URBAN PROJECT

PD-AAI 019

Proposal For Development of

Suez Governorate

Roads Directorate

July 1988

LOCAL DEVELOPMENT II URBAN PROJECT

11 GAMAL EL DIN ABOUL MAHASSEN, GARDEN CITY - CAIRO, EGYPT - 354-6469 - 355-7078 - TELEX (927) 22252 STRVE UN

August 10, 1988

HE Tahseen Shanan
The Governor of Suez
Suez Governorate

Your Excellency,

With the assistance and cooperation of your staff we have completed the preparation of the special project documentation for the Reorganization of the Road Maintenance Department. Five Arabic and Five English copies of the project data are enclosed. Should you have any questions about the project data we will be most happy to meet with you and discuss or clarify any portions or items that may be in question.

Should you find the project scope and detail suitable for your needs, the next step in the procedure is to submit the project data, in Arabic and English, to Mr. M. Kholy, Reporter for the ULDC for review and approval by that body. Upon their approval, the ULDC will forward the special project to the AMANA. Kindly note that a copy of this letter and project documentation is being sent directly to Mr. Gisiger of USAID.

I personally look forward to a visit with you in the near future. We appreciate your support and assistance in implementing the various components of the LD-II Program.

With deepest respect,

WILBUR SMITH ASSOCIATES

Richard E. Miller
Chief of Party

cc: Mr. Jack Gisiger
Chief, Urban Development
USAID Cairo

WILBUR SMITH ASSOCIATES

DELOITTE HASKINS AND SELLS
DEVELOPMENT CONSULTING GROUP

PUBLIC ADMINISTRATION SERVICE
ENGINEERING AND GEOLOGICAL CONSULTING OFFICE

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Abstract

A special project is proposed to implement reorganization and training of personnel in the Suez Governorate Roads Directorate. Road maintenance management methods and systemization of personnel and equipment use will be the principal objective of the training. On-the-job field maintenance training of workers will be carried out also. A training period of five months is proposed.

Two methods of hot-mix asphalt concrete manufacture are feasible and of equal cost: 1) a fixed plant of 40 TPH capacity or 2) four (4) mobile plants of 20 - 20 TPH total capacity. Existing plant needs replacement owing to initial poor design, age, and inefficient operation.

Ancillary buildings are proposed to include an asphaltic material testing laboratory, a small workshop, a repair shed, storerooms, and office space. Equipment required is laboratory equipment, small tools, equipment for the workshop, and necessary spare parts for existing heavy equipment. Certain inoperable heavy equipment needs repair and it is proposed that this be done by means of private sector contractors.

Total estimated time for project implementation is eleven months. Estimated cost of proposed special project is LE 819,796 plus US$ 20,808.

C'

I. Project Definition

A. In October, 1987, Wilbur Smith Associates submitted a report entitled "Road and Street Maintenance – Suez Governorate" to the US Agency for International Development, Cairo. That report recommends a special project to implement reorganization of the Roads Directorate. The report which follows proposes certain means of improved equipment utilization, and recommends training of road maintenance workers and supervisors in order to perform their work according to performance standards established in the above mentioned WSA Report.

1. Remove existing 10-year old hot-mix asphalt plant from present location next to Suez Road Directorate's garage and maintenance workshop and replace it with a suitable fixed or mobile batch plants.

2. Construct new workshop, asphalt laboratory, storeroom, repair shed, and offices at present site according to the concept of figure (1).

3. Equip a small asphaltic-concrete and road materials testing laboratory.

4. Provide necessary workshop equipment and tools.

5. Repair inefficiently operating heavy equipment by contract through private sector firms.

6. Purchase spare parts as required for serviceable machines and heavy equipment.

7. Train and reorganize the Roads Directorate during a period of five months by means of one expatriate and one Egyptian national road maintenance specialist.

   The Egyptian national road maintenance specialist is required for a period of five months, two months initial training in practical on the job techniques, two months in cooperation with the expatriate, emphasizing use of performance standards and reorganization, and one month in implementing such reorganization in day to day operations. The expatriate will be employed for a period of two months, assisting in reorganization and training in accord with accepted performance standards and maintenance management methods.

B. To assist in implementing the measures outlined in paragraph 1-A above, this proposal provides some preliminary plans and specifications, staffing requirements and estimated costs for construction, repair, and equipment purchases. Private sector firms and private consultants are to be used to the fullest extent practicable in implementing this project.

II. Project Justification

A. General

1. The report titled "Road and Street Maintenance-Suez Governorate" dated October 1987, submitted to US Agency for International Development by Wilbur Smith Associates details the background for this special project. The following is extracted from the Executive Summary of that report.

"The Roads Directorate does not seem to have, within the Governorate, a clearly-stated mission to maintain the roads and streets, nor sufficient delegated authority to carry it out. If a written mandate exists, it is not indicated on the organization chart for Roads, by naming maintenance as a specific function. The Roads Directorate does not have all the funds and facilities necessary for the maintenance task. There is a competition among operating agencies for available equipment. In programs, priority is awarded to new construction and, while this may be justified, there is no definition of the need for regular and adequate maintenance. Unfinished and unsatisfactory utility work affects the street surfaces for long periods of time, without enough authority in the Roads Directorate or cooperation enforced from higher levels to get prompt correction of utility problems so that surfaces can be repaired.

Within the Roads Directorate, the organizational structure does not show a strong supervision of main activities. Maintenance of roads seems to be subordinate to construction, or at least not clearly independent of it....

Much of the problem is due to the absence of a plain commitment to do maintenance. This lack of an effective commitment causes vehicle operating costs in Egypt to be much higher than they should be, with millions of pounds in economic costs. In

addition to increased discomfort in travel, the surprises and defects in the surfaces, and the obstruction of road sides and shoulders, result in higher accident rates and vehicle damage. The neglect of city streets allows accumulations of refuse and soil which significantly reduce the capacity and utility of the streets. This sometimes reaches such a state that several blocks of street can be inventoried as 'unpaved' when there is an AC pavement underneath. The condition menaces the public health.

Regular, simple maintenance can do much to avoid these negative effects and to preserve the integrity and utility of streets which have been constructed at public expense. The maintenance is feasible, it is justified, and it is cost effective. It should be done".

2. The private sector will be involved in the special project to the maximum extent feasible. As a minimum the private sector will:

   a. act as consultant in the planning and design of the facilities as well as supervise construction.

   b. perform major repairs to the vehicles and equipment.

   c. furnish the hot mix asphalt plant or optional mobile plants.

   d. furnish the spare parts for vehicle and equipment maintenance and repair.

   e. furnish equipment for the laboratory.

   f. construct the required facilities.

3. The problems of road and street maintenance in Suez Governorate are not peculiar to that Governorate. Similar situations exist throughout the country. The reorganization of the Road Department with emphasis on maintenance will provide a model that may be applicable to other Governorates.

B. <u>Remove and replace present hot-mix asphalt plant:</u>

An estimated total of 200,000 m2 of new 2-layer asphalt pavement is needed anually. About one-half of this amount may be allocated to the Roads Directorate in paving narrow and irregular lanes, which would not be

suitable to be done under contract. An example is the 15-20 narrow lanes that are adjacent to Orabi Street and some streets of El Arbaeen District. An additional 7000 m3 of hot-mix asphalt is required for routine pavement repair and single layer overlays. Above quantities required by Roads Directorates total 18,000 m3/yr (32,000 ton/yr). Assuming 1560 available working hour per year, a 21 ton per hour capacity for asphalt production is sufficient. The lowest available fixed plant capacity is 40 tons per hour. Present site is environmentally suited to asphalt manufacture, since prevailing winds carry fumes away from residential areas. Optionally, four (4) mobile batch plants of 5-7 ton capacity each could produce the required amount of asphalt.

C. Construct ancillary buildings

The present repair shed and workshop is inadequate to affect minor maintenance of heavy equipment. Storage space for spare parts and lubricating oils is inadequate. Office and laboratory space are needed. See Figure 1 for layout.

D. Furnish equipment for an asphalt-testing laboratory

A small asphalt-materials testing laboratory is required for quality control of hot-mix asphalt.

E. Provide tools and shop equipment

In addition to small tools, some small shop equipment is needed to carry out routine heavy equipment maintenance.

F. Repair inoperable heavy equipment:

Some 46% of the heavy equipment operates inefficiently and is in need of major and minor repairs that are beyond the capacity of the Governorate facilities. These repairs will be made by means of private sector firms.

G. Purchase small parts for heavy equipment

Adequate spare parts are not available for all heavy equipment. Ready availability of requisite spare parts will lower the down time of this equipment. Spare parts will be provided contingent to implementation of an inventory control system.

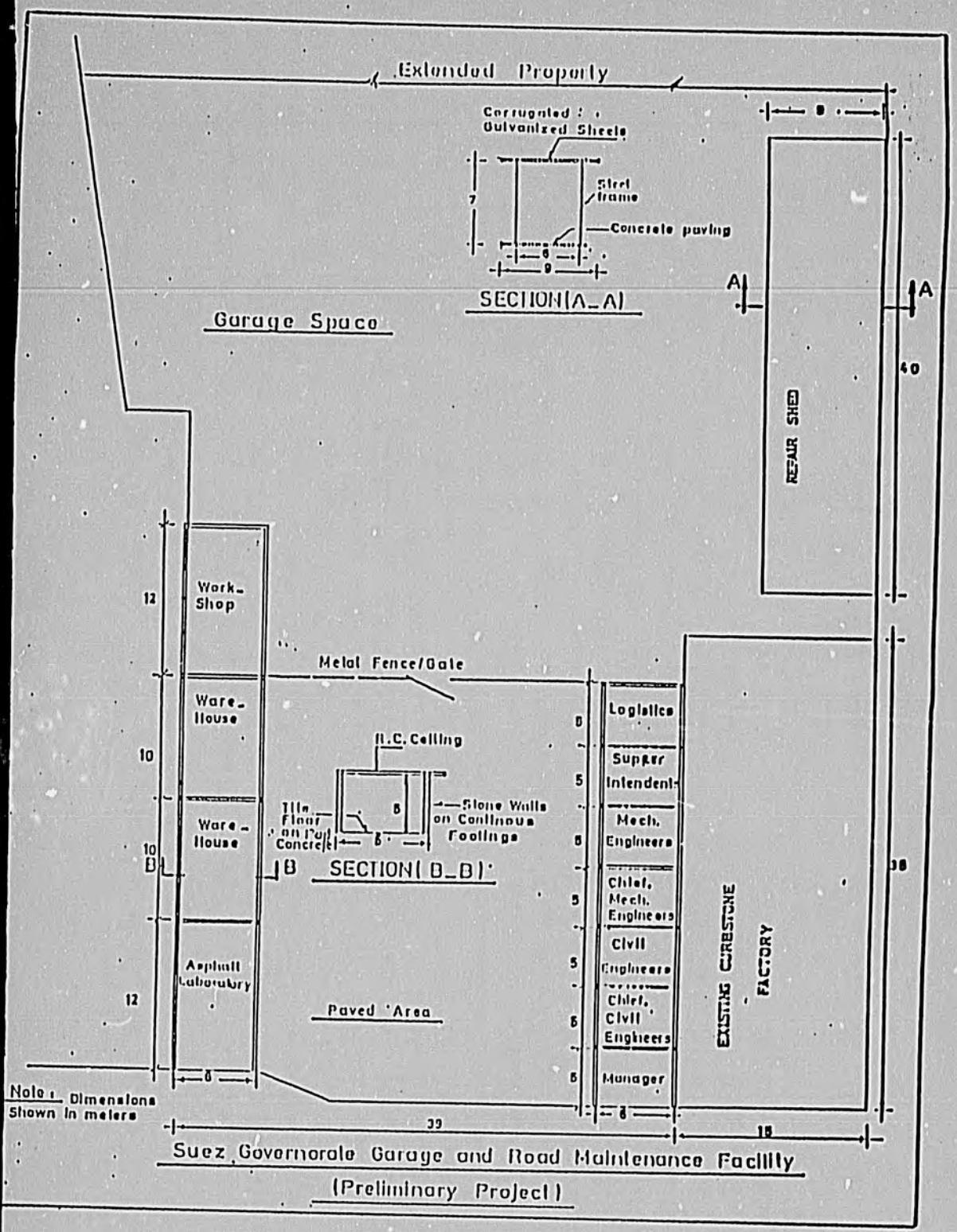

Extended Property
Corrugated Galvanized Sheets
Steel frame
Concrete paving
SECTION (A-A)
Garage Space
REPAIR SHED
Work-Shop
Ware-House
Ware-House
Asphalt Laboratory
Metal Fence/Gate
R.C. Ceiling
Tile Floor on Pour Concrete
Stone Walls on Continuous Footings
SECTION (B-B)
Paved Area
Logistics
Superintendent
Mech. Engineers
Chief, Mech. Engineers
Civil Engineers
Chief, Civil Engineers
Manager
EXISTING CURESTONE FACTORY
Note: Dimensions Shown in meters
Suez Governorate Garage and Road Maintenance Facility
(Preliminary Project)

Figure 1.

II. Provide training for Roads Directorate staff:

Organization of maintenance crews to increase productivity needs attention. Presently there is little or no specialization of job-functions. Formal and on-the-job training by an expatriate for two months and an Egyptian national road maintenance specialist for a period of five months would contribute to increased productivity. Reorganization and systemization of the activities of the Roads Directorate will be of prime concern in the training program.

During this training period, road maintenance schedules will be established whenever possible, for all types of operations conducted by the Roads Directorate. Crew sizes and composition will be defined in light of field experience for each type of operation as described in WSA report of October 1987.

III. Facility Sketch

See figure 1

IV. Expatriate/Egyptian Project Staff Requirements

A. Implementation of training procedures for the Suez Governorate Road Directorate supervisors and workers is to be carried out as a part of this proposal.

B. Staffing requirements for training in road maintenance:

1. One expatriate road maintenance specialist.
2. One Egyptian national road maintenance specialist.

V. Project Budget

A. Equipment Cost

1. Asphalt plant (fixed) - 40 tph capacity

a.	Supply and erect 40 tph asphalt plant	LE	420,000
b.	Supply and install 180 HP generator	LE	40,000

c.	demolition of existing foundations	LE	2,000
d.	cost of new R.C. foundation	LE	8,000
	Sub-total	LE	470,000

or

Option:

1*. Four (4) mobile asphalt plants of 20 to 28 tph total capacity

4 mobile asphalt plants (at LE 117,500 ea). 5-7 tph capacity each to include loading, burner, mixer, bitumin tank and delivery system, ground level controls, 15 hp power unit, main and free-standing fuel tanks, output of 7 tons per hour hot-mix and of 9 tons per hour cold mix.

	Mobile Plants option subtotal	LE	470,000
2.	Asphalt Laboratory		
a.	Marshall compaction/CBR apparatus (to include molds, spacers, compaction hammer, surcharge masses, swell-measuring apparatus, marshall loading yoke, flow meter, and compresion machine).	LE	13,700
b.	Centrifuge with bowl for sample	LE	8,500
c.	Drying oven (200-250 C)	LE	2,200
d.	Sieves (12.5 mm, 9.5 mm, 4.75 mm, 2.36 mm, 1.18 mm, 0.60 mm, 0.30 mm, 0.15 mm, 0.075 mm pan, and sieve shaker)	LE	1,000
e.	Sand cone apparatus	LE	400

f.	Proctor test-std. compaction apparatus, (including compaction mold, collar, and compaction hammer)	LE	200
g.	Balance, pycnometer bottles, vacuum pump and miscellaneous pans and glassware	LE	2,000
	Sub-total	LE	28,000
3.	Workshop Equipment		
a.	Hydraulic press, 25 ton capacity	LE	4,500
b.	Pump pressure gages	LE	500
c.	Special tools for heavy equipment	LE	5,000
		LE.	10,000
4.	Spare parts for heavy equipment	LE.	32,000
	Total Equipment Cost	**LE.**	**540,000**

Construction Cost

Estimated Bills of Quantities for
Civil & Architectural works for
offices, Stores, Workshops and Laboratory

Item	Unit	Qty	Unit Price	Total
Demolition of Existing Bldgs				
1) Demolition of existing offices and sheds including foundations and transportation of all residuals to refuse disposal areas.	sum	-	3000	3000
Earth Work				
1) Excavation for foundations and transportation of soils to refuse disposal areas	m3	650	3	1950
2) Backfilling using compacted sand	m3	300	4	1200
Concrete works				
1) Plain concrete for foundations, 180 kg/cm2 using sulphate resisting cement	m3	150	50	7500
2) Plain concrete for floors inside offices, 180 kg/cm2, 15 cm thick	m2	475	10	4750
3) Reinforced concrete for foundations, 250 kg/cm2 using sulphate resistent cement, (Rate excludes reinforcement)	m3	50	70	3500
4) Reinforced concrete for beams, lentils, ceilings, 250 kg/cm2 (Rate excludes reinforcement)	m3	85	120	10200
5) Supply and install steel reinforcement of grade 37	ton	10	800	8000
Masonry				
Stone walls, 40 cm thick, external surfaces pointed	m3	615	65	39975
Floors				
1) Terrazo tiles 30 x 30 x 3 cm	m2	210	12	2520

Item	Unit	Qty	Unit Price	Total
2) Cement tiles 20 x 20 x 2 cm	m2	475	6	2850
3) Anti-abrasive cement tiles (steel crete) 20 x 20 x 2 cm	m2	265	12	3180
Damp Proofing & Thermal insulation				
1) Painting of foundations with 3 coats of oxidized bitumen, 1.5 kg/m2 per coat	m2	700	2	1400
2) Damp-proofing for ceilings, consisting of 3 layers of bitumen membranes on a hessian base, of minimum weight 2.5 kg/m2 per each layer and four mopping coats of oxidized bitumen 1.5 kg/m2 per coat	m2	475	8	3800
3) Thermal insulation for ceilings, polystyrene boards, 3 cm thick	m2	475	10	4750
Walls & Ceiling internal finishings				
1) Sand lime plaster	m2	1000	4	4000
2) Cement plaster	m2	380	5	1900
3) Plastic paint	m2	1380	5	6900
Windows & doors				
1) Doors	m2	30	100	3000
2) Windows	m2	30	100	3000
Plumbing				
Plumbing works including sinks, taps, pipes, WC, drainage, sewage connections, etc.	lumpsum	-	-	4000

Item	Unit	Qty	Unit Price	Total
Electrical				
Electrical works including conduits, cables, lamps, connections to workshop equipment	lumpsum	-	-	5000
Laboratory Furniture				
Supply and install laboratory benches and cabinets	lumpsum	-	-	2000
Sub-total for ancillary buildings				128375

Estimated Bills of Quantities for Repair Shed

Item	Unit	Qty	Unit Price	Total
Excavation of soils and transportation of residuals to refuse disposal areas	m3	235	3	705
Base coarse, 25 cm thick	m3	90	20	1800
Reinforced concrete floors, 20 cm thick, 250 kg/cm2, lightly reinforced, with control and expansion joints	m2	360	25	9000
Anti - abrasive coat on floors	m2	360	8	2880
Plain concrete for shed foundations, 180 kg/cm2 using sulphate resistant cement	m3	20	50	1000
Reinforced concrete for shed foundations using sulphate resistant cement, rate excludes reinforcement	m3	10	80	800
Supply and install of steel reinforcement, grade 37	ton	1	800	800
Supply, erect and paint structural steel for columns and beams	ton	7	2000	14000
Supply, erect painted galvanized corrugated steel cover, 0.6 mm thick	m2	360	10	3600
Sub-total Repair Shed				34585

5. Estimated Bills of Quantities for Paved Areas Between Offices

Item	Unit	Qty	Unit Price	Total
Excavation of soils and transportation of residual to refuse disposal area	m3	400	4	1600
Base coarse 25 cm thick	m3	225	20	4500
Reinforced concrete floors, 20 cm thick, lightly reinforced with control and expansion joint	m2	900	25	22500
Metal fence & gate	m.l	26	100	2600
Sub-total for paved area				31200

Total, Cost of Construction,	
Offices	128375
Shed	34585
Paved area	31200
	194160
Consultant Fee 3%	5825
	199985
Total Construction Cost	200000

Heavy Equipment Repair Cost

ipment	No.	Year of Manufacture	Present Efficiency	Source of Failure
uck, SIRUS (W. Germany)	3	1976	60%	Gear & Brakes
uck, NASR Egypt	2	1987	60%	Gear & Brakes
uck, PAN goslavia	1	1986	60%	Damaged in an accident
ldozer, FIAT ice (Haly)	1	1986	75%	Water Pump
ldozer, JOHN ER (British)	1	1983	80%	Needs adjustment and pressure gages
tor Grader, FAWN , (W. Germany)	1	1986	70%	Major repair required
tor Grader, TSUBISHI, Japan	1	1982	50%	Major repair required
tor Grader, ELEN 6, (England)	1	1981	75%	Under repair
ader, FREISH . Germany)	1	1976	70%	(Pumps)
umper, MOCLENA Italy)	2	1984	60%	Motors will be replaced by MAGIRUS motors
rane, JOHNS, British)	1	1983	70%	Hoist wires & Supporting wheels
ractor, Romani 5, (Yogoslavia)	7	1979	60%	Repaired when required, needs complete overhaul
oller, DIMAG, British)	1	1983	60%	Needs complete overhaul

otal equipment repair cost LE 45,000
estimated by Suez Roads Directorate)

D. Staffing Cost

1. Expatriate Road Maintenance Specialist

1 1/2 months @ $ 5,000/mo	$ 7,500
1/2 months @ $ 6,000/mo	$ 3,000
Total Compensation	$ 10,500
Overhead 108.38%	$ 11,380
Fringe Benefits 36.97%	$ 3,882
Sub-Total	$ 25,762
Profit 6%	$ 1,546
Sub-total	$ 27,308
Round Trip Airfare	$ 1,500
Total US$ Cost	$ 28,808

2. Egyptian National Road Maintenance Specialist

5 months @ 2,000 LE/mo	LE. 10,000
Overhead 64%	6,400
Fringe Benefits 26%	2,600
	19,000
Profit 6%	1,140
Sub-total	LE. 20,140

3. Per Diem

Egyptian Specialist (assuming Cairo residence)

150 days total			
120 Suez	@ LE. 73.05	LE.	8,766

American Specialist (foreign residence)

60 days total			
10 Cairo	@ LE 223.72	LE	2,237
50 Suez	@ LE 73.05	LE	3,653
Sub-total (per diem)		LE	14,656

Total Staffing Cost	LE	34,796	& $ 28,808

E. Total Project Budget

1.	Equipment Cost (including Spare Parts)	LE	540,000	
2.	Construction Cost	LE	200,000	
3.	Heavy Equipment Repair Cost	LE	45,000	
4.	Staffing Cost	LE	34,796	$ 28,808
		LE	819,796	$ 28,808

VI- Bidding and Contract Procedures

A. Civil Works

1. Only pre-qualified contractors will be invited to bid. Suez Governorate list of such contractors may be used if available. Otherwise a standard prequalifications procedure shall be adopted prior to call for tenders.

2. Tender documents shall include general and special conditions, detailed drawings and specifications, and bills of quantities. All tender documents will be submitted to the technical assistance contractor of USAID for review prior to issuance of call for tenders.

3. Contract shall be limited to a maximum ceiling price based on drawings and specifications. Unit prices will be used in evaluating payment certificates.

4. Scope of work follows:

a. Demolition of existing office and sheds and transportation of residual to refuse disposal area.

b. After removal of present asphalt plant, demolition of existing plant foundations and transportation of residuals to refuse disposal area.

c. Construction of a small asphalt/road materials laboratory, a workshop, and a storeroom for spare parts and small tools. Construction will be comprised of the following procedures:

1) Excavation and backfilling.

2) Placement of plain and reinforced concrete foundations.

3) Erection of stone walls.

4) Construction of reinforced concrete ceilings

5) Installation of roof insulation.

6) Placement of finishing work (plastering painting, flooring, and installation of windows doors, shelves, laboratory and workshop benches, etc.)

7) Installation of lighting and electrical conduits and appurtenances for connection to workshop machines and laboratory equipment.

8) Construction of a foundation for the new asphalt plant according to specifications and layout recommended by the manufacturers.

9) Construction of yard floors in specified areas including base course, reinforced concrete floors with anti-abrasive coating.

10) Construction of metal repair sheds as specified in layout drawings.

5. Evaluation of tenders is to be made on the basis of lowest price bid in compliance with condition of contract and specifications.

6. Handing over the site to the selected contractor will take place at the time of awarding of contract.

7. After contractor's initial handing over of work, a completion certificate will be issued by the Roads Directorate of Suez.

8. Final completion certificate will be issued and performance bond returned to contractor after lapse of one year from time of issuance of initial completion certificate.

B. Mechanical Equipment

1. Documents pertaining to bids for procurement and installation of equipment, spare parts and for equipment repair shall include general conditions, special conditions, specifications, bills of quantitites, guarantee periods, and spare parts requirements. Technical Assistance contractor for USAID shall review tender documents prior to issuance of calls for tenders.

2. Equipment suppliers shall be limited to Western bloc non-communist aligned countries.

3. Specifications for equipments will be prepared separately for each of the following equipment items:

a. Hot-mix asphalt plant (fixed)

1) Plant shall be supplied by a reputable manufacturer, and manufactured locally under international license, and deemed suitable by the Suez Roads Directorate.

2) Output: 40 tons per hours at 5% aggregate humidity.

3) Control: complete electrically operated control panel.

4) Feed units: Three hoppers for separate grading of aggregates and sand, each hopper to have a capacity of about 7m3.

5) Conveyors: Standard conveyors with adequate and durable belts with removable and adjustable support system.

6) Hot elevator up to 100 TPH capacity.

7) Dryer: Approximately 1.5 meter diameter, 6-meter length producing up to 60 TPH, with dust control system to include a cyclone of capacity 12,000 m3/hr. Heat provided by an oil burner provided with a self-adjusting, self purifying oil atomizing valve.

8) Mixer: to operate efficiently up to 2000 Kg per batch.

9) Bitumen tanks: One tank of 40-tons capacity to be provided with a heating system.

10) Power Source: Electric generator of 180 HP capacity as recommended by plant manufacturer. Separate tender to be made for this item.

11) Specifications shall include the following items:

a) One-year minimum manufacturer guarantee.

b) Spare parts list with prices.

c) System to have had previous successful operating experience.

d) Manuals for operation and maintenance.

e) Name and address of responsible local manufacturer's agent.

f) Operational training of engineers and workers.

g) Delivery and installation deadlines.

or

Option -

a*. Four (4) mobile batch plants

1) The four plants shall be of the same manufacturer and model to be supplied by a reputable manufacturer with a maximum delivery time of 3-months after placement of purchase order.

2) Output: 5-7 Tph hot-mix at 3% aggregate humidity or 7-9 Tph cold mix capacity.

3) Loading skip: 140 Kg capacity

4) Batch heater capacity: 140 kg.

5) Heated aggregates to be delivered by hydraulically operated fully lined swivel chute. Coarse dust to be collected in an expansion box and automatically delivered to the mixer.

6) Burner nozzles: 41 litres per hour rating using 35 sec light diesel fuel.

7) Mixer: 150 Kg of mixed material based on density of 1600 kg/m3.

8) Bitumen system: 300 liter capacity bitumen heating/storage tank with thermometer.

9) Controls: Manual controls operated from ground level.

10) Power unit: 15 bhp at 1850 rpm on load. Direct clutch take-off

11) Fuel Tank: 180 liter capacity

12) Specification shall include the following items:

a) One year minimum manufacturer's guarantee.

b) Spare parts list with prices.

c) System to have had previous successful operating experience.

d) Manuals for operation and maintenance.

e) Name and address of responsible local manufacturer's agent.

f) Operational training of engineers and workers.

g) Delivery deadlines.

b. Laboratory equipment

1) Specifications shall call for price lists of equipment listed in paragraph V.A.2.

2) Equipment must be able to perform according to American Standards of Testing Materials methods.

3) Relevant accessories are to be included in order to perform all requisite aggregate and asphalt tests.

c. Workshop equipment tools and spare parts shall be precisely defined according to requirements of Roads Directorate.

d. Equipment Repair Specifications shall indicate specific requirements for complete repair of each piece of equipment.

4. All bids shall be evaluated according to their compliance with tender requirements, prices, and delivery factors.

5. The Suez Governorate will negotiate with selected bidder in order to obtain the lowest possible prices and towards improvements of mechanical system in case of minor deviations of specifications.

VII. Project Implementation

A. During the five months training period for the Suez Roads Directorate, reorganization of personnel will be accomplished in accordance with an organization chart similar to the one shown in this report in figure 2.

B. Maintenance management will be emphasized during training, in addition to on-the-job road maintenance techniques.

C. According to WSA report of October 1987, Roads Directorate presently has twenty-one (21) personnel classifications on the payroll. Performance Standards analysing personnel requirements call for only seven (7) such classifications of road maintenance workers (narrow street paving requires one additional crew, not included in WSA report). Estimated maintenance personnel requirement are:

4 foremen
2 grader operators
2 loader operators
2 roller operators
8 truck drivers
3 masons
22 laborers

43 - total field work force requirement

D. Responsibilities of Roads Directorate, as outlined in WSA report of October, 1987 include the following activities with typical crew and equipment requirements.

1. Short asphalt overlays

1 forman
1 grader operator (1 motor grader)
1 roller operator (1 roller)
3 truck drivers (3 dump trucks)
7 laborers

2. Small pavement repairs

1 foreman
1 roller operator (1 roller)
2 truck drivers (2 dump trucks)
6 laborers

3. Curb repair and replacement

1 foreman
1 truck driver (1 dump truck)
3 masons
6 laborers

4. Grading unpaved streets

1 Grader operator (1 grader)

5. Shaping unpaved streets

1 foreman
1 loader operator (1 loader)
2 truck drivers (2 dump trucks)
6 laborers

6. Cleaning paved streets (presently not done by RDA)

1 foreman
1 loader operator (1 loader)
2 truck drivers (2 dump trucks)
8 laborers

7. Grading unpaved shoulders

1 grader operator (1 motor grader)
1 truck driver (1 dump truck)
2 laborers

D. Paving of narrow streets (not in WSA report of October 87)

1 foreman
1 grader operator (1 motor grader)
1 roller operator (1 roller)
3 truck drivers (3 dump trucks)
7 laborers

E. According to previous WSA report of October, 1987 resource needs are shown for personnel, equipment, and materials in Table I, II and III. These needs are to be tested during training operations, and to be adapted to local conditions as necessary. They provide guidelines for efficient performance standards.

F. Scheduling for the complete project is shown by means of Critical Path Method in Figure 3. Total time for completing project is estimated at 11 months.

G. Analysis activities of project implementation are detailed in Table IV.

VIII. Concluding Remarks

1. Garage yard will be cleared, leveled and compacted by the Suez Governorate and is not to be included in the funding of this project.

2. Road materials (aggregates, bitumen, etc.) for implementing training procedures of this project will be supplied by the Roads Directorate.

3. Dismantling and removing existing asphalt plant will be the responsibility of the Roads Directorate.

4. Consultant's fees are authorized for use in the execution of this project, subject to review by the USAID Technical Assistance contractor.

5. Option of multiple (4) mobile batch plants is deemed adequate for the Suez Road Directorate paving and maintenance needs (20-28 tph capacity).

6. Either the fixed or mobile plant options provide ample capacity for both road maintenance and projected new pavement needs. However, owing to past experience of generally poor maintenance of mobile equipment, the fixed plant is recommended as the better alternative.

ORGANIZATION CHART FOR SUEZ ROADS DIRECTORATE

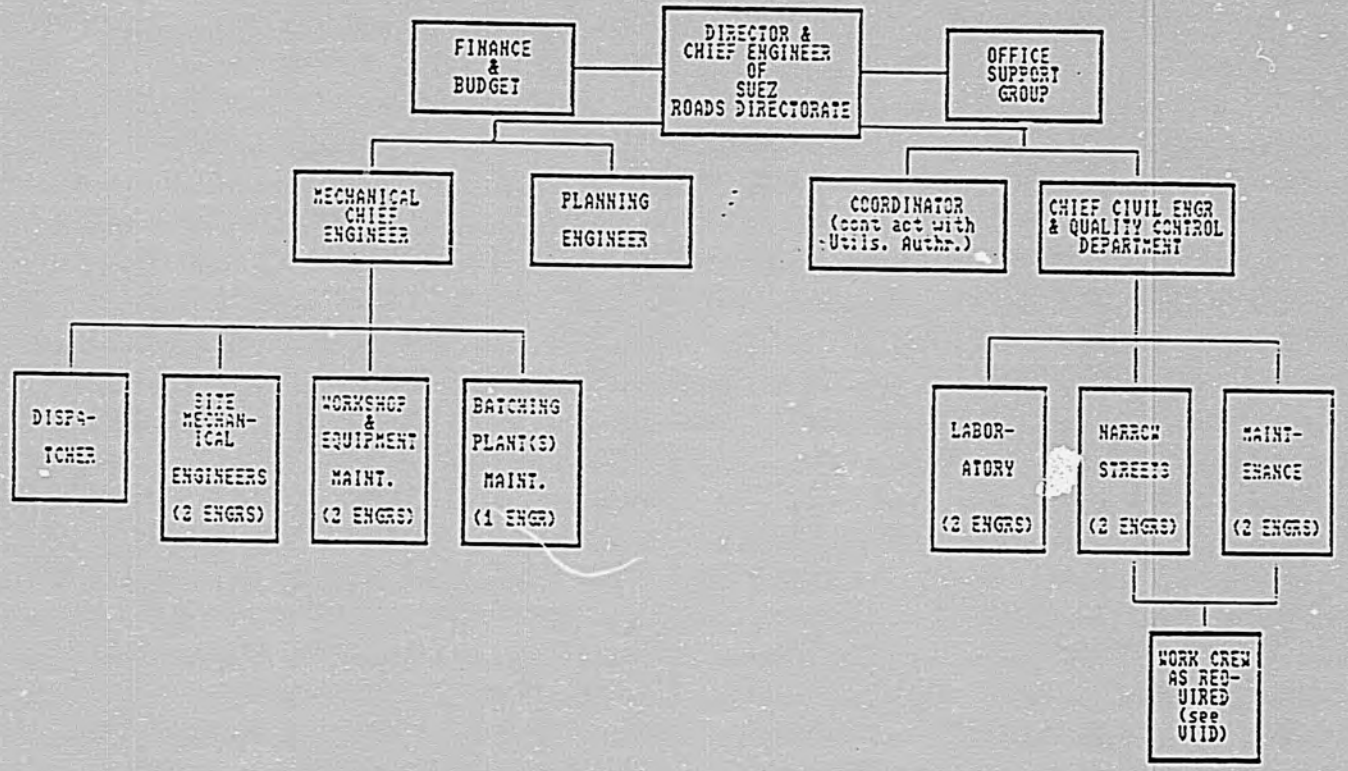


FIGURE 2

CALCULATION OF RESOURCE NEEDS

Personnel Hours

Activity	Total Crew Days	Foreman		Grader	Operator	Roller	Operator	Loader	Operator	Truck	Driver	Mason		Labourer	
		Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs
1	89	6	534	6	534	6	534	-0-	-0-	18	1602	-0-	-0-	42	3738
2	21	6	126	-0-	-0-	6	126	-0-	-0-	12	252	-0-	-0-	36	756
3	184	6	1104	-0-	-0-	-0-	-0-	-0-	-0-	6	1104	18	3312	36	6624
4	25	-0-	-0-	6	150	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
5	105	6	630	-0-	-0-	-0-	-0-	6	630	12	1260	-0-	-0-	36	3780
6	169	6	1014	-0-	-0-	-0-	-0-	6	1014	12	2028	-0-	-0-	48	8112
7	30	-0-	-0-	6	180	-0-	-0-	-0-	-0-	6	180	-0-	-0-	12	360
Total			3408		864		660		1644		6426		3312		23370

(From WSA Report of October 87)

Table I

CALCULATION OF RESOURCE NEEDS

Equipment Hours

Activity	Total Crew Days	Grader		Roller		Loader		Dump Truck	
		Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs	Per C-D	Total Hrs
1	89	6	534	6	534	-0-	-0-	18	1602
2	21	-0-	-0-	6	126	-0-	-0-	12	252
3	184	-0-	-0-	-0-	-0-	-0-	-0-	6	1104
4	25	6	150	-0-	-0-	-0-	-0-	-0-	-0-
5	105	-0-	-0-	-0-	-0-	6	630	12	1260
6	169	-0-	-0-	-0-	-0-	6	1014	12	2028
7	30	6	180	-0-	-0-	-0-	-0-	6	180
Totals			864		660		1644		6426

(From WSA Report October 87)

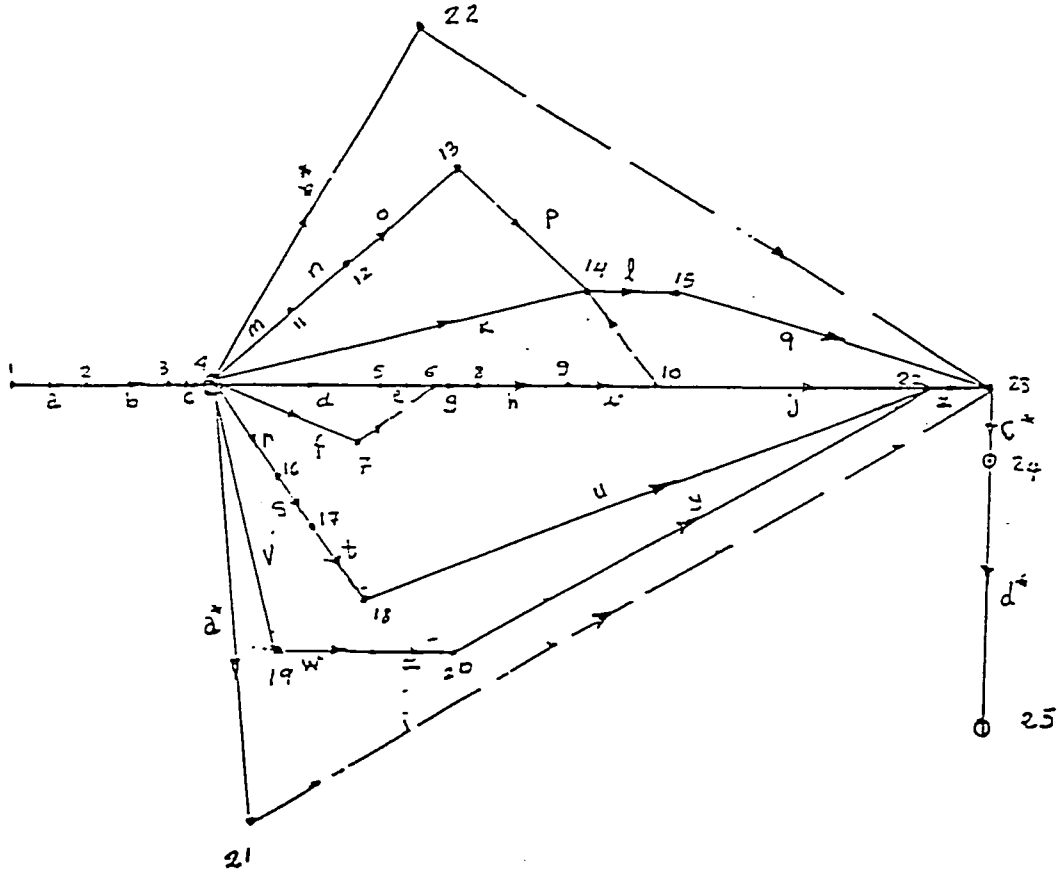
Table II

Activity	Total Crew - Days	Hot-mix Asphalt (Cubic Meters)		Tack Coat (Liters)		Crushed Base (Cubic Meters)		Pre-Cast Curbstone (Each)		Bedding Sand (Cubic Meters)		Mortar (Cubic Meters)	
		Per C-D	Total	Per C-D	Total	Per C-D	Total	Per C-D	Total	Per C-D	Total	Per C-D	Total
1	89	12	1068	30	2670	6	534						
2	21	8	168	20	420	4	84						
3	184							50	9200	1.0	184	0.5	92
4	25												
5	105												
6	169												
7	30												
Totals			1236		3090		618		9200		184		92

Table III

(From WSA Report, October 87)

(Critical Path)



Note: See Table II for legend of activities shown as a through d^*

Critical path activities
a - b - c - d - e - g - h - i - j - z - c^* - d^*

≡ 48 weeks

Figure 3

TABLE IV

PROJECT IMPLEMENTATION

Activity	Item	Duration (Weeks)	Preceding Activity
a	Project Review and approval by Suez Governorate and submission to ULDC	2	
b	ULDC approval and submission to USAID for funding	2	a
c	USAID approval	1	b
d	Civil work design and tender preparation including specifications and drawings	5	c
e	Review of (d) by TA Contractor for USAID	1	d
f	Civil contractor prequalifications	4	c
g	Call for bid for civil works	1	e & f
h	Bid period for Civil works	2	g
i	Evaluation of Civil tenders and contract award	2	h
j	Construction of civil works	10	i
k	Removal of existing plant	3	c
l	Construction of batch plant foundation	3	i, p, k
m	Batch plant tender preparation including specifications, conditions	2	c
n	Review of (m) by TA Contractor for USAID	1	m
o	Bid period for batching plant tender & contract award	4	n
p	Supply of foundation plan by batch plant supplier	2	o

q	Erection of batching plant	6	l
r	Issue of laboratory equipment tender	2	c
s	Review (r) by TA contractor for USAID	1	r
t	Bid period for laboratory equipment & contract award	2	s
u	Supply of laboratory equipment	8	t
v	Preparation of workshop equipment spare parts tender	2	c
w	Review of (v) by TA contractor	1	v
x	Bid period for supply of wokshop equipment and spare parts	3	w
y	Contracts award and supply of workshop equipment and spare parts	8	x
z	Installation of workshop equipment and laboratory equipment	1	j, y, u
a*	Repair of Equipment by private sector contractors/bid approval contract award - repair and handing over	10	c
b*	Appointment of new crews, performance tests, by governorate	10	
c*	Expatriate & Egyptian specialists on site for administrative functions	1	z,q,a*,b*
d*	Training and organization of Roads Directorate	20	c*