described in Section 7, hereof.

TABLE 2.1

WATER UTILITY PLANT ACCOUNTS

Acct No.	
Intangible Plant	
301.	Organization
302.	Franchises and Consents
303.	Miscellaneous Intangible Plant
Source of Supply Plant	
310.	Land and Land Rights
311.	Structures and Improvements
312.	Collecting and Impounding Reservoirs
313.	Lake, River and Other Intakes
314.	Wells and Springs
315.	Infiltration Galleries and Tunnels
316.	Supply Mains
317.	Other Water Source plant
Pumping Plant	
320.	Land and Land Rights
321.	Structures and Improvements
322.	Boiler Plant Equipment
323.	Other Power Production Equipment
324.	Steam Pumping Equipment
325.	Electric Pumping Equipment
326.	Diesel Pumping Equipment
327.	Hydraulic Pumping Equipment
328.	Other Pumping Equipment
Water Treatment Plant	
330.	Land and Land Rights
331.	Structures and Improvements
332.	Water Treatment Equipment
Transmission and Distribution Plant	
340.	Land and Land Rights
341.	Structures and Improvements
342.	Distribution Reservoirs and Standpipes
343.	Transmission and Distribution Mains
344.	Fire Mains
345.	Services
346.	Meters
347.	Meter Installations
348.	Hydrants
349.	Other Transmission and Distribution Plant

TABLE 2.1 (cont'd)

WATER UTILITY PLANT ACCOUNTS

Acct No.	
General Plant	
389.	Land and Land Rights
390.	Structures and Improvements
391.	Office Furniture and Equipment
392.	Transportation Equipment
393.	Stores Equipment
394.	Tools, Shop and Garage Equipment
395.	Laboratory Equipment
396.	Power Operated Equipment
397.	Communication Equipment
398.	Miscellaneous Equipment
399.	Other Tangible Property

References: Uniform Systems of Accounts for Class A and B Water Utilities, NARUC, Washington, D.C., 1976.

TABLE 2.2

SEWERAGE UTILITY PLANT ACCOUNTS

Acct No.	
Intangible Plant	
301.	Organization
302.	Franchises and Consents
303.	Miscellaneous Intangible Plant
Collection Plant	
350.	Land and Land Rights
351.	Structures and Improvements
352.	Collection Sewers
	352.1 Collection Sewers-Force
	352.2 Collection Sewers-Gravity
	352.3 Special Collecting Structures
353.	Services to Customers
354.	Flow Measuring Devices
355.	Flow Measuring Installation
356.	Other Collection Plant Facilities
Pumping Plant	
360.	Land and Land Rights
361.	Structures and Improvements
362.	Receiving Wells
363.	Electric Pumping Equipment
364.	Diesel Pumping Equipment
365.	Other Pumping Equipment
Treatment and Disposal Plant	
370.	Land and Land Rights
	370.1 Oxidation Lagoon Land and Land Rights
	370.2 Other Land and Land Rights
371.	Structures and Improvements
372.	Treatment and Disposal Equipment
373.	Plant Sewers
374.	Outfall Sewer Lines
375.	Other Treatment and Disposal Plant Equipment
General Plant	
389.	Land and Land Rights
390.	Structures and Improvements
391.	Office Furniture and Equipment
392.	Transportation Equipment
393.	Stores Equipment
394.	Tools, Shop and Garage Equipment
395.	Laboratory Equipment
396.	Power Operated Equipment
397.	Communication Equipment
399.	Other Tangible Property

References: Uniform Systems of Accounts for Class A and B Sewer Utilities, NARUC, 1976.

TABLE 2.3

TYPICAL WATER UTILITY ACCOUNT COMPONENTS

Account Number	Description
Various	Land and Land Rights
	- Bulkheads - Cost of acquisition - Fees, commissions, and salaries to brokers and agents - Removing, relocating, or reconstructing property of others - Special assessments for public improvements such as new roads, new bridges, new sewers, new curbing, new pavements - Surveys
Various	Structures and Improvements
	- Architects' and engineers' plans and services - Machinery for lighting, and air conditioning - Plumbing - Docks - Drainage and sewerage systems - Elevators, cranes, hoists - Excavation - Fences and fence curbs - Floors - Floor covering - Foundations - Grading and clearing - Landscaping - Lighting fixtures - Painting - Paving, within the property lines - Roofs - Sewer systems - Sidewalks, culverts and curbs - Sump pumps and pits - Storage facilities - Structural system - Walls - Windows and doors
	SOURCE OF SUPPLY PLANT
313	Lake, River and Other Intakes
	- Clearing land - Conduits - Cribs - Fences - Gate houses and equipment - Intake pipes - Intake wells - Screens and racks

Account Number	Description
314	Wells and Springs
	- Wells, casings and appurtenances - Collecting pipes - Fences - Landscaping
316	Supply Mains
	- Meters and meter houses - Pipes, aqueducts or conduits - Placing mains and accessories - Shut-offs - Trenching - Valves and appurtenances - Valve vaults
	PUMPING PLANT
323	Other Power Production Equipment
	- Diesel engines - Generators - Electric transformers and switching equipment
325	Electric Pumping Equipment
	- Motors - Pumps - Piping - Electric equipment - Recorders and gauges
326	Diesel Pumping Equipment
	- Engines - Pumps - Piping - Recorders and gauges
	WATER TREATMENT PLANT
332	Water Treatment Equipment
	- Aerators - Chemical treating plant . Agitating equipment . Chemical pumps . Chemical handling equipment . Chlorine machines . Gauges . Motors . Piping and valves . Rate controllers . Sludge pumps

Account Number	Description
	- Clear water basin . Basin . Gauges . Piping systems, including valves - Filter plant . Filters . Gauges . Piping system, including valves . Substructures . Valve control tables . Valve operating mechanism . Wash troughs . Wash water pumps . Wash water tanks - Mixing chambers . Piping system, including valves . Chambers . Mechanical mixers - Sedimentation or coagulation basin . Basins . Coagulant storage tanks . Feeder equipment . Mechanical mixers . Piping system, including valves . Screens and hoists . Sludge removal apparatus
	TRANSMISSION AND DISTRIBUTION PLANT
342	Distribution Reservoirs
	- Aerators - Foundations - Gates and gate houses - Landscaping - Lighting systems - Rust-proofing apparatus - Superstructures - Tanks - Towers - Valves and appurtenances - Valve vaults and houses - Water level control apparatus
343	Transmission and Distribution Mains
	- Pipes - Placing mains and accessories - Pressure regulators - Shut-offs - Sterilizing new mains - Surge tanks - Trenching - Valves and appurtenances - Valve vaults

Account Number	Description
345	Services
	- Corporation stops or tees - Gate valves and boxes - Goose necks - Pavement cutting and replacing - Pipes - Placing pipes and accessories - Service or curb boxes and stops - Tapping main
346	Meters
	- Meters - Remote meter registers
347	Meter Installations
	- Installation labor - Meter coupling - Meter yokes - Meter fittings and connections - Meter vaults or boxes
348	Hydrants
	- Connections to main - Excavation and backfill - Hydrants and fittings - Pipe including leads and drains - Tee at main - Valves and valve boxes
	GENERAL PLANT
391	Office Furniture and Equipment
	- Book cases and shelves - Desks and chairs - Drafting room equipment - Electronic data processing equipment - Filing, storage, and other cabinets - Mechanical office equipment such as calculators and typewriters - Tables
392	Transportation Equipment
	- Automobiles - Bicycles - Electrical vehicles - Trucks - Motorcycles - Tractors and trailers

Account Number	Description
393	Stores Equipment

- Counters
- Cranes
- Hoists
- Lockers
- Scales
- Shelving
- Storage bins
- Trucks, hand and power driven
- Wheelbarrows

394 Tools, Shop and Garage Equipment

- Air compressors
- Automobile repair shop equipment
- Battery charging equipment
- Concrete mixers
- Drill presses
- Derricks
- Electric equipment
- Engines
- Forges
- Furnaces
- Gasoline pumps, oil pumps and storage tanks
- Greasing tools and equipment
- Hand tools
- Ladders
- Lathes
- Machine tools
- Motor driven tools
- Motors
- Pipe threading and cutting tools
- Pneumatic tools
- Tools racks
- Vises
- Welding apparatus
- Work benches

395 Laboratory Equipment

- Autoclaves
- Barometers
- Centrifuge
- Distilling apparatus
- Furnaces
- Microscopes
- Ovens
- Pitometers
- Refrigirators
- Scales
- Sterilizers
- Testing machines
- Thermometers
- Voltmeters

Account Number	Description
396	Power Operated Equipment - Air compressors - Bulldozers - Cranes and hoists - Diggers - Engines - Pipe cleaning machines - Pipe coating or wrapping machines - Tractors, crawler type - Trenching machines
397	Communication Equipment - Antennae - Distribution boards - Handsets - Intercommunicating sets - Operators desks - Poles and fixtures - Radio transmitting and receiving sets - Sending keys - Storage batteries - Switchboards - Telephone and telegraph circuits - Testing instruments - Towers - Underground conduit

Reference: Uniform System of Accounts for Class A and B Water Utilities, NARUC, Washington, D.C., 1976

TABLE 2.4

TYPICAL SEWERAGE UTILITY ACCOUNT COMPONENTS

Account Number	Description
Various	Land and Land Rights - Bulkheads - Cost of acquisition - Fees, commissions, and salaries to brokers and agents - Removing, relocating, or reconstructing property of others - Special assessments for public improvements such as new roads, new bridges, new sewers, new curbing, new pavements - Surveys
Various	Structures and Improvements - Architect's plans - Machinery for lighting, and air conditioning - Plumbing - Docks - Drainage and sewerage systems - Elevators, cranes, hoists - Excavation - Fences and fence curbs - Floors - Floor covering - Foundations - Grading and clearing - Landscaping - Lighting fixtures - Painting - Paving, within the property lines - Roofs - Sewer systems - Sidewalks, culverts and curbs - Sump pumps and pits - Storage facilities - Structural system - Walls - Windows and doors
	COLLECTION PLANT
352	Collection Sewers - Collection Sewers-Force . Sewers used to lift sewage from a low elevation to a higher elevation . Pipe between the discharge outlet of the lift station and the receiving manhole

Account Number	Description
	- Collection Sewers-Gravity . Gravity collecting sewers . Interceptor sewers . Branch sewers . Trunk sewers . Lateral sewers . Service wye . Manholes . Lampholes - Special Collecting Structures . Inverted siphon . Other special designed structures . Jointing and jointing material . Manhole or clean-out . Pavement cutting and replacement . Tapping saddle
	PUMPING PLANT
362	Receiving Wells
	- Wells at pumping stations or at other junction points - Screening - Chemical feed apparatus - Holding basins
363	Electric Pumping Equipment
	- Motors for driving pumps - Pumps - Sewage piping within station, including valves - Electric power lines and switching - Foundations, frames, and bed plates
364	Diesel Pumping Equipment
	- Engines for driving pumps - Pumps - Sewage piping within station, including valves
	TREATMENT AND DISPOSAL PLANT
372	Treatment and Disposal Equipment
	- Aeration Chambers . Air blower . Diffuser . Piping system, including valves . Substructures . Basin

Account Number	Description
	- Chemical Equipment . Feeder . Handling equipment . Pump, motor and electrical, etc., appurtenances . Mixer - Trickling Filter . Basin . Bed material . Distributer system . Pump, motor and electrical equipment . Underdrain system - Imhoff Tank - Oxidation pond or lagoon . Inlet facilities . Effluent or outlet facilities - Sedimentation equipment . Basin or clarifier . Detritus tank . Drive unit . Grit chamber . Scraping apparatus . Sludge or scum well - Screen unit . Chamber or basin . Drive unit . Scrapers . Screens - Sludge system . Drying bed or lagoon . Heat exchanger . Compressor . Digestor . Dryer . Pumps, motors, appurtenances
373	Plant Sewers - Yard piping . Valves and vaults . Pipe tunnels or galleries
374	Outfall Sewer Line - Sewer line carrying effluent from treatment facility to point of discharge

Account Number	Description
	GENERAL PLANT
391	Office Furniture and Equipment
	- Book cases and shelves - Desks and chairs, and desk equipment - Drafting room equipment - Filing, storage, and other cabinets - Mechanical office equipment - Tables - Electronic data processing equipment
392	Transportation Equipment
	- Automobiles - Bicycles - Motor trucks - Motorcycles - Tractors and trailers - Other transportation vehicles - Counters - Elevating and stacking equipment - Hoists - Lockers - Scales - Shelving - Storage bins - Trucks, hand and power driven - Wheelbarrows
394	Tools, Shop and Garage Equipment
	- Air compressors - Anvils - Automobile repair shop equipment - Battery charging equipment - Belts, shafts, and countershafts - Cable pulling equipment - Concrete mixers - Drill presses - Forges - Furnaces - Gasoline pumps - Greasing tools and equipment - Hoists - Ladders - Lathes - Machine tools - Motor driven tools - Pipe threading and cutting tools - Pneumatic tools - Smithing equipment - Tool racks - Vises - Welding apparatus - Work benches

Account Number	Description
395	Laboratory Equipment - Autoclaves - P H Meter - Centrifuge - Distilling apparatus - Microscopes - Ovens - Refrigerators - Scales - Sterilizers - Timing equipment - Testing machines - Thermometers
396	Power Operated Equipment - Air compressors - Back filling machines - Boring machines - Buldozers - Cranes and hoists - Diggers - Pile drivers - Pipe cleaning machines - Tractors - crawler type - Trenchers
397	Communication Equipment - Antennae - Distribution boards - Intercommunicating sets - Radio transmitting and receiving sets - Switchboards - Telephone and telegraph circuits
399	Other Tangible Property - Hospital and infirmary equipment - Kitchen equipment - Recreation equipment - Operator's cottage furnishings - Other miscellaneous equipment

Reference: Uniform System of Accounts for Class A and B Sewer Utilities, NARUC, Washington D.C., 1976

TABLE 2.5

CONSOLIDATION OF WATER UTILITY PLANT ACCOUNTS

Account Number	
* 111	Land
310	Source of Supply Land
320	Pumping Land
330	Treatment Land
340	Transmission and Distribution Land
389	General Land
* 112	Buildings
311	Source of Supply Structures
321	Pumping Structures
331	Treatment Structures
341	Transmission and Distrubution Structures
390	General Structures
* 113	Machinery
313	River Intakes
314	Wells
316	Supply Mains
323	Power Production Equipment
325	Electric Pumping Equipment
326	Diesel Pumping Equipment
332	Water Treatment Equipment
342	Distribution Reservoirs
343	Transmission and Distribution Mains
345	Services
346	Meters
347	Meter Installations
348	Hydrants
* 114	Means of Transport
392	Transportation Equipment
396	Power Operated Equipment
* 115	Loose Tools and Meters
393	Stores Equipment
394	Tools, Shop and Garage Equipment
* 116	Furniture
391	Office Furniture and Equipment
395	Laboratory Equipment
397	Communications Equipment
398	Miscellaneous Equipment

* Account and Number Prescribed by the Egyptian Uniform System of Accounts

TABLE 2.6

CONSOLIDATION OF SEWERAGE UTILITY PLANT ACCOUNTS

Account Number		
* 111		Land
	350	Collection Land
	360	Pumping Land
	370	Treatment and Disposal Land
	389	General Land
* 112		Buildings
	351	Collection Structures
	361	Pumping Structures
	371	Treatment and Disposal Structures
	390	General Structures
* 113		Machinery
	352	Collection Sewers
	353	Services to Customer
	354	Flow Measuring Devices
	356	Other Collection Plant
	362	Receiving Wells
	363	Electric Pumping Equipment
	364	Diesel Pumping Equipment
	365	Other Pumping Equipment
	372	Treatment and Disposal Equipment
	373	Plant Sewers
	374	Outfall Sewers
* 114		Means of Transport
	392	Transportation Equipment
	396	Power Operated Equipment
* 115		Loose Tools and Meters
	393	Stores Equipment
	394	Tools, Shop and Garage Equipment
* 116		Furniture
	391	Office Furniture and Equipment
	395	Laboratory Equipment
	397	Communication Equipment
	399	Other Tangible Property

* Account and Number Prescribed by the Egyptian Uniform System of Accounts

3.0 INVENTORY

A detailed inventory of Utility Plant in Service for the water systems located in Greater Cairo/Helwan, Alexandria, Ismailia, Port Said and Suez is presented in the appendices to this report. The inventory for each location is as follows:

Appendix 1 - Greater Cairo/Helwan Water Utility

Appendix 2 - Greater Cairo/Helwan Sewerage Utility

Appendix 3 - Alexandria Water Utility

Appendix 4 - Alexandria Sewerage Utility

Appendix 5 - Ismailia Water and Sewerage Utility

Appendix 6 - Port Said Water and Sewage Utility

Appendix 7 - Suez Water and Sewerage Utility

3.1 SOURCE OF INFORMATION

The data presented in the Appendices was obtained from:

- Records of GOGCWS, AWGA, SCA and GOSSD.
- Reports by other consultants.
- Field investigation by BVI-ATK Associates personnel.

3.1.1 Records of Agencies

Records provided by GOGCWS, AWGA, SCA and GOSSD consisted of historical financial information, drawings, plans and maps.

3.1.1.1 GOGCWS. Property records provided by GOGCWS included:

- Inventory, original cost, and date of installation as of December 31, 1970 broken down by individual plant component.
- Summary of the cost of additions by year from July 1, 1970 to December 31, 1978 by plant account shown in Section 2.1.
- Cost data for selected components of utility plant.
- Maps, drawings and specifications for various types of property.

The number of units of some types of property installed since 1970 was made available.

3.1.1.2 AWGA. Property records provided by AWGA included:

- Inventory and valuation report - 1970.
- Inventory and valuation report - 1975.
- Summary of the cost of additions by year from 1973 to 1978 by plant account shown in Section 2.1.
- Selected cost data for various plant components.
- Maps, drawings and specifications for various property.

3.1.1.3 SCA. No adequate property accounting records were obtained from the SCA. Data received included:

- Maps, drawings and specifications.
- Tabulated lists and cost of installation of selected property.
- Costs of various work orders covering various periods of time.
- Estimates of value prepared by SCA.

3.1.1.4 GOSSD. Property records provided by GOSSD include:

- Summary of the cost of additions by year from 1972 to 1978.
- Selected cost data for selected components of utility plant.
- Maps, drawings and specifications for various types of property.

3.1.1.5 Governorates. Property records received from the Governorates consisted mainly of oral reports obtained during field inspection. Virtually no property records could be located at the Governorates.

3.1.2 Reports of Other Consultants

The inventories of property contained in the Appendices were principally obtained from reports of other consultants. The following reports were used in preparing the inventories:

- Greater Cairo Waterworks Development Program, Draft Final Report, Waterworks Master Plan, Part I, Immediate Phase, Volume 1, ES-Parsons, June, 1978.
- Greater Cairo Wastewater Project, Draft Master Plan Report, Volume 3, Existing Wastewater Facilities, John Taylor and Sons, Binnie and Partners, December, 1977.
- Helwan Wastewater Master Plan, Final Report Volume 2, Existing Conditions and Design Criteria, E.P.C. 1977-1978.
- Alexandria Waterworks Development Program Preliminary Immediate Phase Waterworks Master Plan Report, Appendices, Camp Dresser and McKee International, Inc. August, 1977.
- Alexandria Wastewater Master Plan Study, Special Report No. 2, Camp Dresser and McKee, April, 1977.

- Ismailia Waterworks and Wastewater Facilities Master Plan, Part 1 Immediate Phase, Draft Final Report, Volume II - Waterworks, Metcalf and Eddy, Inc., November, 1978.

- Port Said Water and Wastewater Master Plan, Part 1, Immediate Phase Draft Final Report and Status Report No. 2, Volume 2, Water Facilities, Hazen and Sawyer, October, 1978.

- Port Said Water and Wastewater Master Plan, Part 1, Immediate Phase Draft Final Report and Status Report No. 2, Volume 3, Wastewater Facilities, Hazen and Sawyer, October, 1978.

- Suez Water and Wastewater Facilities Master Plan, Water Facilities, Volume 2, Draft, Pirnie-Harris International, February, 1979.

- Suez Water and Wastewater Facilities Master Plan, Wastewater Facilities, Volume 2, Draft, Pirnie-Harris International, February, 1979.

3.2 CONFIRMATION OF INVENTORY

Inventory data obtained from the operating agencies and from other consultants was confirmed to the extent deemed necessary. Confirmation was accomplished by:

Field investigation

Record check.

3.2.1 Field Investigation

Every major water and sewerage installation was visited and inspected by one or more members of the Tariff Study Team. Inspection included confirmation of major property units previously identified by others. Where it was considered necessary, detailed examination of equipment was conducted.

The exterior physical condition of property was noted as part of the inspection process. This observed condition was used in conjunction with other relevant information in arriving at current value of utility plant in service.

As a result of the field investigation, certain property units were added to or deleted from the inventories prepared by other consultants. These changes were generally required because of improvements constructed or acquired subsequent to the date of the inventories by others. No inspection was made of distribution mains, sewers, service lines or other below ground properties. No detailed confirmation of these facilities was attempted.

3.2.2 Record Check

No inspection was made of distribution mains, sewers, service lines or other below ground properties. No detailed confirmation of these facilities was attempted. Total units of this type of property reported in the appendices is based on reports of the operating agencies or other consultants.

Tests were made of the reasonableness of these reports. A map take off of the distribution systems was made on a sample basis. This take off was initially instigated as a method of determining average age of the distribution system. It was also used as a test of the reasonableness of the inventory prepared by others.

4.0 VALUATION

The valuation developed in this report should not be considered as a price determination of the value of the water and sewerage systems. Rather they are approximate estimates of the value of major items of utility plant in service. In this section value is computed on:

- Cost at the time of construction, or original cost.
- Reproduction cost.

4.1 HISTORICAL COST RECORDS

A substantial amount of historical cost information is available from the operating utilities. However, none of the utilities maintains an adequate plant property record.

Records obtained from GOGCWS and AWGA and used in this study were limited to:

- GOGCWS
  - Balance sheet account balances.
  - Summary of annual additions shown in annual reports from 1973 to 1978.
  - Inventory and valuation of property at June 30, 1970.
  - Contract documents.
  - Requests for specific costs.

- AWGA
    - Balance sheet account balances.
    - Summaries of annual additions.
    - Reports on revaluation of property.
    - Contract documents.
    - Request for specific costs.

The SCA did not make available any annual reports or other official documents that would permit the identification of investment in utility plant. An informal record was obtained that reported to show annual investment by year. However, this record could not be reconciled with identified units of property and, was therefore, considered of limited value.

A specific request was made for a balance sheet of SCA showing the financial position of the water systems operated by the SCA. No such record was made available.

Neither GOSSD nor the Governorates covered by this study maintain property records. Historical cost records for sewerage utilities used in this study were limited to:

- Summary of annual additions shown in the GOSSD annual reports from 1973 to 1978.
- Contract documents.
- Response to specific requests for costs.

4.1.1 Balance Sheet Accounts

Total book value of GOGCWS and AWGA is recorded in the general books of accounts. It is known that a portion of these values represents a reevaluation of the book costs. Nevertheless, the balance sheet figures provide a reasonable measure for reporting original costs.

It should be noted that neither GOGCWS nor AWGA practise normal retirement accounting. Therefore, the values shown in the balance sheet are probably overstated. This factor was taken into consideration for this report. At the same time, the investment in the distribution system appears to be understated. This is probably a reflection of a substantial amount of mains installed by contribution or before plant values were recorded.

As previously stated, a balance sheet reflecting water utility investment was not available from SCA. SCA did prepare the equivalent of a balance sheet in support of a grant to be received from USAID. However, the values shown in this balance sheet could not be confirmed.

No balance sheet records were available from GOSSD or the Governorates.

4.1.2 Annual Additions

In the annual reports of GOGCWS and AWGA the cost of additions constructed during the year were recorded.

In some cases this included a description of the property. However, in most cases only total money investments were shown making a comparison of units and location difficult. Available information on annual additions of the SCA appeared to be fragmentary. It was not supported by a balance sheet or annual report.

GOSSD is responsible for the construction of sewerage utility properties in the cities covered by this study. The cost of improvements in the five cities is shown in the GOSSD annual report. However, units of property are not identified with cost and reconciliation was impossible.

4.1.3 Inventory and Valuation Studies

GOGCWS and AWGA have had valuation studies. No such studies were located for SCA, GOSSD or the Governorates. These studies were particularly helpful in establishing the description and age of properties. They also served to simplify property classification.

Normally, utility plant in service is shown on the balance sheet at cost. The revaluations result in overstating the value of utility plant in service. This factor was recognized in the preparation of this report. It was felt that the effect of the recomputed book value would have little significance in the near future. The magnitude of future improvements will quickly dilute the values currently shown on the utilities' books.

4.1.3.1 GOGCWS. A detailed inventory was prepared by GOGCWS as of June 30, 1970. This inventory listed the cost of most property units installed up to that date. Estimates were apparently made of the cost of some very old properties. This record was used as the principal source of cost estimates for the Greater Cairo/Helwan water systems.

4.1.3.2 AWGA. Periodically AWGA has revalued its investment in utility plant. Data concerning those revaluations was used where appropriate.

4.1.4 Contract Documents

In limited cases, copies of contracts were made available for determining original cost. The availability of other records made the use of this source of information unnecessary in most cases. Original cost data for some sewerage facilities in the Suez Canal cities was obtained by extracting costs and units from contracts. Contract summaries were not generally available or were incomplete.

4.1.5 Request for Cost Data

Requests were made of GOGCWS, AWGA, SCA and GOSSD for the cost of construction of certain specific units of property. This information was to be used in developing trends in costs. Only limited data was obtained through this source.

4.2 ESTIMATED COST OF CONSTRUCTION

Adequate records of the original cost of facilities when they were first dedicated to public use are limited. It was not considered practical to try to obtain a complete record of original costs. Therefore, estimates of cost were developed to supplement the historical record. These estimates were based on:

- The cost of similar property installed elsewhere.
- Trending of cost of known property.
- Construction cost data developed by other consultants.

4.2.1 Cost of Similar Property

In all water and sewerage systems some property unit installations are duplicated. When the duplicated unit was installed in the same year, a reasonable assumption is that the two units cost about the same amount to install.

In some cases the unit with the unknown cost will have similar but not exact characteristics with a unit with a known cost. Where this occurs the estimated cost can be interpolated from known data.

4.2.2 Trended Cost

The use of trends or indexes to measure cost is an acceptable means to develop cost or value. To use trends it is necessary to:

- Establish a base year.
- Determine the ratio the index in other years bears to the base year.

- Apply the appropriate ratio to the cost of property constructed in a known year.

These steps permit the changing, upward or downward of the known cost of a property unit. The result is an estimated cost of a similar unit which was constructed in a different year.

The system of trending requires the development of an acceptable index. No historical index exists for water or sewerage system property in Egypt. For purposes of this study three existing indexes were considered:

- The consumers price index reported in International Financial Statistics, Volume XXXI, Number 12, Egypt.
- The wholesale price index reported in the same publication.
- The construction price index included in the Report "Immediate Action Proposals for Housing in Egypt," June, 1976.

The consumer price index was rejected as not appropriate to water construction. The other two indexes were compared and a composite index developed. The composite index includes a weighting of the material index and the labor index, with the material index weighted substantially heavier than the labor index.

The available data covered the period 1960 to 1974. The wholesale price index was used as a basis for projecting the construction price index through 1978. An arbitrary backward projection was made for the index from 1960 to 1955 to merely reflect some change. The composite index developed for this study is shown in Table 4.1.

Trend factors for 1955 are used for periods prior to that year which results in overstating the original cost of old properties. This method is not considered to have a significant impact on the values used in developing utility basis tariffs.

4.2.3 Consultants' Cost Data

Estimated costs of construction are contained in various master plan reports prepared by other consultants. When costs could not be established by one of the methods previously discussed, estimates from the master plans were used. Where appropriate they served as a basis for the development of reproduction cost which was then back trended to arrive at estimates of original cost.

4.3 REPRODUCTION COST

Section 5.4.4 of Appendix I to the contract for this study provides for the preparation of two estimates of value of the property "currently in use" by the operating utility. One shall reflect cost at time of construction. The other shall be an estimate of current replacement cost. For purposes of this report, the term Reproduction Cost is used in lieu of the term Replacement Cost.

"Reproduction cost of a property is the estimated cost of reproducing substantially the identical property at a price level as of the data specified - - - Replacement cost of a property is the estimated cost of replacing the service of the existing property by another property,

of any type to achieve the most economical or preferred service, but at prices as of the date specified", (Marston, Winfrey, Hampstead, Engineering Valuation and Depreciation, Ames, Iowa, 1953, p9.)

Reproduction cost of the water and sewerage utility facilities covered by this report has been computed in three ways:

- Trending original cost.
- Developing current unit costs.
- Using construction cost data developed by other consultants.

4.3.1 Trended Reproduction Cost

The object and result of trending is to restate original cost, through the use of indexes, at present levels of construction cost. To make this determination requires a record of original cost and knowledge of the age of property.

Section 4.2.2. contains a discussion of the use of indexes to determine estimated original cost. The methods used for that purpose are also used to develop reproduction cost. The difference between the two methods is that in determining reproduction cost, known original cost is trended forward to 1978 price levels. In determining estimated original cost, a known cost is trended forward or back to the year of construction.

4.3.2 Unit Cost

Reproduction cost may be determined by developing unit costs. The unit cost method may be applied in valuing mass properties such as water distribution systems. The unit cost method may also be used in determining the cost of structures and improvements. Only limited use has been made of the unit cost method.

4.3.3 Consultants' Cost Data

In each of the master plan studies, construction cost estimates were developed. These estimates were normally presented in the form of curves indicating cost levels for various sized properties. Analysis was made of these curves to determine whether or not estimates of like properties had been computed in approximately the same manner by the various consultants. Values developed by other consultants were also adjusted for estimated inflation from the date the estimates were made.

When value could not be obtained by one of the other methods the cost new, based upon known capacities of existing facilities, was obtained by the application of the accepted curves. This cost was then adjusted to reflect known conditions in the existing plants.

4.4 REPRODUCTION COST LESS DEPRECIATION

The principles upon which depreciation accounting and the establishment of depreciation reserves are based are set forth in Sections 5.0 and 6.0 Of this report.

The principles have been applied to the values established in this section to arrive at "Reproduction Cost Less Depreciation".

Normally, reproduction cost is adjusted to show the effects of depreciation. A more meaningful and accurate interpretation of value is achieved when the value of property is adjusted to include all factors affecting the future useful life of the property.

One use of property values, based upon reproduction cost, is to determine the amount of allowable return for tariff purposes. Obviously, it would be erroneous to include in this value the replacement cost new of property which is nearing the end of its economic life.

Reproduction cost developed for this study has been adjusted to reflect the estimated remaining service life of the various property units. In addition the functional capabilities of the various properties has been considered. Where properties can no longer effectively meet the design criteria, an allowance for functional depreciation has also been added to the normal loss in value.

4.5 SUMMARY OF VALUATION STUDIES

A summary of the approximate estimates of cost at time of construction (OC), current reproduction cost (RC) and current reproduction cost less depreciation (RCLD)

of facilities in Cairo/Helwan, Alexandria, Ismailia, Port Said and Suez is contained in the Appendices to this Report. The values shown for each utility represent a reasonable estimate of the values of the property currently in use.

TABLE 4.1

TREND FACTOR FOR PRICING
UTILITY PLANT IN SERVICE

	Estimated Construction Cost Index[a]	Trend Factor 1978 to Prior Years	Trend Factor Prior Years to 1978
Before 1956		20	5.00
1956		21	4.95
57		21	4.90
58		21	4.85
59		21	4.80
60		21	4.75
1961	1.00	22	4.61
62	1.06	23	4.35
63	1.17	25	3.94
64	1.30	28	3.55
65	1.35	29	3.41
1966	1.48	32	3.11
67	1.62	35	2.85
68	1.66	35	2.78
69	1.70	37	2.71
70	1.78	39	2.59
1971	1.86	40	2.48
72	2.00	43	2.31
73	2.22	48	2.08
74	3.15	68	1.46
75	3.39	74	1.36
1976	3.65	79	1.26
77	4.00	87	1.15
78	4.61	1.00	1.00

(a) Immediate Action Proposals for Housing in Egypt, MOHR, MOP, USAID, June, 1976 Page 73. 1961-1974 from Table VI, weighted between labor and material. 1975-1978 interpolated using wholesale price index as a guide. Prior to 1961 estimated.

5.0 DEPRECIATION ACCOUNTING

Depreciation accounting for water and sewerage utilities involves procedures whereby the original cost of tangible property, less net salvage value is distributed over the estimated useful life of the property in an orderly and rational manner.

5.1 GENERAL

Depreciation can be defined as follows:

> Depreciation, as applied to depreciable utility plant is the loss in service value not restored by current maintenance due to all factors causing the ultimate retirement of the property. The causes of depreciation may be classified as wear and tear, sudden physical damage, physical decrepitude, obsolescence, inadequacy, and supersession prior to elapse of useful life.

Several terms require definition:

- "Service value" means the difference between original cost and net salvage value.
- "Original cost" means the cost to construct, purchase or otherwise acquire property when it is first placed in service.
- "Net salvage value" means the amount received for property retired, less the cost of removal or any other expenses of retirement.
- "Property retired" means property which has been removed, abandoned, destroyed, sold or otherwise removed from service.
- "Service life" means the time from date the property is first used and the date of its retirement.

Depreciation is an economic fact. It is a cost directly related to providing utility service. Depreciation occurs because properties wear out. The rate of deterioration is affected by use of the property, decay, and corrosion. The rate of deterioration is also affected by the degree of maintenance property receives.

Another factor which bears on depreciation is functional use of the property. An under sized facility that must be replaced because it no longer meets demands is the victim of functional depreciation even though it is actually usable at the time it is replaced.

5.2 EXISTING DEPRECIATION PRACTISES

Rules for depreciating property have been established under the Egyptian Standardized Accounting System. These rules provide for:

- Depreciating the cost of new property at a designated rate.
- Depreciating the cost of acquiring used property at 150 percent of the rate that would be used if the property were new.
- Depreciation rates should cover the normal obsolescence expected.
- Depreciation charges should be computed quarterly.
- Depreciation shall be computed at 50 percent of the rate used when property was acquired after the property is fully depreciated.

5.2.1 Evaluation of Existing Depreciation Practises

The methods of computing depreciation enumerated above are unnecessarily complicated. They serve no useful

purpose when applied to any of the water or sewerage utilities covered by this report.

5.2.1.1 Depreciation of used property. Depreciating used property at rates that vary from that used for new property is an unnecessary and complicated procedure. It requires multiple records that serve no useful purpose. As will be discussed in Section 5.3, depreciation in a water or sewerage utility should be based on average life of related property.

5.2.1.2 Computing depreciation quarterly. The Egyptian Standardized Accounting System requires that depreciation be computed quarterly. It further requires that if property is not used during the quarter, the rate of depreciation will be reduced to 50 percent of the standard rate.

This method is impractical. It requires a reporting system that is beyond the capability of any water or sewerage utility in Egypt. With the thousands of units of property in a water or sewerage system, only a sophisticated, highly computerized property accounting system can meet this objective. Such systems do not exist in Egypt.

5.2.1.3 Continuing depreciation. The practise of continuing to depreciate fully depreciated property is based on the misconception that accumulating depreciation expenses is for the purpose of accumulating funds for the replacement of property. This is not necessarily so. If funds are in fact recovered they can be used for any

purpose unless there is a firm commitment to deposit them in restricted bank accounts. In addition, regardless of the amount of annual depreciation expense, unless rates are adequate for the purpose, no funds will be accumulated at all. Rates charged by the water utilities covered by this report presently are inadequate for wages, materials and services. No revenues from tariffs are received by the sewerage utilities. No operating revenues can be accumulated from depreciation by any of the water or sewerage utilities.

5.3 ANNUAL DEPRECIATION

The purpose of computing an annual depreciation expense is to charge an annual loss in investment in depreciable property to the expense of operations. The straight-line method is commonly employed by utilities to compute annual depreciation expense. This method assigns a given annual percentage rate to be charged against the total investment amount. The annual percentage rate is based upon amortizing the investment over the expected service life of the property. For example, if an investment is made in depreciable property which is expected to have a total useful service life of 5 years, the annual percentage rate based upon straight-line amortization would be 20 percent. This rate applied annually to the original investment will determine the annual amount to be charged as depreciation expense to the costs of operation.

The amounts charged annually for depreciation expense are accumulated and accounted for in a liability account entitled Accumulated Provision for Depreciation or Reserve for Depreciation. The amount accumulated in this account reflects the amount of the gross investment in property assets that has been charged to annual expenses and, theoretically, recovered from the operations. The total gross investment less the depreciation reserve equals the amount of investment remaining.

Two methods are normally used to compute annual depreciation expense for a water utility, one method applies to unit property and a second method to mass property.

5.3.1 Unit Property

The annual depreciation expense for an individual unit property is computed on the basis that the original investment in the asset is amortized over its expected service life. To illustrate, the following shows the computation of the annual depreciation expense for such an asset, which is assumed to represent an investment of LE 1,000 and to have an expected service life of 5 years:

ANNUAL DEPRECIATION EXPENSE

Year	Gross Investment LE	Depreciation Expense: Annual Rate %	Depreciation Expense: Amount Charged LE
1	1,000	20	200
2	1,000	20	200
3	1,000	20	200
4	1,000	20	200
5	1,000	20	200

The annual rate of 20 percent is applied each year to the gross investment of LE 1,000 to determine the annual depreciation expense of LE 200. As shown, this computation is made for each of the 5 years of service life resulting in a total depreciation expense charged during the period of LE 1,000, the original amount.

The following shows the procedure followed in accounting for, or recording, the Depreciation Reserve for this property unit:

ACCUMULATED PROVISION FOR DEPRECIATION*

Year	Balance Beginning of Year LE	Depreciation Expense Charged During Year LE	Balance End of Year LE
1	0	200	200
2	200	200	400
3	400	200	600
4	600	200	800
5	800	200	1,000

* Or Reserve for Depreciation

The annual depreciation expense is added to the Reserve for Depreciation each year and accumulates over the service life of the asset. At the end of the service life when the asset is retired, the balance accumulated should equal the asset being retired, thereby showing full recovery of the original investment. In the example above, LE 1,000 was accumulated over the five years.

5.3.2 Group Property

The annual depreciation expense for a group property of many similar property items, such as meters of pipe,

is also computed on a straight-line basis. However, there is a difference between unit and group property depreciation in that a group of property will have individual units within the group which will have a different service life than other units in the group.

For example, three pieces of pipe may be installed at a given time and be expected to have an average service life of 40 years. Of these three pieces, one piece survives only 30 years; another lasts the predicted service life of 40 years; and the third piece survives for 50 years before it is taken out of service. If each unit were considered separately, three separate rates for annual depreciation expense with individual accounting records for each unit, or piece of pipe, would be required. Such a method is unwieldy. It is not economically feasible to maintain such extensive records. Hence depreciation expense is normally computed on the basis of the average expected service life for the properties as a group. In this example for the three pieces of pipe, the average service life would be 40 years for the property group and the annual depreciation expense rate would be 2.50 percent.

The use of group property depreciation accounting requires that retirement accounting be followed for the property units within the group if amounts shown on the books for gross plant investment, depreciation expense, accumulated balance, and net plant investment are to be reflected accurately over the life of the property.

Table 5.1, shows the accounting procedures for computing and recording annual depreciation expense for a group property with retirement accounting. In this simplified example, it is assumed that the initial investment is LE 1,000 for the property group, and that a uniform retirement pattern is realized for the units within the group amounting to LE 100 annually. Based upon the assumed retirement pattern, this property, as a group when new, has an average service life of 5 years, indicating an annual depreciation rate of 20 percent. It can be seen that the application of the average group rate of 20 percent applied to the gross plant investment for surviving properties each year will, over the entire life of the property group, return LE 1,000, the original amount invested.

Table 5.2 also shows the Accumulated Provision for Depreciation. The depreciation expense is added during each year to the preceding balance which is reduced by the amount of the investment retired during the period. At the time the last unit is retired from service the depreciation reserve balance is zero, indicating that the proper amount has been charged to depreciation expense during the period to amortize the original investment in the property group over the average service life of the property units within the original group.

5.4 ACCOUNTING FOR RETIREMENTS

The illustration set forth in Section 5.3.2 above demonstrates the need to practise retirement accounting. In retirement accounting, water and sewerage utility property is divided between retirement units of property and minor items of property.

5.4.1 Accounting for Retirement Units

When a retirement unit is added to the utility plant, the cost is added to the appropriate utility plant account. When a retirement unit is retired from utility plant, with or without replacement, the book cost is credited to the utility plant account in which it is included and charged to the reserve for depreciation applicable to such property. The cost of removal and salvage is charged or credited, as appropriate, to the depreciation reserve account.

5.4.2 Accounting for Minor Items

Frequently the initial cost of minor items of property will be capitalized and entered in the property records. Normally when this occurs, subsequent purchases are treated as operating expenses. Retirements are normally disregarded, unless the total assets originally purchased are completely abandoned.

Items such as small tools, shovels, laboratory glassware and small items of office equipment fall into the minor item category.

5.5 ALTERNATIVE DEPRECIATION METHODS

The straight line method of depreciation recommended in this report is considered the best system to be used by the water and sewerage utilities. It is easily understood, relatively simple to apply, and results in reasonable expense related to providing of water service.

Alternative methods of depreciation exist. Under special conditions each meets the requirements of the using agency. Some alternates include:

- Depreciation based on use
- Compound interest method
- Sinking fund method
- Sum of the digits method
- Double declining balance method.

Depreciation based on use involves some of the practices used in Egypt and discussed in Section 5.2. It requires records of units produced, hours operated or similar parameters. The compound interest method assumes that depreciation in a given period will equal the increase in value of a sinking fund established for the service life of an asset. The sinking fund method is similar but is based on the amount of an annuity that would be accumulated by investing a fixed amount each year.

The sum of the digits method provides for accelerated depreciation in the early years of the property. It is designed as a method to minimize income taxes. Regulated utilities that use this method for tax

purposes are normally required to normalize depreciation expense to the straight line method for rate purposes.

The double declining balance method is another means of increasing expense in the early years of the life of property. Where used by utilities it also is generally normalized for rate purposes.

None of the alternative methods discussed above, or methods not mentioned are recommended for use by the water and sewerage utilities covered by this study.

TABLE 5.1

ANNUAL DEPRECIATION EXPENSE

Year	Gross Plant Investment at Beginning of Year LE	Plant Investment Retired During Year LE	Gross Plant Investment at End of Year LE	Average Plant Investment During Year LE	Annual Depreciation Expense Rate %	Annual Depreciation Expense Amount LE
1	1,000	100	900	950	20	190
2	900	100	800	850	20	170
3	800	100	700	750	20	150
4	700	100	600	650	20	130
5	600	100	500	550	20	110
6	500	100	400	450	20	90
7	400	100	300	350	20	70
8	300	100	200	250	20	50
9	200	100	100	150	20	30
10	100	100	0	50	20	10
		1,000				1,000

TABLE 5.2

ACCUMULATED PROVISION FOR DEPRECIATION*

Year	Balance at Beginning Year LE	Depreciation Expense Charged During Year LE	Reserve Used To Offset Retirements LE	Balance at End of Year LE
1	0	190	(100)	90
2	90	170	(100)	160
3	160	150	(100)	210
4	210	130	(100)	240
5	240	110	(100)	250
6	250	90	(100)	240
7	240	70	(100)	210
8	210	50	(100)	160
9	160	30	(100)	90
10	90	10	(100)	0
		1,000	(1,000)	

(Negative Amount)

* or Reserve for Depreciation

6.0 DEPRECIATION RATES AND RESERVES

The concepts used in developing depreciation rates and reserves are discussed in the foregoing Section 5.0. This section considers the actual rates and reserves that are applicable to properties of GOGCWS, AWGA, SCA, GOSSD and the Governorates.

6.1 EXISTING RATES OF DEPRECIATION

Existing rates of depreciation for utilities are prescribed by the Egyptian Standardized Accounting System. The prescribed rates are shown in Table 6.1. Existing rates of depreciation actually used by GOGCWS, AWGA and SCA are shown in Table 6.2.

6.2 RECOMMENDED DEPRECIATION RATES

Annual depreciation rates recommended for water utilities in Egypt were developed from estimated service lives of property. Estimated service lives may be determined statistically, by comparison with similar property elsewhere and by observation.

None of the operating utilities practice retirement accounting nor have costs identifiable by vintage year of installation. Statistical analysis of the actual life of properties was not possible. Statistical analysis was partially used in the few instances where date of installation was available. In such cases survivor and probable life curves were used to estimate the remaining life of

the properties. These curves were adopted from "Condition-Percent Tables for Depreciation of Unit and Group Properties" Robley, Winfrey, Iowa State College Engineering Experiment Station, Bulletin 156, 1942.

The results obtained from statistical analysis were supplemented by the empirical experience of BVI-ATC Associates, by observed condition of properties and by reports of others. The estimated services lives and recommended rates of depreciation for water utility property are shown in Tables 6.3 and 6.4. Estimated service lives and recommended annual depreciation rates for sewerage utilities are shown in Tables 6.5 and 6.6.

The annual depreciation rates in Tables 6.4 and 6.6 are based on the straight-line method of depreciation. Rates are a composite for certain classifications where service life varies because of size, capacity, or composition. Current composite rates of depreciation applicable to each utility are shown in Tables 5.3 of the Report on Water and Sewerage Tariffs.

It should be recognized that the service lives and rates of depreciation shown in Tables 6.3 to 6.6 are based on estimated average life of properties. Some properties within a classification will last well beyond this estimated life. Others will be retired in just a few years. The recommended lives and depreciation rates are reasonable estimates and should be used until further studies indicate

the need for modification.

6.3 ADJUSTMENT OF DEPRECIATION RATES

The recommended rates of depreciation should be revaluated every two to three years. Rates recommended in Tables 6.4 and 6.6 are based on estimated weighted average values of plant in service at December 31, 1978. As new property is constructed and retirements made, the weighting will change.

6.4 VALUATION DEPRECIATION

A recommended depreciation reserve is discussed in Section 6.5. As indicated, the reserve is expressed in relationship to original cost but was determined by use of remaining life of the property. The remaining life concept was used since an adequate historical cost record was not available.

6.4.1 Accrued Depreciation in Surviving Properties

Accrued depreciation represents an estimated loss in value in the surviving properties. The loss is not based upon length of time the property has been in service. Rather the loss is measured by the expected future usefulness of the property compared with the expected future usefulness if the property were new. This difference is referred to as accrued depreciation in surviving properties.

Factors that were considered in determining the accrued depreciation in surviving properties include:

- Age of the property.
- Adequacy of the facilities for their present use.
- Field observed physical condition.
- Opinion of other consultants.
- Statistical analysis.

6.4.2 Procedure for Computing Accrued Depreciation

In computing accrued depreciation in surviving property, the following procedures are normally followed:

- Establish the value base which is to be adjusted for depreciation.
- Estimate any salvage value.
- Develop year of installation of the property.
- Establish the physical condition of the property for its age.
- Establish its probable future service life.
- Estimate its average service life.
- If vintage or mass property, adopt appropriate life and survivor curves.

This data is converted into percentage factors which are applied to the value base. The result can be expressed as:

- Accrued depreciation in the surviving property or,
- Condition of surviving property expressed as a percentage.

6.4.3 Summary

The difference between reproduction cost and reproduction cost less depreciation expressed as percentage represents the accrued depreciation in surviving properties of the utility systems. In the facilities covered by this report, the values are shown in the Appendices to this report.

6.5 RECOMMENDED DEPRECIATION RESERVES

The depreciation reserves recommended in this section are based upon estimated original cost developed in this report. Normally a depreciation reserve is the sum of:

- Accumulated annual accruals of depreciation expense.
- Less the original cost of property units retired.

Since no record exists of property retirements the accrued depreciation in surviving properties has been used to determine an acceptable level of depreciation reserve, as of December 31, 1978. The recommended depreciation reserves are shown in the Appendices.

It is emphasized that this method does not produce the same results that would be achieved if normal depreciation accounting is practised. The recommended reserves are overstated to the extent that they fail to provide for retirements. Nevertheless, the recommended reserves are considered to be reasonable for establishing a basis for proper depreciation and retirement accounting.

TABLE 6.1

EGYPTIAN STANDARDIZED ACCOUNTING SYSTEM

Rates of Depreciation and Average Service Lives

Details	Rate %	Average Life Years
Water Supply Utility Depreciation Rates		
Water dams	1.00	100
Wells and springs	*	*
Infiltration galleries and tunnels	1.25	80
Collection conduits and reservoirs	1.75	57
Cast iron pipes		
100 mm and less	2.00	50
150 mm	1.50	67
200-250 mm	1.33	75
300 mm	1.00	100
Sedimentation basins	2.50	40
Filters	2.50	40
Steam engines/machines	4.00	25
Internal combustion engines/machines diesel	5.00	20
Pumps	2.50	40
Main pipes	2.50	40
Water gauge	4.00	25
Hydrants	2.50	40
Equipment in general		
Administrative units	6.00	17
Workshops	6.00	17
Warehouses	6.00	17
Laboratory equipment	7.00	14
Sewerage Utility Depreciation Rates		
Sewerage Networks		
Clay pipes	5.00	20
Cast iron pipes	5.00	20
Galvanized pipes	5.00	20
Mechanical Diffusion or Spray Appliances	6.67	15
Trickling Filters	6.67	15
Lift Stations	6.67	15

* Technical estimate

TABLE 6.2

EXISTING RATES OF DEPRECIATION[a]

	GOGCWS %	AWGA %	SCA %
Land	None	None	(b)
Buildings and Structures:			
Buildings	2.5	2.5	
Pipes	3.0	3.0	
Wells	10.0	NA	
Machines:			
Mechanic and Electrical	7.5	7.5-20.0	
Means of Carrying (Transportation)	20.0	20.0	
Tools	6.0	20.0	
Meters	15.0	15.0	
Furniture and Office Equipment	10.0	10.0	

(a) GOSSD does not practise depreciation accounting

(b) Rates of Depreciation used by the Suez Canal Authority were not available.

NA Not applicable

TABLE 6.3

RECOMMENDED SERVICE LIVES OF WATER UTILITY PROPERTY

Account Number		Estimated Average Service Life years
	Source of Supply Plant	
311	Structures and Improvements	50
312	Collecting and Impounding Reservoirs	60
313	River Intakes	60
314	Wells	10
316	Supply Mains	40
	Pumping Plant	
321	Structures and Improvements	50
323	Other Power Production Equipment	35
325	Electric Pumping Equipment	25
326	Diesel Pumping Equipment	33
328	Other Pumping Equipment	25
	Water Treatment Plant	
331	Structures and Improvements	50
332	Water Treatment Equipment	
	Basins	50
	Filters	50
	Mechanical Equipment	20
	Chemical Equipment	10
	Transmission and Distribution Plant	
342	Distribution Reservoirs	50
343	Transmission and Distribution Mains	
	Less than 100 mm	33
	100-300 mm	67
	Over 300 mm	75
345	Services	33
346	Meters	20
348	Hydrants	33
	Fountains	40
	General Plant	
390	Structures and Improvements	50
391	Office Furniture and Equipment	
	Furniture	20
	Equipment	5
393	Stores Equipment	20
394	Tools, Shop and Garage Equipment	10
395	Laboratory Equipment	10
396	Power Operated Equipment	10
398	Miscellaneous Equipment	10

TABLE 6.4

RECOMMENDED ANNUAL WATER UTILITY DEPRECIATION RATES

Account Number		Annual Depreciation %
	Source of Supply Plant	
311	Structures and Improvements	2.00
312	Collecting and Impounding Reservoirs	1.66
313	River Intakes	1.66
314	Wells and Springs	10.00
316	Supply Mains	2.50
	Pumping Plant	
321	Structures and Improvements	2.00
323	Other Power Production Equipment	2.85
325	Electric Pumping Equipment	4.00
326	Diesel Pumping Equipment	3.00
328	Other Pumping Equipment	4.00
	Water Treatment Plant	
331	Structures and Improvements	2.00
332	Water Treatment Equipment	3.00
	Transmission and Distribution Plant	
342	Distribution Reservoirs	2.00
343	Transmission and Distribution Mains	2.00
345	Services	3.00
346	Meters	5.00
348	Hydrants	3.00
	General Plant	
390	Structures and Improvements	2.00
391	Office Furniture and Equipment	12.50
393	Stores Equipment	5.00
394	Tools, Shop and Garage Equipment	10.00
395	Laboratory Equipment	10.00
396	Power Operated Equipment	10.00
398	Miscellaneous Equipment	10.00

TABLE 6.5

RECOMMENDED SERVICE LIVES OF SEWERAGE UTILITY PROPERTY

Account Number		Estimated Average Service Life Years
	Collection Plant	
351	Structures and Improvements	50
352	Collection Sewers	
352.1	Collection Sewers - Force	40
352.2	Collection Sewers - Gravity	
	300 mm and smaller	30
	350 to 1000 mm	40
	Over 1000 mm	50
353	Services to Customers	30
354	Flow Measuring Devices	10
	Pumping Plant	
361	Structures and Improvements	50
362	Receiving Wells	40
363	Electric Pumping Equipment	15
364	Diesel Pumping Equipment	25
365	Other Pumping Equipment	20
	Treatment and Disposal Plant	
371	Structures and Improvements	50
372	Treatment and Disposal Equipment	
	Basins	40
	Lagoons	40
	Drying beds	40
	Mechanical equipment	15
374	Outfall Sewers	40
	General Plant	
390	Structures and Improvements	50
391	Office Furniture and Equipment	
	Furniture	20
	Equipment	5
393	Stores Equipment	20
394	Tools, Shop and Garage Equipment	10
395	Laboratory Equipment	10
396	Power Operated Equipment	10
399	Other Tangible Property	10

TABLE 6.6

RECOMMENDED ANNUAL DEPRECIATION RATES
OF SEWERAGE UTILITY PROPERTY

Account Number		Annual Depreciation %
	Collection Plant	
351	Structures and Improvements	2.0
352	Collection Sewers	
352.1	Collection Sewers - Force	2.5
352.2	Collection Sewers - Gravity	2.5
	300 mm and smaller	
	350 to 1000 mm	
	Over 1000 mm	
353	Services to Customers	3.3
354	Flow Measuring Devices	10.0
	Pumping Plant	
361	Structures and Improvements	2.0
362	Receiving Wells	2.5
363	Electric Pumping Equipment	6.7
364	Diesel Pumping Equipment	4.0
365	Other Pumping Equipment	5.0
	Treatment and Disposal Plant	
371	Structures and Improvements	2.0
372	Treatment and Disposal Equipment	3.0
	Basins	
	Lagoons	
	Drying beds	
	Mechanical equipment	
374	Outfall Sewers	2.5
	General Plant	
390	Structures and Improvements	2.0
391	Office Furniture and Equipment	
	Furniture	5.0
	Equipment	20.0
393	Stores Equipment	5.0
394	Tools, Shop and Garage Equipment	10.0
395	Laboratory Equipment	10.0
396	Power Operated Equipment	10.0
399	Other Tangible Property	10.0

7.0 PROPERTY RECORDS

The basic property records of a water and sewerage utility consist of:

- Balance Sheet accounts.
- Subsidiary accounts.
- Budgetary and operating records.

7.1 BALANCE SHEET ACCOUNTS

Water and sewerage utility plant records are a key aid to management in the performance of its task of planning and controlling investment in utility plant. Property with a life expectancy of more than one year should be accounted for in the utility's property accounts.

The basic control account is the balance sheet account sometimes titled Utility Plant in Service. Other balance sheet accounts covering property owned by the utility include Utility Plant Pending Classification, Construction Work in Progress and Reserve for Depreciation.

The GOGCWS and AWGA include a variation of the above accounts in their records. No data was made available on accounts used by the SCA. GOSSD has no balance sheet property accounts.

7.2 SUBSIDIARY ACCOUNTS

In Section 2.0 of this report is a discussion of account classification under proposed Uniform System of Accounts.

7.2.1 Water Utilities

The five functional classifications for water utilities

- Source of supply
- Pumping
- Treatment
- Transmission and Distribution
- General

make up the base for subsidiary accounting records.

7.2.1.1 Existing Subsidiary Accounts. The GOGCWS and AWGA use the system of subsidiary accounts prescribed by the Egyptian Standardized Accounting System. No record was available of the system used by the SCA.

The system used by GOGCWS and AWGA breaks down total book value to six general balance sheet classifications:

- Land
- Buildings
- Machinery
- Means of Transport
- Loose Tools and Meters
- Furniture

The principal subsidiary record behind these accounts consists of a book in which is entered monthly additions to the accounts. Only cost or value is shown. Units of property are not recorded. No evidence was found of a

perpetual inventory of units of plant property.

7.2.2 Sewerage Utilities

Section 2.0 of this report also contains a discussion of account classifications under a proposed Uniform System of Accounts for Sewer Utilities. The four functional classifications, Collection, Pumping, Treatment and Disposal and General make up the base for subsidiary accounting records under this uniform system.

Sewerage utilities also use the existing system of accounts prescribed by the Egyptian Standardized Accounting System shown in Section 7.2.1.1. However, no accumulation of costs or units is maintained by GOSSD or the Governorates subject to this study.

7.2.3 Proposed Subsidiary Accounts

It is recommended that the property accounting records of water utilities in Egypt be expanded. Property records for the sewerage utilities should be established. The records for water and sewerage utilities should provide a method where the cost of a unit of property can be easily identified with the unit of property. Two methods are discussed here although other methods exist. The first is referred to as secondary or subsidiary accounts. The second is a continuing property record.

7.2.3.1 Secondary account records. Using either the grouping of accounts shown in Tables 2.1 and 2.2

or in Table 2.5 and 2.6 secondary account records can be established. For purposes of this discussion, primary accounts consist of the classifications listed in Sections 7.2.1 and 7.2.2. Secondary accounts thus include Land, Structures, and the various detailed accounts under each primary classification.

Secondary account records consist of a permanent ledger. A separate page or pages are maintained for each account such as "Water Account 325, Pumping Plant, Electric Pumping Equipment".

All charges for the various elements of Electric Pumping Equipment would be consolidated on this ledger page. When known, the location and brief description of the unit should also be entered.

Similarly all charges to "Sewerage Utility Account 352, Collection Sewers" would be consolidated on a ledger page showing the laying length, size and kind of sewer installed. However, for mass property, location is not normally included.

This system will provide in one place details of the cost of all similar property. Its chief draw back is that costs of plant from a wide variety of locations may be entered on the same ledger, unless the ledger pages are established by location. Also when a number of similar items are installed at various times at one location, identification of the cost of a single unit for retirement

purposes is difficult. It is often necessary to retire average cost or first in-first out cost rather than specific cost.

This draw back is not significant for mass property. A job order system and maps will permit determination of date and cost of installation of mains, sewers or other mass property. However, secondary account records normally show only the total number of units of property, by size and type of material and accumulated cost.

7.2.3.2 Continuing property records. A continuing property record (CPR) is an elaborate and detailed system for matching property units (CPR units) with the cost of that unit. A CPR system provides:

- Tabulation of every CPR unit in the water system.
- Identifying each CPR unit.
- Establishing the cost of every CPR unit.

A CPR unit is normally each retirement unit in the utility system. Retirement units consist of such items as:

- Each building.
- Each pump and each motor.
- Each floculator, clarifier, sedimentation basin, filter, digestor, aerator and sludge bed at each plant.
- Each reservoir.
- Each size and type of main, sewer, services, meters and hydrants.
- Each unit of office furniture and fixtures.

A property record card or ledger is established for each CPR unit. The card contains such complete details as:

- Name, description, and serial number.
- Location.
- From whom, or how, acquired.
- When acquired.
- Cost.
- Estimated service life.
- Estimated salvage value.
- Recorded depreciation unless composite rates of depreciation are used.
- Utility account and identification number.

Although it has not been made available for this study, it is understood that the legal department of GOGCWS maintains the equivalent of a CPR for all land owned by that organization.

7.3 ESTABLISHING PROPERTY RECORDS

Establishment of a Continuing Property Record of existing facilities is presently beyond the capability of any utility subject to this study. The cost of very old property is just not available.

For purposes of establishing suitable detailed property records, the Secondary Account Record system described in Section 7.2.3.1 is recommended.

7.3.1 Existing Property

To establish a record of existing property, each operating water and sewerage utility should use the

inventory and valuation data contained in this report as a point of beginning.

7.3.1.1 Establishing the record. The following procedures are recommended:

- Convert property records to the Uniform System of Accounts shown in Table 2.1 and 2.2.
- Prepare a record card or ledger page for each account. A separate page should be prepared for each major plant or installation location.
- Prepare a record card or ledger page for each size and type of mass property i.e. mains, sewers, services, meters, hydrants.
- Using the inventories in the Appendices to this report, enter units of property by account on the appropriate page.
- Where known, enter original cost on the ledger, identified with the unit of property.
- Include a card or page for units of property, and/or original cost not classified and/or identified.

7.3.1.2 Maintaining the record. To maintain the new record, it will be necessary to:

- Provide for the accounting for improvements to existing property on the record of existing property.
- Assign personnel to research for the cost of property not assigned costs when the system is established.
- Establish a retirement accounting system.

7.3.2 Future Additions, Extensions and Betterments

A true Continuing Property Record can be established for future additions to the existing water systems.

However, this is not considered practical until such time as adequate electronic data processing equipment is available. To account for future additions it is recommended that:

- The existing property accounting systems of each water utility be modified to include a Job or Work Order System for accumulating cost of additions.

- The system outlined in Section 7.3.1 be used for future additions. This will require only the addition of new property cards or ledgers for facilities constructed at new locations.

The work order system can be established by adopting methods and procedures set forth in Sections 2 and 3, of the Report on Management Information Systems and Section 2 of the Report on Procedures and Methods, both issued concurrently herewith.