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Final Report

**MOGADISHU
WATER SUPPLY PROJECT
SOMALI DEMOCRATIC REPUBLIC**

Prepared for
**WATER DEVELOPMENT AGENCY
SOMALI DEMOCRATIC REPUBLIC**

Aid Loan Agreement 649-H-005

Parsons Project Number 4416

March 1974

PARSONS CORPORATION



**LOS ANGELES
NEW YORK**

The Ralph M. Parsons Company

Engineers • Constructors

617 WEST SEVENTH STREET, LOS ANGELES, CALIFORNIA
P. O. BOX 54802, LOS ANGELES, CALIFORNIA 90054

March 11, 1973

Department of State
Agency for International Development
21st and Virginia Ave., N. W.
Washington, D. C. 20523

ATTENTION of Mr. Jerry Knoll, Director AFR/ESA

SUBJECT Mogadishu Water System
 Final Report
 Our Job No. 4416-1

REFERENCE AID Loan 649-H-005

Gentlemen:

In compliance with Section II, Guidelines for Preparing Final Reports, as set forth in AID-1260-1, transmitted herewith are five copies of a Final Report for the Mogadishu Water System Project.

The Water Development Agency, now known as the Mogadishu Water Agency, took Beneficial Occupancy of the project on March 7, 1973. On May 21, 1973, a Completion Report was submitted, covering Phase IV, Final Design of Distribution and Transmission System, and Phase V, Resident Engineering and Construction Inspection. This Final Report is intended to supplement that report.

Inasmuch as the Completion Report covered in detail those items required by the guidelines for the design and construction activities, this Final Report covers the period from March through December 1973, during which period operations and maintenance training services were provided in addition to ongoing procurement and administrative assistance. This supplement also updates all project costs as of the period covered.

The Engineer has completed all contractual requirements; no Engineer personnel remain in Somalia. Because further assistance is beyond the scope of this current contract, the Engineer submits this document as a Final Report with a request for acknowledgment of receipt and acceptability as such.

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THE RALPH M. PARSONS COMPANY

Department of State

-2-

March 11, 1973

Considering the calibre of training and general assistance provided, the number of revenue-producing connections made, and the maintenance shops and service organizations established, it is believed the City of Mogadishu now has a viable public utility that would be a credit to any municipality.

Very truly yours,

PARSONS CORPORATION

BY


P. S. Bennett

Project Director

PSB:lg

Enclosure
As noted



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SECTION 1

INTRODUCTION

On March 7, 1973, the Water Development Agency took Beneficial Occupancy of a completely new municipal water utility, which included supply, transmission, storage, treatment, distribution, and administration and maintenance facilities. Following the termination of construction operations and the departure of supervisory personnel, Parsons Corporation prepared a completion report finalizing all previous work by the Engineer and the several construction contractors, and tabulating the total costs as of March 1973. This supplemental report is necessitated by the continuing services of the Engineer in on-the-job training in maintenance and operation of the entire municipal water system and by the need to update the record of the final project costs.

1.1 PROJECT BACKGROUND

In 1962 the Somali Government asked the U.S. Government for a loan to provide a modern water system for the City of Mogadishu. The United States Agency for International Development (USAID) loan agreement was signed on January 7, 1968. On February 29, 1968, a contract was signed between the Mogadishu Water Agency and Parsons Corporation of Los Angeles, California, whereby Parsons would provide technical assistance and engineering services for the design and construction of a new groundwater supply and distribution system.

For purposes of budgeting and scheduling, the project was divided into five work phases:

- I - Criteria Review and Development Study
- II - Hydrogeologic Study
- III - Construction of First-Stage Production Wells
- IV - Final Design of Distribution and Transmission System
- V - Resident Engineering and Construction Inspection

Implementation Letter No. 1, which became effective as of the date of execution of the loan agreement, provided for management consultant services by a team of experienced U.S. water utility management personnel to assist in establishing and initially operating a water supply utility organization for the City of Mogadishu.

1.2 PREVIOUSLY COMPLETED WORK

Phase I was completed with the presentation and review of a document entitled "Design Criteria, Mogadishu Municipal Water System, Mogadishu Water Agency, Somali Republic, Africa," dated March 7, 1969.



Phase II was completed on October 31, 1969. The results of that investigation were presented in a report entitled "A Final Report, Hydrogeologic Studies, Mogadishu Water Supply Project, Somali Democratic Republic," dated May 15, 1970.

Phase III was completed with the drilling and development of the last production well on October 9, 1970. A final report, entitled "Production Well Construction, Phase III, Mogadishu Water Supply Project," was presented on November 10, 1970.

Phase IV was completed on August 15, 1970. The final design documents consisting of 101 drawings together with some 275 pages of bidding requirements, contract forms, technical specifications, and invitation to bid were mailed to prequalified construction contractors on August 21, 1970.

Phase V was completed on March 7, 1973; on that date the Water Development Agency took Beneficial Occupancy of the project. A final report covering both Phases IV and V was presented on May 21, 1973. This document, entitled "Completion Report, Final Design and Construction, Phases IV & V, Mogadishu Water Supply Project, Somali Democratic Republic," covered all aspects and costs as of March 7, 1973.

The management consulting services required by Implementation Letter No. 1 and covering the establishment of a water utility organization were furnished by others. This report covers the maintenance and operations training phase of that requirement.

1.3 DESCRIPTION OF PROJECT

The facilities designed and constructed under the five work phases included the following components:

- Transmission mains to collect the output of the individual wells and convey it from the well field to storage.
- A treatment facility with chlorine feeding and measuring equipment, chlorine cylinder unloading equipment, and storage areas.
- A distribution system (consisting of area feeder mains, neighborhood networks, public fountains, vendor water points, individual service connections, a diesel generating power source, diesel fuel storage tanks, booster pumps) and related equipment and facilities.
- Administrative and operating facilities (including material storage yards, repair and maintenance shops, quality control equipment, garages) and other necessary facilities, vehicles, equipment, and structures.



1.4 TRAINING PROGRAM

The scope of work for the training program was to furnish two technicians for a period of 18 months. These specialists were to provide on-the-job training of Agency personnel in the maintenance and operation of the entire municipal water system. Specifically, the technicians were to have the following capabilities:

- Technician No. 1 - A water utility engineer specialist in overall system operation. He was to provide training to Agency crews in proper well field scheduling and dispatching, booster station operation, telemetry system operation, service connection procedures, and water meter servicing.
- Technician No. 2 - A field specialist in organizing and training of Agency crews in the maintenance and overhaul of tube well pumps and motors, power plant generators, power distribution, booster pumps, and diesel engine drivers for power plant and booster station.

1.5 CONTRACT AUTHORIZATION

The five-phase water supply project and training program for the City of Mogadishu was authorized by a contract dated February 29, 1968, between the Mogadishu Water Agency and Parsons Corporation. The funding for the contract was provided by USAID under Loan Agreement Number 649-II-005, dated January 7, 1968, between the Governments of the United States of America and the Republic of Somalia (now the Somali Democratic Republic). The basic contract was for \$1,676,000, distributed into two Letters of Credit (L/C) for services and procurement:

Engineer's Services - \$1,100,000 (L/C AID 662-70-C)

Equipment Procurement - \$ 576,000 (L/C AID 662-71-C)

The contract was amended twice in 1972 and once in 1973. Amendment No. 1, dated February 19, 1972, transferred \$100,000 from L/C 662-71-C to L/C 662-70-C to cover the U.S. dollar commitments for the Engineer's services:

Engineer's Services - \$1,200,000 (L/C AID 662-70-C)

Equipment Procurement - \$476,000 (L/C AID 662-71-C)

Amendment No. 2, dated July 10, 1972, provided for the services of two more technicians to furnish on-the-job training in maintenance and operations, provided funds for their salaries, and extended the construction supervisory services to December 31, 1972. It also transferred an additional \$50,000 from equipment procurement to Engineer's services, and increased the engineering services loan by \$263,400:

Engineer's Services - \$1,513,440 (L/C AID 662-70-C)

Equipment Procurement - \$426,000 (L/C AID 662-71-C)



Amendment No. 3, dated January 23, 1973, increased the funding for the Engineer's services by the amount of \$34,596 to provide continuing inspection services occasioned by delay in project construction completion:

Engineering Services - \$1,548,036 (L/C AID 662-70-C)

Equipment Procurement - \$426,000 (L/C AID 662-71-C)

Total amount of contract funding as amended - \$1,974,036

As a result of a requirement for additional purchasing covering items not included in the basic contract or its amendments, Parsons Corporation was issued a Letter of Commitment on May 22, 1972, designated No. 649-H00505, for \$250,000. This direct authorization provided for the purchase of tools, service connection materials, radio communications equipment, telemetry and diesel engine spares, and training simulation material needed by the Water Development Agency to maintain a viable operating facility.

A summary of all project expenditures by letters of credit and the letter of commitment is included in Section 2.

1.6 FINAL REPORT

Implementation Letter No. 6, dated May 25, 1971, states that Parsons Corporation shall submit reports in accordance with Attachment C, Reporting Requirements. Section II, Paragraph E, of the Reporting Requirements states: "On capital requirements where the agreement (Amendment No. 2 Parsons contract) provides for a year or more of technical assistance to the owner in post-construction training, management, operation, and maintenance, a completion report should be submitted when physical construction of the project has been completed and accepted by the Owner. Progress reporting on the technical assistance activities shall continue after submission of the completion report and the final report shall be submitted after the overall project is completed." Since this report covers the technical assistance and additional purchasing activities and updates the total project costs, it is submitted as a Final Report Supplement to the "Completion Report, Final Design and Construction, Phases IV & V," dated May 21, 1973.



SECTION 2

PROJECT GENERAL REPORT

As indicated in Section 1, this report covers the maintenance and operations training activities, updates project costs, and records the activities that followed completion of construction. For a detailed background of the project, complete with maps, drawings, and photographs, see the "Completion Report, Final Design and Construction, Phases IV & V, Mogadishu Water Supply Project," dated May 21, 1973.

2.1 TRAINING ACTIVITIES

The Mechanical Equipment Training Specialist, Mr. R. G. Bartell, arrived in Mogadishu on June 6, 1972. The Water Utility Training Specialist, Mr. G. G. Johnson, arrived on July 11, 1972. Since their activities, with the exception of installation of the well pumps and drivers, could not be scheduled or programmed as for normal construction, it is believed a narrative report in chronological order by period and major emphasis; i.e., administration, maintenance, or operations, will best describe the extent and caliber of their efforts.

2.1.1 PERIOD OF JULY-SEPTEMBER 1972

A. Maintenance

Pumps were set in 16 of the 19 production wells. Motors were installed on 13 wells; well-pump lubrication systems and meters, piping, and appurtenances were completed on 10 wells. This work is reported herein since it was, by agreement, to be conducted simultaneously with initiation of Agency personnel training. Mr. Bartell prepared lessons for formal classwork, which was to be implemented upon completion of the well pump installations.

B. Operations

Mr. Johnson reviewed and evaluated previously prepared material pertaining to water utility management training. Field and staff personnel requirements, information sheets for new employees, and service truck tools and accessory lists were prepared. The following suggested forms were also prepared and presented for review:

- Application for Water Service
- Meter Installation Work Sheet
- Supplemental Distribution Service Lines



- Customer Installation Costs
- Meter Record Card
- Meter Reading Chart
- Billing Record Sheet
- Customer Complaint Slip
- Shutoff and Lock Form
- Customer Bill

Later in the period, an Organization Chart, Job Descriptions, Scope of Duties, and formal class lessons were prepared. Also, the following items were furnished to the Agency:

- Cost to Subscriber Per Cubic Meter - minimum monthly charge
- Vending Stations - operating procedures and rates
- Public Fountains - operating procedures and rates
- Billing Form for Vendor Station and Public Fountain Concessionaires
- Customer Monthly Billing Form
- Daily Well-Pumping Report

2.1.2 PERIOD OF OCTOBER-DECEMBER 1972

A. Maintenance

All 19 wells were completed and made ready for service. Lessons and instructions were completed for maintenance and operation of the power plant generators, Caterpillar diesel engines, booster station pumps, and Fairbanks Morse diesel engines.

B. Operations

Lessons and instructions were prepared for:

- Well-Pump Operation
- Meter Reading
- Pipe Tapping Procedures



- PVC Pipe and Fitting Installation Procedures
- Pipeline Installation and Service Connections
- Warehousing
- Billing Procedures and Office Records
- Water Treatment (chlorination)

Well-pump operators began training during this period. After the arrival of the service connection and training simulator material in December, pipeline crews also began training.

2.1.3 PERIOD OF JANUARY-MARCH 1973

A. Maintenance

Diesel engine operators, booster pump operators, and well operators received practical experience; by the end of the period, the locally trained personnel were operating pumps and engines with a minimum of supervision.

B. Operations

Meter and line installation crews received practical experience, and actual service line construction was initiated on February 1, 1973.

2.1.4 PERIOD OF APRIL-JUNE 1973

A. Administration

With the completion of construction in March 1973, the Office Manager, Mr. P.R. Lofgren, transferred the major portion of his activities to training in administrative matters. The City of Mogadishu's old Water System group transferred two bookkeepers/record clerks, one cashier, and one chief accountant to the Agency. In addition, two new record clerks were employed. Procedures were established for collecting receipts from vendor stations and public fountains as each was opened. A filing system for customer records and a new general ledger were established. Mr. Lofgren left Mogadishu on June 17, 1973.

B. Maintenance

Training of diesel engine, pump, and well operators continued. One mechanic, one new power plant operator, and two new booster plant operators were employed and began training.



C. Operations

Six 5-man installation crews were trained, and over 700 customer connections had been made by the end of the period. Warehousing procedures for proper storage and control of parts and materials continued, and the reading of customer meters and customer billing were begun. The training of surveyors also continued during this period. Their work consists of customer contacts and verification of property, location, length, and size of service lines, and meter size. These data, on suitable forms, are submitted to the commercial office. The field foreman is given a work copy and he and his crew install the service.

2.1.5 PERIOD OF JULY-SEPTEMBER 1973

A. Maintenance

The power plant crew consisted of nine men and a superintendent for power and well operation. The booster plant crew had four men and a superintendent. All training was being finalized as personnel, under the leadership of superintendents, were capable of training additional personnel as required. The well rig crews that earlier installed the pumps now pulled pumps, acidized wells, replaced air lines, and reinstalled pumps. This training was stressed because such maintenance is a yearly occurrence, needed to provide a continuous supply of water.

B. Operations

The meter shop was organized and put into operation with two meter repairmen employed and undergoing training. By the end of the period, over 700 meters, some from the old city system, had been serviced and were available for installation. Routine flushing of main lines in the upper- and lower-pressure zones and the well field blowoffs was completed. Over 160,000 feet of PVC pipe had been installed, and the crews were experienced in main line replacements, supplementary service lines, and general metered lines.

2.1.6 PERIOD OF OCTOBER-DECEMBER 1973

A. Maintenance

By the end of this period, all training was complete and all employees were provided with manuals to assist in their continued progress. Only routine inspection and occasional advice were required. The well-cleaning program was completed, and all pumps were adjusted to their maximum capacity. In general, the Agency's maintenance personnel were thoroughly trained in:

- Safety Precaution
- Lubrication and Maintenance Procedures
- Inspection and Adjustments on Hercules Engines



- Air Induction and Exhaust Systems
- Synchronizing Motors
- Engine Valves and Valve Lash
- Air Cleaner Servicing
- Fuel System on Caterpillar Engines
- Well Cleaning and Acidizing
- Pump Installation
- Machine Shop

Mr. Bartoll left Mogadishu on December 30, 1973.

B. Operations

Servicing of meters, particularly the older Bosco (Italian) ones from the original city system, continued; over 1200 meters have been serviced to date. Training of repairmen was completed. The billing department and surveyors were instructed in the handling of customers complaints. Better public relations were developed through the use of demonstrations showing how meters register, the proper water usage, and the costly results of waste. A new technician was employed for the chlorination system and trained in the basics of water treatment, chlorine handling, and chlorinator operations. The service and installation crews completed their training. In general, this division of Agency personnel was thoroughly trained in:

- Well Pumping
- Booster Pumping
- Meter Reading
- Pipe Tapping Procedures
- Installation of PVC Pipe and Fittings
- Pipeline Installation and Service Connections
- Warehousing
- Telemetry
- Meter Repairing



- Chlorination
- Valves (butterfly, pressure, and relief)
- Customer Relations

Mr. Johnson left Mogadishu on December 30, 1973.

2.2 PROJECT DATA

By the end of the report period, the following metered service connections had been installed:

<u>Size/Type of Meter</u>	<u>Number Installed</u>
2 inches	20
1 inch	69
5/8 inch	2,531
1/2 inch (Bosco)	56

Water production for the month of November 1973, including house connections, public fountains, and vendor stations, was as follows:

<u>Zone</u>	<u>Cubic Meters</u>
Upper Pressure	181,290
Lower Pressure	<u>158,560</u>
Total	339,850

This total of 339,850 cubic meters is equivalent to 90 million U.S. gallons; therefore, daily consumption is 3 million gallons per day.

As of the end of the report period, chlorine residual was being maintained between 0.3 and 0.5 ppm.

During November 1973, an additional order was placed for 2400 meters and associated service connection material and equipment. This material was aboard two Lykes Line vessels scheduled to arrive in Mombasa on March 6 and 31, 1974.

2.3 PERSONNEL

Table 2-1 lists the names of Somali personnel employed by the Mogadishu Water Agency and assigned for the maintenance and/or operations training described in this report. Also listed are classifications, responsibilities, and numbers in crew.



Table 2-2 lists all Parsons personnel who were assigned to the jobsite, or officially visited it since its inception. Previous reports listed only expatriate personnel actively concerned with one or more phases of the work; this table names all field personnel for the total contract.

Table 2-3 indicates the total number of Somali personnel employed on a direct-hire, salaried basis; it does not include daily laborers, who were numerous at times.

2.4 FISCAL INFORMATION

Total dollar expenditures from the inception of the project through December 28, 1973, are itemized in Table 2-4, which lists costs for the Engineer's services, project equipment, and Agency equipment. It should be noted that the latter two costs include the recently purchased meters and service connection material and equipment. Total local currency costs from inception through May 18, 1973, at which point the revolving local currency account was closed, are itemized in Table 2-5.

Table 2-6 updates Table 6 of "Completion Report, Final Design and Construction, Phases IV & V, Mogadishu Water Supply Project," dated May 21, 1973, and summarizes all known dollar and shilling payments to Amelco. The adjusted figures are identified by asterisks. This summary does not include claims for extras that have been made but not yet negotiated.



Table 2-1 - Local Trainees - Operations and Maintenance Personnel

Name and Classification ^a	Duties and Responsibilities	Personnel in Crew ^b
Hussen H. Jama Director of Engineering	General Operations	-
Mohamed Nuur Liban Supervisor	Purchasing - Custom Clearance	1
Mohamed Hadafow Foreman	Meter Repairing	2
Mohamud Hassan Nuul Work Shop Foreman	Welding, Machine and Auto Shops	5
Mohamed Abdirahman Dahir Supervisor	Plumbing and Service Line Foremen	-
Abdi Jibril Foreman	Plumbing and Service Line Connections	4
Salah Ali Foreman	Plumbing and Service Line Connections	4
Abdi Farah Foreman	Plumbing and Service Line Connections	4
Jama Suleman Foreman	Plumbing and Service Line Connections	4
Mohamed Abdi Foreman	Plumbing and Service Line Connections	4
Shoblo Moalin Foreman	Plumbing and Service Line Connections	4
Bashir Nur Storekeeper	Inventory - Warehousing	3
Ismail Mohamoud Abdi Supervisor	Service Crew, Leaks, Repairs	4
Mohamed Abdi Warsame Superintendent	Power Station, Well Field Operations	9



Table 2-1 (Contd)

Name and Classification ^a	Duties and Responsibilities	Personnel in Crew ^b
Osman Abdullahi Kulmiye Superintendent	Booster Station and Chlorination	5
Xasan Mohamed Cadow Supervisor	Meter Reading	13
Shaigor Arfaaye Jimaale General Mechanic	Power Plant, Booster Plant & Well Field	
Ahmed Yaslam Ahmed Well Rig Operator	Installing & Pulling Pumps Hoisting Motors	5

^aSupervisory personnel.

^bNumber of trained personnel in crew in addition to named supervisor. Total number of Agency personnel trained in Operations and Maintenance - 89 men.



Table 2-2 - American Personnel^a

Name/Title ^b	Arrival Date	Departure Date
Arnold, G. E. Project Manager/Phase I	Sept. 15, 1968	Nov. 15, 1968
Bartell, R. G. Mech. Equip. Training Supervisor	June 6, 1972	Dec. 30, 1973
Berges, E. R. Project Manager/Resident Engineer	Feb. 22, 1970	March 18, 1973
Burgess, R. K. Construction Engineer	April 13, 1971	Dec. 20, 1972
Fisch, W. D. Office Manager	Sept. 9, 1970	Jan. 30, 1972
Huntley, A. R. Water Utility Engineer	July 8, 1972	Jan. 24, 1973
Johnson, G. G. Water Utility Training Supervisor	July 11, 1971	Dec. 30, 1973
Kraus, H. R. Design Project Manager	Sept. 29, 1968	Nov. 10, 1968
Lofgren, P. R. Office Manager	Jan. 25, 1972	June 17, 1973
Morrow, B. R. Construction Engineer	Feb. 6, 1971	June 9, 1972
Mueller, J. R. Drilling Supervisor	Nov. 15, 1968	May 31, 1970
Puzo, W. E. Consulting Demographer	Sept. 11, 1968	Oct. 11, 1968
Ring, E. W. Drilling Supervisor	Oct. 1, 1969	Dec. 13, 1970
Scheliga, J. T. Project Manager/Hydrogeologist	Oct. 2, 1968	July 26, 1970



Table 2-2 (Contd)^a

Name/Title ^b	Arrival Date	Departure Date
Scott, A. C. Office Manager	Sept. 15, 1968	Sept. 30, 1970
Thomas, B. E. Consulting Demographer	Sept. 8, 1968	Sept. 18, 1968
Vigil, H. Senior Design Engineer	June 17, 1970	July 10, 1970

^aPrevious reports have listed those expatriate personnel concerned primarily with the work of the particular phase being described. This table lists all personnel through Project Phases I, II, III, IV, V and training phase of Contract Amendment 2.

^bThe following home office personnel visited the project on the dates shown:

P. S. Bennett, Chief Engineer, Foreign Operations, Parsons Corporation, October 1967.

H. O. Wedekind, Vice President, Parsons Corporation, July 1970 and Sept. 1971

P. S. Bennett, Project Director, Parsons Corporation, April 1972.



Table 3-3 - Local Personnel^a

Name	Classification
Yusuf Mohamed Ali	Hydrogeologist
Ali Mohamed Farah	Administrative Assistant
Mohamed Hussein Nuh	Chief Mechanic
Mohamed Abdi Duale	Welder
Hussein Keire Giumale	Driver
Mohamed Egal Ahmed	Janitor
Dahir Hassan Mohamed	Work Shop Helper
Ali Magan Nur	Chief Driller
Ramzanali F. Alidina	Accounting Assistant
Ghelle Mohamed Mohamud	Driver
Musse Ahmed Debei	Technical Assistant
Ismail Mohamed Ali	Technical Assistant
Abdi Ali Mumin	Driver
Mohamed Jama Abdi	Bilingual Typist
Mohamed Ibrahim Barre	Rig Hand
Mohamed Sceek Abdulla	Rig Hand
Abdullahi Ali Hasci	Drilling Helper
Hassan Mumin Barre	Chief Security Guard, Field
Said Mohamed Farah	Welder
Ahmed Mohamid Salim	Heavy Equipment Operator
Hussein Ali Shedeh	Rig Hand and Tool Dresser
Mohamed Osman Hersi	Technical Assistant

Table 3-3 (Contd)^a

Name	Classification
Yusuf Fahie Farah	Administrative Aide
Ahmed Gutale Aden	Guard, Office/Yard
Aden Mohamed Ali	Guard, Office/Yard
Mohamed Yusuf Jama	Guard, Office/Yard
Mohamed Osman Ahmed	Guard, Office/Yard
Awil Said Yusuf	Office Helper
Abdi Abdillahi Abdi	Technical Assistant
Modhamed Haji Omar	Driver
Feisal Basci Abdullahi	Work Shop Helper
Mohamud Yusuf Mohamud	Assistant Office Engineer
Mohsen Abdo Mohamed	Field Assistant
Omar Hilowle Ayanle	Guard, Office/Yard
Abdikarim Warsama Farah	General Helper
Mohamed Farah Hire	Construction Inspector
Mohamoud Ahmed Mohamed	Materials Testing Engineer
Abdillahi Abdi Musa	Administrative Assistant
Mohamed Artan Yusuf	Guard, Office/Yard
Yusuf Haji Mohamed	Guard, Office/Yard
Sharif Mohamed Ali	Assistant Materials Testing Engineer
Mohamed Rabileh Gaud	Construction Inspector
Ismail Mohamoud Abdi	Construction Inspector
Hassan Mohamed Ahmed	Draftsman/Assistant Construction Inspector

^a Includes direct-hire local employees through Phases I, II, III, IV, and V, as reflected in monthly shilling payroll; does not include numerous daily hired laborers. No local employees remained on payroll after June 20, 1973.



Table 2-4 - U.S. Dollar Costs of Project

Expenditure	Cost to Date
Services, Letter of Credit AID 662-70-C	
Home Office Services	
U.S. Salaries	\$ 310,849
Payroll Overhead	73,053
Field Services	
Field Salaries	339,163
Payroll Overhead	101,382
Professional Services	22,534
Transportation	34,990
Subsistence & Schooling	8,533
Freight	13,023
Miscellaneous	56,435
Overhead	
Home Office	248,680
Field	186,178
Fee	<u>148,688</u>
Total Costs through 30 December 1973	\$1,543,471
Total Amount through Amendment No. 6	\$1,548,036
Project Equipment, Letter of Credit AID 662-71-C	
Total Costs Through 22 February 1974	\$ 424,612.85
Total Amount Through Amendment 5	\$ 426,000.00
WDA Equipment, Letter of Commitment 649-1100505	
Total Costs Through 22 February 1974	\$ 249,927.95
Total Amount Through Letter of Commitment	\$ 250,000.00



Table 2-6 - Summary of Payments to Amelco Engineers Company

Bid Item	Unit	Quantity		Dollars		Shillings	
		Est.	Act.	Unit Cost	Total Cost	Unit Cost	Total Cost
1. Mobilization	LS	1	1	114,811.00	114,811.00	42,296.00	42,296.00
2. Scek Muhidin Res.	LS	1	1	179,640.00	179,640.00	455,692.00	455,692.00
3. Milk Factory Res.	LS	1	1	166,560.00	166,560.00	407,140.00	407,140.00
4. Dist. & Trans. System Valves	LS	1	1	174,540.00	174,540.00	64,285.00	64,285.00
5. Vendor Water Sta. 1 and 2	LS	2	2	14,320.00	14,320.00	35,714.00	35,714.00
6. Booster Pump Sta.	LS	1	1	126,620.00	126,620.00	71,428.00	71,428.00
7. Chlorination Bldg.	LS	1	1	30,740.00	30,740.00	7,143.00	7,143.00
8. Power Plant	LS	1	1	267,380.00	267,380.00	71,428.00	71,428.00
9. Elect. Trans. Line	LS	1	1	117,000.00	117,000.00	150,000.00	150,000.00
10. Public Fountains	Ea	123	118 ^a	1,300.00	153,400.00	2,000.00	236,000.00
11. 1-1/2-in. PVC Pipe	LF	1,515	7,120	1.15	8,188.00	1.00	7,120.00
12. 2-in. PVC Pipe	LF	7,099	11,350	1.20	13,620.00	1.00	11,350.00
13. 3-in. PVC Pipe	LF	41,835	43,489 ^a	2.50	108,722.50 ^a	1.00	43,489.00 ^a
14. 4-in. AC Pipe	LF	115,880	116,122 ^a	3.05	354,172.10 ^a	1.00	116,122.00 ^a
15. 6-in. AC Pipe	LF	110,690	109,212	4.25	464,151.00	2.00	218,424.00
16. 8-in. AC Pipe	LF	75,289	74,958	6.60	494,722.80	2.00	149,916.00
17. 10-in. AC Pipe	LF	19,311	19,740	9.20	177,928.00	2.00	38,680.00
18. 12-in. AC Pipe	LF	15,075	14,979	13.10	196,224.90	2.00	29,958.00
19. 14-in. AC Pipe	LF	13,748	13,559	17.15	232,536.85	2.00	27,118.00
20. 16-in. AC Pipe	LF	4,921	4,858	21.00	102,018.00	2.00	9,716.00
21. 18-in. AC Pipe	LF	4,429	4,110	28.00	115,080.00	3.00	12,330.00
22. 20-in. AC Pipe	LF	8,580	8,792	30.85	271,233.20	3.00	26,376.00
23. 24-in. AC Pipe	LF	26,314	26,159	32.00	837,088.00	3.00	78,477.00
24. Pavement Removal and Replacement	SY	29,300	33,555 ^a	4.00	134,220.00 ^a	23.00	771,765.00 ^a
25. Rock Excavation	CY	5,000	5,121.20	2.00	10,242.40	14.00	71,696.80
Totals					4,865,158.75		5,153,663.80
Change Order No. 1 Less Bid Items 14, 15 and 16					10,840.68		11,285.18
Change Order No. 2					2,352.52		18,465.82
Change Order No. 3					(457,600.00)		2,335,695.60
Grand Total					4,420,751.95		5,519,110.40

^a Total fountains installed, 123. Five fountains were moved to Medina Village, and costs are included in Change Order No. 1.

^a Denotes quantity increases and payments subsequent to Completion Report issued on May 21, 1973.