REPUBLIC OF LEBANON

MINISTER OF STATE FOR ADMINISTRATIVE REFORM

NATIONAL ADMINISTRATIVE REHABILITATION PROGRAMME (NARP)

WATER AUTHORITY OF BEIRUT

PROGRAMME 1996 - 1998

January 1996

WATER AUTHORITY OF BEIRUT

SUMMARY

The Sector

Though Lebanon lies within a semi-arid region, it is privileged, in comparison to its neighbours, in terms of natural water resources. However, despite the high level of rainfall and the comparative abundance of springs and rivers, actual modern-age water supply for domestic consumption, irrigation and industrial purposes constitutes a major national concern. This problem was further compounded by the continuing demographic changes that started at the outset of the civil war. Population growth, the national recovery process and the program of economic development accentuate the present and future demand for an upgraded water supply. Since supply of this life sustaining resource is currently limited to rain and snow fall during winter months, and is subject to various factors of losses in the form of evapotranspiration, and runoff, in addition to the recurrent embezzlement (by Israel), what remains available for use falls considerably below the national need.

Various estimates put the total volume of water resulting from precipitation in an average year at about 9,200 million cubic meters. About 47% of this is lost due to evapotranspiration. The remainder finds its way into the country's main 16 rivers and associated streams, or percolates to the ground water. Traditionally, surface water from springs and streams represents an important source for many Lebanese communities. Historically, these water sources serve domestic and irrigation purposes while the Litany River waters serve additionally in hydro-electric power generation. Up to date information about water sources and their continuous flow measurement is a prerequisite to any development project in this field.

Few decades after the formal establishment of the Republic of Lebenon, there was a noticeable growth in disparate organisations, both public and private, whose mandate involved research, exploitation and administration of Lebanon's water resources.

The Institution

At present, there are more than 10 independent water authorities charged with the management of drinking water, all under the auspices of the ministry of Hydraulics and Electric Resources. In addition, there is a large number of committees and councils run directly by the municipalities.

Established in 1951, the Water Authority of Beirut (WAB) is one of the oldest and largest authorities. It is headed by a Board of Directors and a Director General and it enjoys financial and administrative independence.

This authority is in charge of supplying potable water to the city of Beirut and its suburbs. It's global mission is the management and exploitation of Beirut water supply. During the war years, there were a lot of population shifts, which made planning for new services quite difficult. Moreover, the war events caused the destruction of many of the authority's installations and curtailed the maintenance and keep-up efforts. At times, Beirut suffered serious water shortages and inhabitants consequently resorted to uncontrolled well drilling. Over pumping has caused contamination of ground water by intrusion of sea water.

As soon as the fighting ended, WAB was able to start rehabilitating its installations showing a tangible improvement in services. At present, the average water distribution per day amounts to 237,000 m3 and the number of subscribers to 150 thousand which is equivalent to around 1.25 million consumer.

The present report identifies 6 priority projects to be undertaken by WAB in view of improving the services it provides and strengthening its institutional capacities.

These are:

- Equipping WAB with office technology.
- Providing WAB with adequate information technology applications.
- Upgrading personnel skills.
- Equipping WAB with vehicles and field equipment.
- Establishing a training center for the water utility sector.
- Computerization study for WAB.
- Conducting a public awareness campaign on the use of potable water.
- Establishing a centralized automated monitoring and control system

Minister of State for Administrative Reform

National Administrative Rehabilitation Programme
(NARP)

NARP FINANCIAL REQUIREMENTS 1996-1998

AGENCY OF : WATER AUTHORITY OF BEIRUT

AGENCY WAB	Breakdown by category	Year 1 (1996) USD	Year 2 (1997) USD	Year 3 (1998) USD	Total USD	Funds secured	Net amount (Gov. Budget)
GRAND TOTAL	Equipment	150,000	100,000	93,300	343,300		343,300
	Computer Systems	1,524,300	1,210,000	1,210,000	3,944,300		3,944,300
	Training	657,400	369,400	323,400	1,350,200		1,350,200
	Tech. Assistance & adv.	2,728,000	2,000,000	1,200,000	5,928,000		5,928,000
	Total	**5,059,700**	**3,679,400**	**2,826,700**	**11,565,800**		**11,565,800**

Minister of State for Aministrative Reform
National Administrative Rehabilitation Programme
(NARP)

NARP FINANCIAL REQUIREMENTS 1996-1998
BREAKDOWN BY PROJECTS

AGENCY OF : WATER AUTHORITY OF BEIRUT

AGENCY WAB	Breakdown by category	Year 1 (1996) USD	Year 2 (1997) USD	Year 3 (1998) USD	Total USD	Funds secured	Net amount (Gov. Budget)
project	Equipment						-
WAB-1	Computer Systems	314,300		-	314,300		314,300
Office	Training	18,000			18,000		18,000
Technology	Tech. Assistance & adv.				-		-
	Total	**332,300**	-	-	**332,300**	-	**332,300**
	Premises				-		-
project	Equipment				-		-
WAB-2	Computer Systems	1,210,000	1,210,000	1,210,000	3,630,000		3,630,000
Information	Training	18,400	18,400	18,400	55,200		55,200
Technology	Tech. Assistance & adv.				-		-
	Total	**1,228,400**	**1,228,400**	**1,228,400**	**3,685,200**	-	**3,685,200**
	Premises				-		-
project	Equipment				-		-
WAB-3	Computer Systems				-		-
Upgrading of	Training	621,000	351,000	305,000	1,277,000		1,277,000
Personnel	Tech. Assistance & adv.						-
Skills	**Total**	**621,000**	**351,000**	**305,000**	**1,277,000**	-	**1,277,000**
	Premises				-		-

BREAKDOWN BY PROJECTS

AGENCY OF : WATER AUTHORITY OF BEIRUT

AGENCY WAB	Breakdown by category	Year 1 (1996) USD	Year 2 (1997) USD	Year 3 (1998) USD	Total USD	Funds secured	Net amount (Gov. Budget)
project	Equipment	150,000	100,000	93,300	343,300		343,300
WAB-4	Computer Systems				-		-
Vehicles &	Training				-		-
Field	Tech. Assistance & adv.				-		-
Equipment	**Total**	**150,000**	**100,000**	**93,300**	**343,300**	-	**343,300**
	Premises				-		-
project	Equipment				-		-
WAB-5	Computer Systems				-		-
Study for	Training				-		-
Establishing	Tech. Assistance & adv.	148,000			148,000		148,000
a Training	**Total**	**148,000**	-	-	**148,000**	-	**148,000**
Center	Premises				-		-
project	Equipment				-		-
WAB-6	Computer Systems				-		-
Study	Training				-		-
to computerize	Tech. Assistance & adv.	80,000			80,000		80,000
WAB	**Total**	**80,000**	-	-	**80,000**	-	**80,000**
	Premises				-		-

BREAKDOWN BY PROJECTS

AGENCY OF : WATER AUTHORITY OF BEIRUT

AGENCY WAB	Breakdown by category	Year 1 (1996) USD	Year 2 (1997) USD	Year 3 (1998) USD	Total USD	Funds secured	Net amount (Gov. Budget)
project	Equipment						-
WAB-7	Computer Systems						-
Public	Training						-
Awareness	Tech. Assistance & adv.						-
Campaign	**Total**					-	-
	Premises				-		-
project	Equipment						-
WAB-8	Computer Systems						-
Establishment	Training						-
of an automate	Tech. Assistance & adv.	2,500,000	2,000,000	1,200,000	5,700,000		5,700,000
Monitoring	**Total**	**2,500,000**	**2,000,000**	**1,200,000**	**5,700,000**	-	**5,700,000**
System	Premises				-		-

* According to the Lyonnaise des Eaux Study, the total project cost is estimated at $ 7,7 million, out of which $ 2 million are embedded cost in priority project 3.2 (Information Technology) as a partial component of the whole project, concerned with the automation process.

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NATIONAL ADMINISTRATIVE REHABILITATION PROGRAM

1996 - 1998

WATER AUTHORITY OF BEIRUT

1. OUTLOOK OF THE PRESENT SITUATION

1.1 MISSION AND ESSENTIAL FUNCTIONS

1.1.1 Legal Status

The Water Authority of Beirut (WAB) was created by Law dated 11/1/1951. It is the first created autonomous authority in Lebanon as far as its identity and its financial and administrative independence are concerned. Furthermore, it enjoys full decision making power and executive authority.

The administrative and legal status of the Authority was defined by several laws and decrees. Its cadre was established by Decree No. 10462 dated 4/7/1968 to which many amendments were introduced, the latest being Decree No. 4789 dated 20/1/1973.

1.1.2 Functional Status

The mission of this authority is to continuously ensure the supply of safe water to inhabitants of Beirut and its suburbs, (clients of WAB are around 150 thousand subscribers in 1992) taking into consideration the increase in water consumption due to demographic changes.

To this end, the Water Authority of Beirut manages the flow of water from sources under its mandate (around 218 to 293 thousand m3 per day), operates and maintains its pumping and water treatment installations and supplies water to subscribers through its primary, secondary, and tertiary networks.

Moreover, it prepares agreements and tenders and carries out the administrative and financial affairs relative to its missions such as the collection of dues and the control over expenditures.

The global mission of the Water Authority of Beirut is detailed as follows:

Mission I

Transportation of water from sources, water treatment, purification, and supply either through the general network or by storage in reservoirs for distribution by gravity or pumping through distribution networks.

Functions:

- Assessing present and future demand on water and establishing plans for expansion projects.

- Studying and implementing technical installations and distribution networks in coordination with the Council for Development and Reconstruction.

- Operating water treatment plants and pumping stations and their maintenance.

- Supervising the primary and secondary distribution networks and their maintenance and updating the needs when and wherever needed.

- Controlling sanitation and management of water testing laboratories.

Mission II

Managing water supply to consumers

Functions:

- Preparation of subscription agreements.

- Distributing water to subscribers through meters or gauging instruments.

- Supervising distribution, receiving consumers grievances and performing the required maintenance.

Mission III

Drawing agreements and tenders and managing the administrative and financial affairs of the Authority such as the collection of dues and the control over expenditures, and managing personnel affairs including staff, labor and contractuals.

Functions

- Drawing up contracts for deals and bids.
- Material accounting and control of warehouses.
- Customers' accounting: subscription and billing.
- Controlling budgeted expenditures.
- General Accounting.
- Cashier.
- Administrative work.

1.2 ORGANIZATION

For the time being, the Water Authority of Beirut is managed by a Board of Directors composed of a President and 6 members plus a Director General, all appointed by the Council of Ministers. (Chart attached)

To the Directorate General directly reporting are:

- The Diwan (Administration)

- The Financial Department, which comprises 5 bureaus plus 3 sections:
  - Financial Control Bureau
  - General Accounts Bureau
  - Treasury Bureau
  - Collection Bureau
  - Subscribers' Accounts Bureau
  - Budget Section
  - Expenditures Control Section
  - Expenditures Liquidation Section

- The Procurement and Public Relations Department which comprises 3 Bureaus:
  - Litigations and Bids
  - Material Accounting
  - Purchasing and Warehouses Control

- The Distribution Department which comprises 5 bureaus:
  - Contracts for Beirut City
  - Contracts for Borj Hammoud
  - Distribution Control
  - Beirut Works
  - Borj Hammoud Works

- The Technical Department with 5 bureaus:
  - Execution of Pipes
  - Technical Bureau
  - Statistics and Studies
  - Electro-Mechanical Bureau which comprises two sections; namely Borj Abi Haydar Technical Section and Achrafieh Technical Section.
  - Dbayeh Plant Bureau with Laboratory Section

- The Department of Projects (Hydraulic, Civil and Statistical Engineers).

Following a reorganizational study aiming at modernizing the authority's structure and functions, a new organizational chart is proposed (refer to chart attached). The previous departments are grouped under two directorates: Administrative and Technical. Three Departments are allocated under each Directorate, as follows:

Administrative Directorate:

- Administration Department, including:
  - Personnel
  - Administrative Affairs
  - Subscriptions Follow up

- Finance Department, including:
  - Financial Control
  - Revenues
  - Subscription
  - Budget

- Litigations and Bids Department, including:
  - Bids
  - Legal Affairs

Technical Directorate:

- Production Department, including:
  - Stations and Wells
  - Dbayeh Stations
  - Damour/Awali Center
  - Maintenance and Executions
  - Technical Control
  - Technical Archiving

- Distribution Department, including:
  - Works, Maintenance and Distribution
  - Distribution Control

- Projects and Studies Department, including:
  - Studies and Projects
  - Technical Planning

1.3 PERSONNEL

There are 502 established positions in the Water Authority of Beirut 178 of which are occupied and 324 still vacant. There are also 10 contractuals and 231 daily workers. The immediate personnel needs of WAB are described in Tables 1 and 2 attached.

Below is a summary of the present staff situation:

Grade	Established Cadre Positions	Occupied by Cadre	Vacancies in Cadre
I	1	1	-
II	6	6	-
III AD	26	5	21
III-Tech	21	3	18
IV AD	194	75	119
IV Tech	110	29	81
V AD	43	14	29
V Tech	101	45	56
Total	**502**	**178**	**324**
Contractuals		10	
Daily Workers		216	

1.4 ONGOING ACTIVITIES

The years of strife had drastically affected WAB's productive assets and technical and institutional capacities.

Intensive effort has been put by the Beirut Water Authority jointly with the Council for Development and Reconstruction, and the Ministry of Hydraulic and Electric Resources with the assistance of International Organizations, Arab and European countries to rehabilitate the existing facilities.

A loan of 16 million ECU from the European Bank for Investment has been allocated to WAB for the rehabilitation of its installations.

The Authority has therefore been able to achieve a rationed supply of water at the rate of 20 hours every 48 hours in the water abundant season, and 10 hours every 48 hours in the dry season, to improve on its bill collection from 55% in 1987 to 86% in 1994, and to undertake several other activities including:

1. Execution plan for water conveyance between Jeita and Dbayé in cooperation with the Council for Development and Reconstruction who will be assisting in providing the necessary funds donated by Italian government subsidies.

2. Preparation of studies and tender documents for projects aiming at increasing the capacity of water conveyance between Dbayé and Beirut and its suburbs.

3. Securing financing for the water conveyance project between Awaly and Beirut in cooperation with CDR.

4. The rehabilitation and maintenance of various pumping installations, distribution network for consumers connections, the primary network in general and the secondary one in specific.

5. A reorganization / reengineering study in cooperation with the the Institutional Development Unit of the Office of the Minister of State for Administrative Reform including organization, systems, work flow & procedures, etc.

6. Filling vacant positions. Efforts are now being made to inject new blood in WAB, and competitive entry exams have been prepared accordingly.

7. Follow up of arrear's collection

8. Preliminary study by CID and Dune for establishing a training center: "Centre des Technologies de l'Eau et de l'Environement".

9. Study for the establishment of a centralized automated monitoring and control system for all WAB installations (pumping stations, treatment plants, wells and main distribution networks). This study was conducted by the Lyonnaise des Eaux for a total cost of US$100,000 and its implementation is subject to approval and funds provision.(Refer to Appendix 1).

1.5 MAIN PROBLEMS FACED

The main problems faced by the Beirut Water Authority are the consequences of the war and listed as follows:

1. The extensive damage to the technical equipment, pumps and water treatment stations, water reservoirs and distribution networks.

2. The rapid increase as well as changes in water consumption patterns as a result of the demographic changes in the capital and its suburbs; (population growth, population shift and migration).

3. The shortage in personnel as well as equipment.

4. The urgent need to upgrade existing personnel skills.

5. The urgent need to automate WAB administration and operations.

6. The overlapping of responsibilities due to under specified territorial definition between WAB and Water Authorities of both, Metn and Ain El Delby concerning water supply networks particularly in both Qazas of Metn and Baabda.

7. Distribution Department, Revenue Collection Bureau and Gauges Issuance Section are still suffering a high level of redundancy. This is due to the continued use of two operating offices (East and West of Beirut) which used to prevail during the war period .

2. OBJECTIVES AND PRIORITY REHABILITATION ACTIVITIES FOR THE NEXT 3 YEARS

2.1 EXPECTED AND PROGRAMMED TECHNICAL ASSISTANCE

The Water Authority of Beirut is receiving technical assistance through the Ministry of Hydro-Electric Resources from the Lyonnaise des Eaux, following a study for the establishment of a centralized monitoring and control system (Refer to priority project 3.6 and Appendix 1).

2.2 ELEMENTS OF A MEDIUM LONG-TERM STRATEGY AND OBJECTIVES

1. The damages inflicted on the Beirut Water Authority network and its facilities, as a result of the war, plus the shortages in equipment due either to lack of maintenance or lack of financing, make the complete rehabilitation of the network and facilities of utmost importance if WAB is to provide 24 hours per day supply of water . The responsibility of this rehabilitation falls mainly on the Beirut Water Authority even though there might be other parties interested in financing the projects, preparing studies, or implementing them. The Beirut Water Authority, being in charge of management and exploitation, must shoulder the major responsibility and take the role of activating, following up, controlling, receiving works, and operating and maintenance. This needs a high level of competence and performance.

2. The large demographic changes that occurred in Beirut during the war due to the migration of a great number of people to the Capital and its suburbs, especially to the Southern Suburb, a part of the Northern Suburb, population shifts, as well as the expected reconstruction of Beirut down-town require an urgent up-to-date survey for water demand. This survey should measure consumption as well as the actual needs for the present and the future.

   For this purpose, the authority should:

   - Look for new water sources and install necessary pipes, equipment and facilities.

   - Provide a mechanism for a continuous assessment of water consumption patterns and projection of water demand on modern automated basis for the coming years. An updating is required for the study made in this context by the French company "BECEOM".

- Ensure the necessary financing, equipping, and studies for the implementation of the above, or request the assistance of the Council for Development and Reconstruction, the Ministry of Hydraulic and Electric Resources, and International Organizations.
  It is worthnoting here that WAB satisfactorily uses its self generated funds as far as maintenance and immediate equipping needs are concerned.

Even though some specialized companies might do the above job, the duty remains with the Beirut Water Authority to have efficient and well- equipped staff to lead the operation and guide it to fruition.

2.3 SHORT-TERM PRIORITY PROJECTS

The Beirut Water Authority is a vital utility and services institution as it deals with the daily needs of the Beirut residents, their health and their safety. It requires a high standard of performance especially from the technical and sanitary points of view:

This requires the following:

- Acquisition of modern technical equipment for operations and maintenance (pumps, electrical welding set, trucks, etc.).
- Computerization of WAB operations (study in process).
- Provision of necessary information technology applications, grouped as follows:

1. Administrative, Financial and Operational Systems
   - General Accounts
   - Accounts Receivable and Payable
   - Fixed Assets Control System
   - Payroll/Personnel System
   - Inventory Management
   - Equipment/Site Maintenance and Control System

2. Subscription Control System

3. Billing Control System

4. AM/FM/GIS for the water network of Beirut

5. Centralized Automated Monitoring /Control System
With reference to priority project 3.8, estimated by Lyonnaisė Des Eaux study at $ 7,7 million, we propose to support the project with the automation components, namely:

   a. Central Monitoring System.
   b. Central Data Collection System.
   c. Network and Control Devices

The cost of above components are envisaged into priority project 3.2 (Information Technology) at $ 2 million and excluded from priority project 3.8 of Lyonnaise Des Eaux, as it allows WAB to acquire the Central Monitoring Components for its water network.

- Training of personnel to upgrade their skills (refer to table 3).
- Speeding up the recruiting process of new personnel because the average age of 87% of existing employees is 46 years and/or above. (As per TCU statistical survey).
- Establishment of a training center to enhance vocational skills related to water supply.
- Conducting a public awareness campaign on the use of potable water.

2.4 TRANSITION STRATEGY FROM SHORT-TERM TO LONG-TERM OBJECTIVES

The following is a description of priority projects that, if executed on time, will result in enhancing WAB's potential to achieve its medium and long-term objectives.

3. PRIORITY ACTIVITIES SUMMARY DESCRIPTION

3.1 Priority Project (WAB-1)
Office Technology

The Water Authority of Beirut needs to equip its offices with computers such as (P.C's, complete CAD station, printers, computers, etc.). Those computer stations and equipment are essentially needed by the authority to improve its working conditions and increase its efficiency.

The following table itemizes and costs this need.

Item	Quantity	Cost	Total
Lan (10 Users)	1	$ 88,300	$ 88,300
Lan (5 Users)	4	$ 56,500	$ 226,000
Training	30	$ 600	$ 18,000
			$ 332,300

Lan (10 Users)	Quantity
Server	1
PC's + OT S/W	10
Laser Printer	2
Matirx Printer	2
Cabling	1
Hubs	1
Routers	1

Lan (5 Users)	Quantity
Server	1
PC's + OT S/W	5
Laser Printer	1
Matirx Printer	1
Cabling	1
Hubs	1
Routers	1

To be allocated in the first year.

Year 1	*Year 2*	*Year 3*
332,300		

3.2 Priority Project (WAB-2)
Information Technology Applications

This project needs the following:

1. Administrative, Financial and Operational Systems

General Accounts : since the Water Agency of Beirut is an autonomous agency, it has its own books and procedures. Therefore, it requires its own independent accounting system. However, there may be requirements that are requested by the Ministry of Finance which should be incorporated in the accounting system. The system requires the use of multicurrencies although the financial statements will all be in Lebanese Pounds.

Accounts Receivable and Payable : this system controls any suppliers and clients the Water Agency of Beirut may have. Suppliers are usually local and foreign which requires the use of multicurrency. The Water Agency of Beirut has clients to whom it distributes water under contract. In this manner, a receivable system would be of benefit, but not responsible for the billing function which is part of the system described later. The receivables and payables system is highly integrated with the general accounting system and covers such functions as statements for these parties, aging of incoming or outgoing invoices showing all payments made in part and in full.

Fixed Assets Control System : the Water Agency of Beirut owns a wide range of equipment, buildings, vehicles and various items such as furniture and fixtures. A Fixed Assets control system is required to control the location and distribution of these items. Secondly, such a system is also required to control the financial depreciation of such assets. Should an Equipment Control System is required by the Water Agency of Beirut for engineering maintenance, the Fixed Assets System must interface with it.

Payroll/Personnel Systems : being an autonomous authority, the Water Agency of Beirut handles it own payroll and personnel functions. An integrated system is required to interface with the financial as well as the maintenance systems. The personnel function covers: personnel data, employment and administrative information, educational and training histories, disciplinary actions, and related notes.

The payroll system is parametrized to allow the user to define various allowances and regular deductions made on a periodic basis. Other ad hoc entitlements and deductions can be entered through related transactions. Loans and advances as well as their repayments are to be handled by the system . The system should produce payslips, payroll registers distributing the payments according to mode (Cash, banks, or transfers). It should provide reports related to services such as the social security, medical expenses, etc.

Equipment/Site Maintenance and Control System : this system has three major functions that apply to both equipment and sites :

1. Equipment Control : covers the history and transactions that relate to the various equipment and sites of the Water Agency of Beirut. This means that the system will know the historical data, the location and the various actions that were made on each equipment in the Water Agency of Beirut.

2. Maintenance Control: The system will setup standard maintenance plans on a database containing a detailed definition of the various corrective (If possible) and preventive procedures on each type of equipment. Such plans contain the projected usages of materials, labor, machines as well as textual information related to the maintenance procedures themselves. Each equipment or site will have its preventive maintenance schedule setup on a special database whether the schedule is based on ad hoc planning, cyclical or periodic needs. Work orders are controlled by this module. However, the costing is described in the third function. Each work order on an equipment goes into its history file. Furthermore, other transactions describe what happens to the equipment in terms of change of location, change of design, installation and removal of rotables, change of status, cancellation, etc.

3. Maintenance Cost Control : work orders are issued for both corrective and preventive maintenance. Each work order is supported by transactions that control the issue of : material, labor, machines, subcontracts and other direct costs to the job. The total cost for each work order is accumulated on a work in progress basis. The system should link with various systems to identify costs such as: stock control, payroll, and payables. It also needs to be linked to the general accounting system to reflect all costs and their allocations..

Inventory Management System : covers the inventory management for the various stores whether in the head quarters or in related sites. The life cycle of stock starts with a proper control of purchase requests and the related levels of authority needed for such purchases. This may result in a local or foreign purchase order. The orders are placed on the system and are closed by the full or partial receipts against them giving the user a full picture of outstanding orders. Once items are received, they are costed and setup on the stock masters. From there on, the system should provide the user with a set of transactions needed for the issue of materials to work orders, transfers from warehouse to warehouse, adjustments, write off's and returns.

2. Subscription Control System

The WAB has around 400,000 subscriptions which serve a population of 1.25 million. A system is required that will maintain pertinent information on subscribers and keep it up to date. The system will be distributed since the operations of the WAB are decentralized. In addition, it should cover member's application, change of service, move of service, and end of service. The system will interface with the Billing System and the Accounts Receivable System.

3. Billing Control System

Currently, billing of subscribers is done every three months. Payments of fees are done at 4 collection centers. A system is required to take care of the billing function and to interface with the Accounts Receivable and the Subscription Control system

. Automated Mapping, Facilities Management and Geographic Information System (AM/FM/GIS)

For the purpose of maintaining and controlling the water network, its equipment and sites, the Water Agency of Beirut have a variety of water network maps. Most of these maps are of A0 size or smaller. Due to frequent usage, the maps are deteriorating. The system has to interface with the Subscription Control System and implement the following three major functions:

(a) Archiving of water network maps : there is a need to archive the various maps for easier access.

(b) Technical mapping capability : setup of such a mapping capability to allow the Water Agency of Beirut to prepare future maps using an AM/FM/GIS application. The team using such a software should have its own setup and be properly trained.

(c) Conversion of technical maps to digital maps : this system is capable of converting older paper based maps automatically to standard digital maps for ease of maintenance. Conversion software will be needed for this system.

Therefore, the following is required :

- A team that is properly trained on the GIS.
- Technical mapping and drawing equipment :
  Server + stations
  Plotters
  Scanners
- AM/FM/GIS application
- Software to convert scanned maps into digital maps

5. Centralized Automated Monitoring and Control System

In order to optimally exploit and utilize water resources of Beirut, an integrated centralized automated system to control and monitor the whole water network is needed. This system will allow the WAB to centrally monitor the water network and dispatch requests for action through work orders to correct situations as monitored centrally. The integrated system will be made out of the following components: central monitoring system, central data collection system, the network, and the controlling devices.

P.S. This system comprises a partial cost component of the study conducted by Lyonnaise Des Eaux.
As per attached cost list, this system is estimated at $ 2million, amount as such will be deducted from the estimated project cost by Lyonnaise Des Eaux to net to $ 5,7 million instead of 7,7.

Costs:

The following table summarizes these needs:

Applications	**Qty**	**Cost**	**Totals**
General Accounting	1	$ 49,500	$ 49,500
Accounts Receivables/ Payable	1	$ 43,500	$ 43,500
Membership Invoicing	1	$ 54,000	$ 54,000
Payroll/Personnel	1	$ 78,000	$ 78,000
Fixed Assets	1	$ 33,000	$ 33,000
Cash Collection	1	$ 27,000	$ 27,000
Equipment Site Maintenance	1	$ 78,000	$ 78,000
Inventory Management	1	$ 78,000	$ 78,000
Technical Drawing Tools and Systems	1	$ 20,000	$ 20,000
Document Management System	1	$ 64,500	$ 64,500
Project Management Information System	1	$ 54,000	$ 54,000
Subscription	1	$ 33,000	$ 33,000
AM/FM/GIS	1	$ 81,000	$ 81,000
Centralized Automated Monitoring/Control System	1	$ 2,000,000	$ 2,000,000
			$ 2,693,500
Setup			
Foundation Hardware			
Server Large	2	$ 35,000	$ 70,000
Server Small	4	$ 10,000	$ 40,000
Workstations	5	$ 5,000	$ 25,000
PCs	35	$ 3,000	$ 105,000
	46		
Plotter A0	1	$ 15,000	$ 15,000
Scanner A0	1	$ 17,000	$ 17,000
Jukebox 100	1	$ 25,000	$ 25,000
Foundation RDBMS/OS			
SQL RDBMS	46	$ 600	$ 27,600
NT OS	46	$ 150	$ 6,900
			$ 331,500
			$ 3,025,000
Maintenance			**$ 605,000**
Training	46	$ 1,200	**$ 55,200**
			$ 3,685,200

To be allocated over three years as follows:

Year 1	*Year 2*	*Year 3*
1,228,400	1,228,400	1,228,400

3.3 Priority Project (WAB-3)
Upgrading of Personnel Skills

In addition to equipping, modernization of work methods requires the training of the employees in the use of new equipment through various types of training, namely: administrative and management, professional, vocational and technical.

New recruits in grade II, III, and IV require training in the administration and management fields.

Existing and newly recruited technicians need to be trained on hydraulics, mechanical, and electrical skills that they need to acquire in order to perform their functions.

It is recommended that Senior staff (Grade II) conducts visits abroad to similar water authorities, in order to benefit from their experience.

The impact of such a training will enhance establishing the training center to update the personnel skills in diversified topics to cover all related trades.

The project of Centralized Monitoring and Controlling System will be affected as well. Upgraded skills are a must for this project, and trainees need to get oriented to modern tools and latest technology. Obviously, upgrading personnel skills will enrich the Authority operational capabilities and its level of performance. It will improve the productivity as well through activating the individual functional units, and, thus, decreasing the long-term operational costs.

Table 3 itemizes the training needs of WAB. A summary of those needs is presented below:

Brief Description	Cost USD
194 trainee weeks in Adm. & Management Training	97,000
320 trainee weeks in Professional Training	360,000
1640 trainee weeks in Vocational Training	820,000
Total Cost (USD)	**1,277,000**

To be distributed over 3 years as follows:

Year 1	*Year 2*	*Year 3*
621,000	351,000	305,000

3.4 Priority Project (WAB-4)
Vehicles and Field Equipment

The Water Authority of Beirut needs vehicles and field equipment to carry out its operations in a proper way. Many of the mechanized field equipment used in the operation and maintenance of the water network and treatment plants need to be provided in order to allow the authority to efficiently achieve its objectives and to respond quickly to maintenance calls.

Table 5 itemizes those needs. A summary is presented below:

Brief Description	Cost USD
Vehicles (6 cars 4 WD)	150,000
Field Equipment (Trucks, pumps, welding sets, etc.)	193,300
Total Cost (USD)	**343,300**

To be distributed over 3 years as follows:

Year 1	*Year 2*	*Year 3*
150,000	100,000	93,300

3.5 Priority Project (WAB-5)
A Study for Establishing a Training Center for the Water Utility Sector

A preliminary study was completed by the group CID and Dune for the purpose of establishing the "Centres des Technologies de l'Eau et de l'Environement" and training WAB personnel in hydraulics related fields.

The objective of establishing this training center is to enhance vocational skills related to water supply and sanitary water disposal, also to develop courses and train on new techniques related to water analysis, water pollution detection, computer applications, instrumentation and automation relative to water supply, water treatment equipment, network diagnosis, and water leakage detection. The establishment of this training center requires space (1500 m2) and equipment.

The total cost of this project is identifiable only through a detailed study and design. The estimated cost for this study is:

Brief Description	Cost USD
Final study and design budget	148,000
Premises and equipment (to be allocated and estimated by the study)	
Total Cost (USD)	**148,000**

To be allocated for the first year

Year 1	*Year 2*	*Year 3*
148,000		

3.6 Priority Project (WAB-6)
Computerization Study for the WAB

Develop a Master Plan for Information Systems to support the current and future needs of WAB in order to improve operations and provide a quality service to its customers. This Master Plan will:

- Document current operational practices including business processes workflow of WAB
- Identify current and future needs of WAB
- Analyse current work processes and propose improvements
- Define the requirements and the architecture of Information Systems to support multiple offices in a networked environment
- Develop solution options
- Define effect on staff, management practices, workflow, and customers
- Develop an implementation plan with a time table
- Estimate cost of implementation

It is estimated that the study would take 3-6 months at an estimated cost of $80,000

Brief Description	Cost USD
Study and design budget	80,000
Total Cost (USD)	**80,000**

This sum is to be allocated for the first year.

Year 1	*Year 2*	*Year 3*
80,000		

3.7 Priority Project (WAB-7)
Public Awareness Campaign on the Use of Potable Water

The water availability problem in Beirut and other cities will require not only solutions of the supply side, but should also consider eliminating unnecessary demand.

Potable water is a valuable resource that should be used prudently. Thousands of cubic meters of water are wasted daily through dripping taps and squanderous use. For this reason, WAB should sponsor a public awareness and information campaign via various mass media aimed at encouraging the public on:

- reducing the wasted consumption
- fixing dripping and leaking plumbing

Mass media such as radio, televisions, journals and newspapers may be willing to offer the time and/or space as a public service. The estimated cost is limited to producing the message and themes to be addressed by WAB.

The output of this project is:

- To achieve public participation in the development and implementation of national policies for water conservation, protection and ensures accountability.
- To achieve sustainable and equitable water resources development through the active public participation in the design and implementation of national policies for water conservation, protection, and accountable service delivery.

It is recommended to link this campaign to a strict control of water consumption. This implies the installation of water meters at the consumer's connections, monitoring of consumption, and penalizing wastage.

The conduct of a public awareness campaign on the use of potable water should be an ongoing activity of WAB. The results of the first campaign will reveal whatever modification in campaign planning, design, and implementation are necessary.

This campaign is obviously necessary for the viability of water distribution in Beirut. Budget for campaign planning, design and implementation is USD 100,000.

It is a necessary complement to NARP actions, but is not accounted for in the NARP, as it does not consist of administrative rehabilitation actions.

3.8 Priority Project (WAB-8)
Establishment of a Centralized Automated Monitoring and Control System

A comprehensive study aiming at establishing a centralized automated monitoring and control system has been conducted by the Lyonnaise des Eaux through the technical assistance forwarded by the Ministry of Hydro-Electric Resources for a total cost of USD 100,000.

This project encompasses the optimum exploitation and utilization of water resources through establishing a centralized automated system to control and monitor the whole water network. Furthermore, it realizes a potential for functional evolution in water treatment and in maintaining a continual service on a 24/24 hours basis.

The project identifies the required equipment and their cost estimate including the satellite equipment needed in stations, the synoptic boards, and all other necessary monitoring and controlling tools. In addition, it recognizes the need for staff to operate the system and the training requirement to achieve a developed regular scheme for daily services and maintenance schedules.

The implementation phases of this project will cover the main water exploitation centers, namely the Authority Main Office, Dbayyeh, Jal El Deed, Hazmieh, Hadath, Dekwaneh, Ashrafieh, Tallet Al Khayat and Al Damour, with an estimated cost of FF. 38,5 million, approximately equivalent to USD 7,7 million. (Refer to Appendix 1).

For the objective of optimizing the allocation of funds for this project, WAB is ready to tender this project on phased implementation basis. Accordingly, Al Awaly, Al Damour, Ain El- Delby, Al Hadath and Wardanieh stations will be the last to automate.

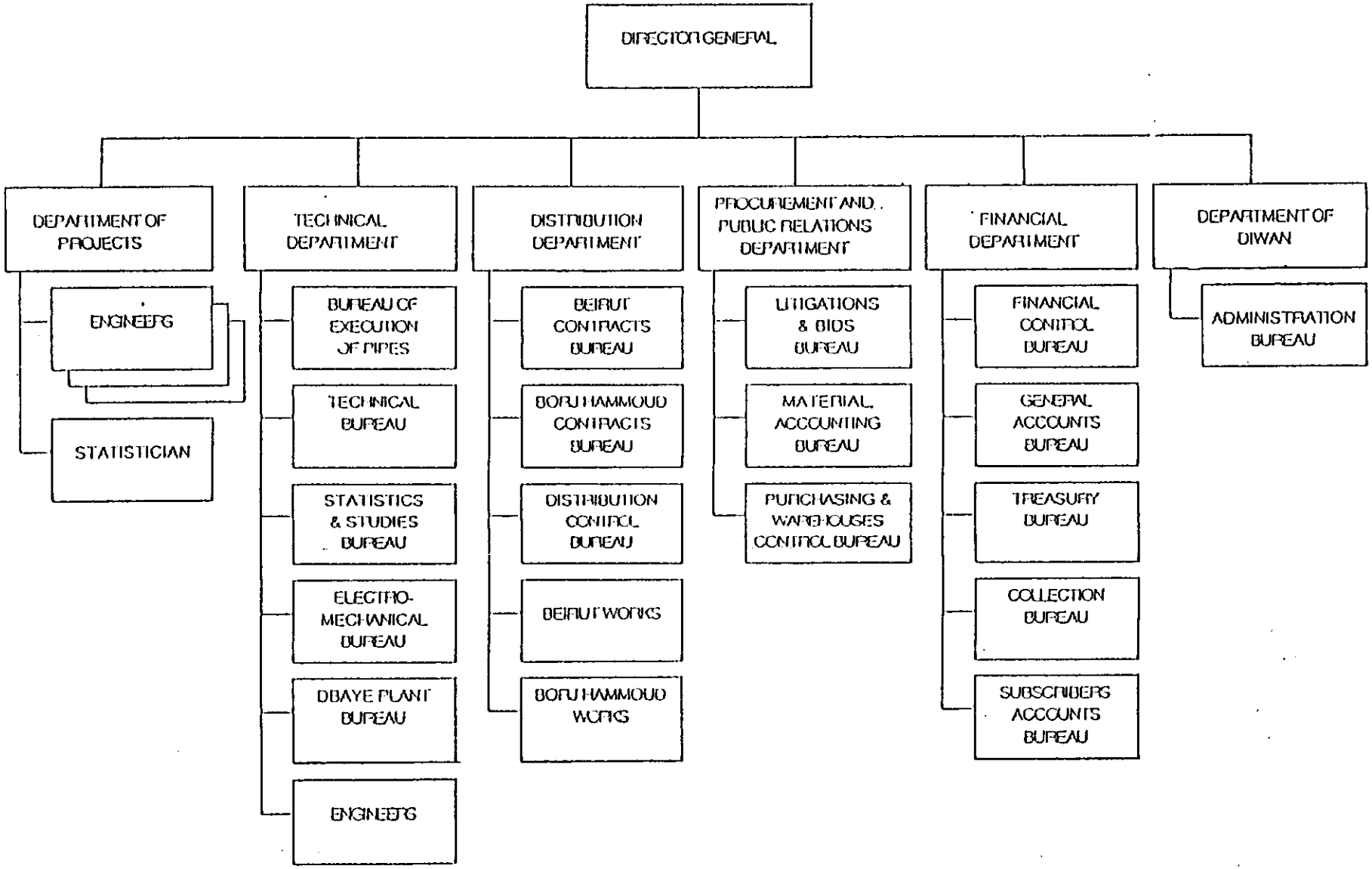
P.S. With reference to priority project 3.2 (Information Technology), the automation component of above project is embedded into the cost of Applications at USD 2 million.

Outputs	Brief Description	Cost USD
1	Estimated Implementation Cost	7,700,000
2	*(Less Automation components accounted for in IT)*	<2,000,000>
	Total Cost (USD)	**5,700,000**

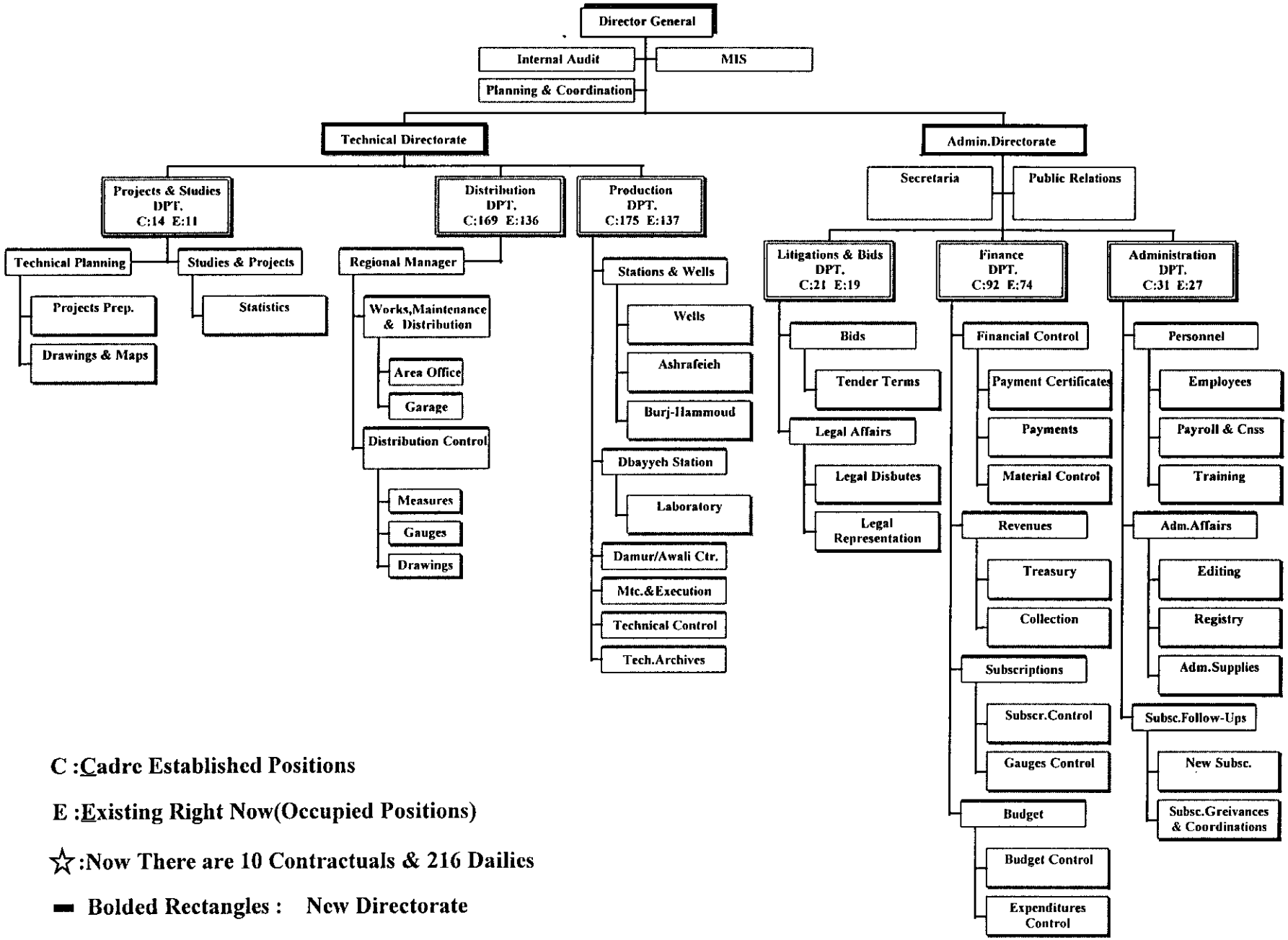
To be distributed over 3 years as follows:

Year 1	*Year 2*	*Year 3*
2,500,000	2,000,000	1,200,000

CURRENT ORGANIZATION STRUCTURE



PROPOSED ORGANIZATION CHART



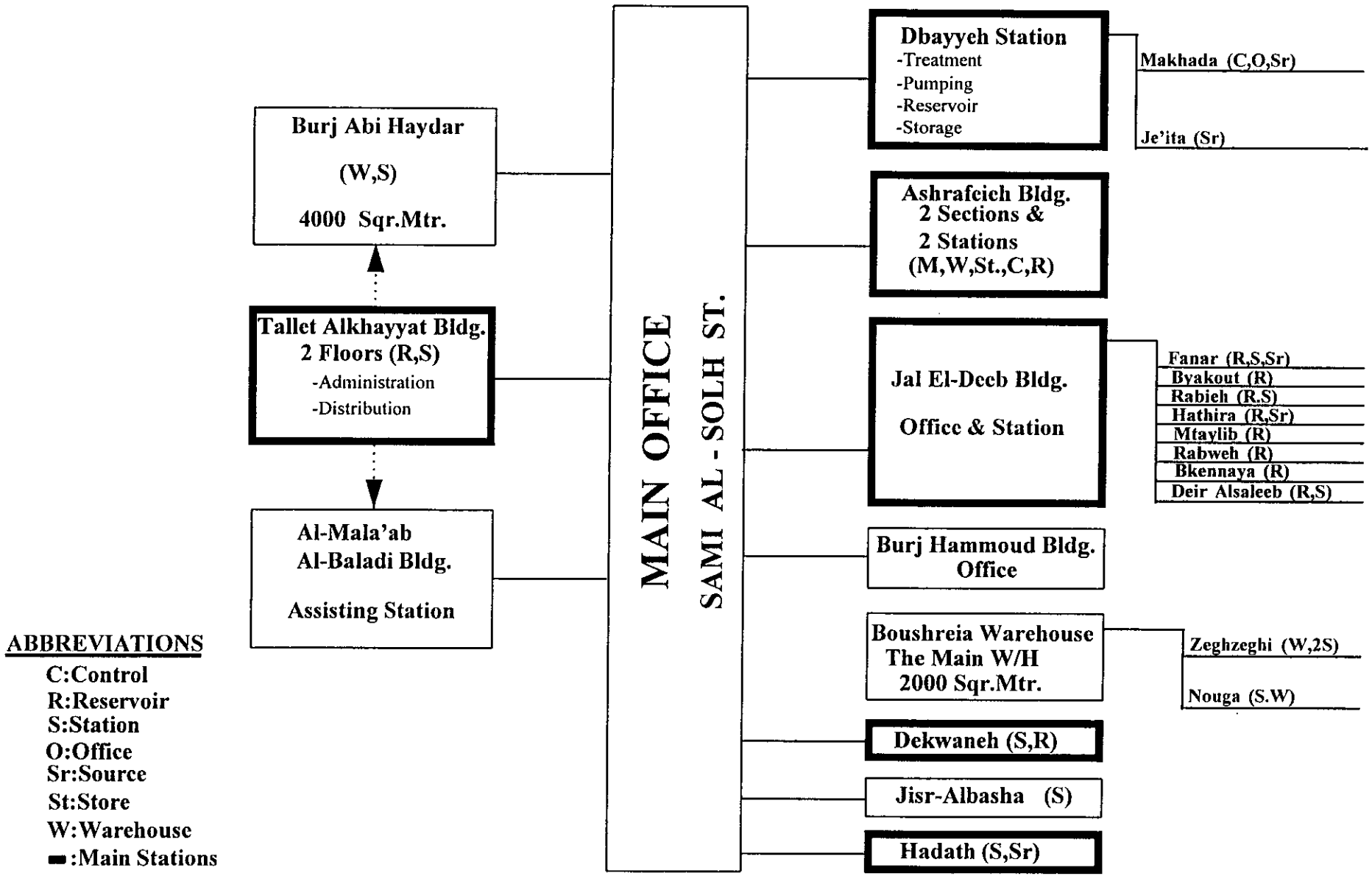
C :Cadre Established Positions

E :Existing Right Now(Occupied Positions)

☆:Now There are 10 Contractuals & 216 Dailies

▬ Bolded Rectangles : New Directorate

GEOGRAPHICAL DISTRIBUTION



ABBREVIATIONS

C:Control
R:Reservoir
S:Station
O:Office
Sr:Source
St:Store
W:Warehouse
▬:Main Stations

TABLE 1
IMMEDIATE NEEDS FOR PERSONNEL

AGENCY : WATER AUTHORITY OF BEIRUT

GRADE	ESTABLISHED POSITIONS	TOTAL OCCUPIED	VACANT POSITIONS END 1995	THREE YEAR DISTRIBUTION		
				YEAR 1 1996	YEAR 2 1997	YEAR 3 1998
Grade I	1	1	0			
Grade II	6	6	0			
Grade III AD 1	12		12	9	3	
Grade III AD 2	14	5	9	6	3	
Grade III tech 1	7	2	5	3	2	
Grade III tech 2	14	1	13	8	5	
Grade IV AD - I	65	23	42	34	8	
Grade IV AD - II	129	52	77	70	7	
Grade IV Tech - I	34	8	26	20	6	
Grade IV Tech - II	76	21	55	50	5	
Grade V AD	43	14	29	10	19	
Grade V Tech	101	45	56	35	21	
TOTAL (Cadre)	**502**	**178**	**324**	**245**	**79**	**0**
Contractuals		10				
Daily Workers		216				

TABLE 2
STAFFING NEEDS CLASSIFIED
BY FUNCTIONS

AGENCY : WATER AUTHORITY OF BEIRUT

GRADE	NO.	FUNCTION	REQUIRED QUALIFICATIONS AND EXPERIENCE	TOTAL PER GRADE
Grade II		Engineer		
Grade II		Administration & Finance		0
Grade IIIAD 1	12	Chief of Bureau - Administrative, Financial	University degree + 5 years experience	
Grade IIIAD 2	9	Chief of Section - Administrative, Financial		21
Grade IIITech1	5	Engineers: Electro-Mechanical, Water, Civil	University degree in engineering + 5 years experience	
Grade IIITech2	13	Engineers: Electrilcal, Mechanical, Public Works, Water and Specialists		18
Grade IV-I	42	Editor, Accountant, Cashier, Storekeeper,	Bac II or equivalent with experience	
Grade IV-I	26	Inspector, Designer, Surveyor, Trainer, Specialist I, Nurse, Lab Technician	BT or TS with experience	68
Grade IV-II	77	Editor, Assistant Storekeeper, Distribution Controller, Collector, Typist, Telephone Operator		
Grade IV-II	55	Specialist, Driver, Draftsman, Health Controller		132
Grade V	29	Office Boy, Watchman, Telephone Operator	Brevet or equivalent	
Grade V	56	Driver, Technical Worker	Literate	85
TOTAL	324			324

TABLE 3
TRAINING NEEDS FOR EXISTING EMPLOYEES

AGENCY WATER AUTHORITY OF BEIRUT

GRADE	NO. OF TRAINEES	(1) WEEKS OF TRAINING	TRAINEE WEEKS	PLACE OF TRAINING	TRAINING TOPICS	TOTAL TRAINING COST $			THREE YEAR DISTRIBUTION		
						LOCAL TRAINING	REGIONAL TRAINING	INT'L TRAINING	Year 1 1996	Year 2 1997	Year 3 1998
					Administration and Management Training						
Grade II	6	4	24	NIAD	Administration and Finance	12,000			6,000	6,000	0
Grade III-1 &III-2	10	4	40	NIAD	Business Administration	20,000			10,000	10,000	0
Grade III-1 &III-2	10	4	40	NIAD	Budgeting and Accounting	20,000			0	10,000	10,000
Grade IV-1	15	3	45	Local	Basic Management , Inventory Management	22,500			7,500	7,500	7,500
Grade IV-1	15	3	45	Local	Cost Accounting, Budgeting	22,500			7,500	7,500	7,500
					Professional Training						
Grade III	20	4	80	Regional	Potable Water Distribution and water technology		120,000		60,000	30,000	30,000
Grade III	20	4	80	Regional	Water Distribution Installations and Equipment		120,000		60,000	30,000	30,000
Grade III	10	4	40	Regional	Water treatment and water quality monitoring techniques		60,000		30,000	30,000	0
Grade IV	30	4	120	Local	Techniques of detection and suppression of frauds	60,000			20,000	20,000	20,000
					Vocational Training *						
Grade IV-1Tech	20	8	160	Local	Piping, Maintenance and Repairs	80,000			40,000	20,000	20,000
Grade IV-1Tech	20	8	160	Local	Engines and Motors Maintenance	80,000			40,000	20,000	20,000
Grade IV-1Tech	5	8	40	Local	Maintenance of Water Purifiaction Equipment	20,000			20,000	0	0
Grade IV-2 &V	40	8	320	Local	General Electricity and Mehanics	160,000			80,000	40,000	40,000
Grade IV-2 &V	40	8	320	Local	Piping, Water distribution installations	160,000			80,000	40,000	40,000
Grade IV-2 &V	40	8	320	Local	Piping, Maintenance and Repairs	160,000			80,000	40,000	40,000
Grade IV-2 &V	40	8	320	Local	Water meters and flow limiting devices	160,000			80,000	40,000	40,000
TOTAL	**341**					**977,000**	**300,000**	**0**	**621,000**	**351,000**	**305,000**
GRAND TOTAL								**1,277,000**			**1,277,000**

* Vocational training will be conducted in the WAB training center (not existing right now). The number of trainees will be increased and the training topics wil be diversified to cover all related trades

TABLE 4
OFFICE REHABILITATION NEEDS

AGENCY : WATER AUTHORITY OF BEIRUT

LOCATION	DESCRIPTION	AREA SQM	UNIT NBR	RENTAL COST OF ADDITIONS $ / YEAR
WAB Office Beirut	This buliding was rehabilitated	600		
Bldg, Sami Solh St.				
	Additional office space needed for expansion	1,200		
	(the actual and expected staff recruited) and			
	modernization WAB operations			
TOTAL				0

* The cost of acquiring additional space is not included in the NARP Budget

TABLE 5
ESSENTIAL EQUIPMENT NEEDS

AGENCY : BEIRUT WATER AUTHORITY

EQUIPMENT	TYPE	NO.	UNIT PRICE	TOTAL COST	TOTAL COST PER GROUP	THREE YEAR DISTRIBUTION		
						YEAR 1 1996	YEAR 2 1997	YEAR 3 1998
OFFICE TECHNOLOGY								
Lan (20 Users)	Refer to Details in Priority Project 3.1	1	88,300	88,300				
Lan (5 Users)	Refer to Details in Priority Project 3.1	4	56,500	226,000	314,300	**314,300**		
Training	Refer to Details in Priority Project 3.1	30	600	18,000	18,000	**18,000**		
TOTAL					**332,300**	**332,300**		
INFORMATION TECHNOLOGY								
Applications	Refer to Details in Priority Project 3.2	-		2,693,500				
Setup	Refer to Details in Priority Project 3.2	-		331,500				
Maintenance	Refer to Details in Priority Project 3.2	-		605,000	3,630,000	**1,210,000**	**1,210,000**	**1,210,000**
Training	Refer to Details in Priority Project 3.2	46	1,200	55,200	**55,200**	**18,400**	**18,400**	**18,400**
TOTAL					**3,685,200**	**1,228,400**	**1,228,400**	**1,228,400**

TABLE 5 (cont'd)
ESSENTIAL EQUIPMENT NEEDS

AGENCY : BEIRUT WATER AUTHORITY

EQUIPMENT	TYPE	NO.	UNIT PRICE	TOTAL COST	TOTAL COST PER GROUP	THREE YEAR DISTRIBUTION		
						YEAR 1 1996	YEAR 2 1997	YEAR 3 1998
Vehicles & Field Equipment								
Trucks	30 Ton Capacity	1	65,000	65,000				
Elect. Welding Set		5	1,000	5,000				
Groupe Moto-Pompe	Mobile 2"	5	2,500	12,500				
Submersible Pump	100m Head 15l/s	4	4,800	19,200				
Submersible Pump	100m Head 15l/s	4	5,000	20,000				
Submersible Pump	100m Head 15l/s	4	6,200	24,800				
Submersible Pump	100m Head 15l/s	3	8,200	24,600				
Submersible Pump	100m Head 15l/s	2	11,100	22,200				
Cars	4 WD	6	25,000	150,000				
TOTAL					**343,300**	**150,000**	**100,000**	**93,300**
TOTAL EQUIPMENT NEEDS					**4,360,800**	**1,710,700**	**1,328,400**	**1,321,700**

APPENDIX 1

ESSENTIAL BRIEFING OF "LYONNAISE DES EAUX" - IN FRENCH

SOMMAIRE

1. PRESENTATION ET OBJECTIFS DU PROJET

1.1. OBJET

Le présent Cahier des Clauses Techniques Particulières, (CCTP) concerne la mise en place de la Gestion Technique Centralisée, (GTC) des installations de production, de traitement et de transport gérées par l'OFFICE des EAUX de BEYROUTH.

Ce projet concerne les Centres d'exploitation suivants :

- DBAYEH
- JALL ED DIB
- HAZMIEH
- HADATH
- DEKOUANE
- ACHRAFIEH
- TALLET EL KHAYAT

Pour chacun des centres d'exploitation précités, le projet déterminera :

- les équipements satellites en station
- les supports de communication à envisager
- les équipements du poste central
- l'aménagement de la salle du poste central
- le panneau synoptique de la salle du poste central
- la formation du personnel d'exploitation et de maintenance
- l'organisation du service de maintenance.

1.2. OBJECTIFS

Ce projet sera conduit pour répondre aux objectifs suivants énoncés par l'O.E.B. :

- centralisation des informations de production et du réseau principal de distribution sur un site unique
- réalisation d'un système permettant une évolution des fonctionnalités :
  - . télésurveillance, téléalarme
  - . télécommandes
  - . télégestion
  - . optimisation
- un service continu 24h sur 24 sera assuré en permanence au poste central

1.2.1. DBAYEH

C'est la plus grosse unité de production de l'Office des Eaux de Beyrouth, sa capacité de traitement est actuellement de 230 000 m^3/jour. Il est donc nécessaire de procéder à un phasage des travaux qui permette d'équiper en priorité cette unité et ses captages.

Description des installations en suivant le fil de l'eau :

- Chambre d'arrivée de l'eau des sources

- Une arrivée par une canalisation diamètre 350 mm en provenance des captages d'Antélias

- Sur le canal d'amenée se trouve une vanne de décharge à la mer du surplus de débit par rapport à la capacité de traitement de l'usine

- Trois décanteurs statiques en parallèle. Une vanne d'isolement par décanteur. Un agitateur en partie centrale des décanteurs pour injection de chlorure ferrique en période de forte turbidité de l'eau.

- Unité de 44 filtres anciens à sable. Les filtres sont commandés par vannes manuellement.

- Station de pompage constituée de 7 pompes à entraînement électrique et 2 pompes couplées chacune à un moteur diesel. Les pompes et les asservissements hydrauliques de démarrage sont réalisés manuellement ou avec asservissements électromécaniques.

Une deuxième batterie de 30 nouveaux filtres à sable, capacité 200 000 m^3/jour, et une nouvelle station de pompage sont en cours de réalisation. La capacité de décantation est augmentée de 70 000 m^3/jour. La nouvelle station de pompage refoule dans le réseau de distribution existant. La capacité de filtration sera portée à 270 000 m^3/jour avec l'ajout de 10 nouveaux filtres.

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur les différents sites contrôlés :
  - chambre d'arrivée d'eau brute
  - décanteurs
  - filtres
  - ancienne unité de refoulement
  - nouvelle unité de refoulement
- la mise place d'un superviseur permettant une gestion et une supervision globale, conviviale et précise de l'ensemble des installations suivant la liste ci-jointe

- l'intégration au système de supervision des sites distants gérés par les exploitants :
  - . la source de Jiita
  - . les 5 forages de Jiita
  - . le barrage de Nahr El Kalb
  - . les 2 forages de Makhada
  - . les 2 forages de Nahr El Kalb
  - . la source de Kach'ouch

. les 2 forages de Naccach
. le forage de Nahr
. le forage école
. la source Salta né
. la source Faouar
. Dbayeh (refoulement, filtration ancienne unité)
. Dbayeh (refoulement ancienne unité)
. Dbayeh (nouvelle unité de traitement et pompage)
. la station de reprise d'Antélias

1.2.2. Station de reprise de JALL ED DIB

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur le site contrôlé

- la mise place d'un superviseur permettant une gestion et une supervision globale, ergonomique et précise de l'ensemble des installations suivant les listes ci-jointes

- l'intégration au système de supervision des sites distants gérés par les exploitants :
  - la station de reprise de Jall ed dib
  - la station de reprise de Rabieh et réservoir n° 1
  - la station de Rabieh 2
  - le réservoir de Mtaileb
  - la station et le réservoir de Deir es salib
  - le réservoir de Biaqout
  - le réservoir de Bquinnaya
  - le forage de Zaaitriyé
  - le forage de Bonjus
  - le forage de Narh el Maout
  - la station et le réservoir de Fanar 1
  - le réservoir métallique
  - le réservoir Fanar 2
  - le forage de Champville 1
  - le forage de Champville 2
  - le forage de Champville 3 (futur)
  - le forage de Tamiche (saab)
  - le réservoir de Hadira

1.2.3. Station de HAZMIEH et ses forages

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur le site contrôlé

- la mise place d'un superviseur permettant une gestion et une supervision globale, ergonomique et précise de l'ensemble des installations suivant la liste ci-jointe :

  . la station et les forage de Dachounieh
  . la station et les forages d'Hazmieh

1.2.4. Station de HADATH et ses forages (AWALI)

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur le site contrôlé
- la mise place d'un superviseur permettant une gestion et une supervision globale, ergonomique et précise de l'ensemble des installations suivant la liste ci-jointe.

1.2.4.1. Projet AWALI

Le cabinet d'Ingénieurs Conseil MONTGOMERY WATSON rédige les spécifications de construction et d'exploitation de la nouvelle usine de traitement d'eau de Ouardaniye.

Celle-ci sera alimentée en eau brute par le tunnel existant de Joun avec de l'eau en provenance du Nahr el Awali. Après traitement, l'eau est amenée par gravité au réservoir d'Hadath et de Tallet el Khayat. La répartition hydraulique entre les deux réservoirs est effectuée par une vanne de régulation située à Khalde. A terme cette vanne sera télécommandable depuis le poste central de la GTC de l'OEB. Chaque conduite d'amenée d'eau aux réservoirs sera équipée d'un débitmètre.

L'instrumentation, les automates programmables et les postes de supervision seront spécifiés par Montgomery Watson à l'identique du présent document technique.

Les informations suivantes de l'usine de traitement seront disponibles au réseau de la GTC :

- débit et comptage d'eau brute
- débit et comptage d'eau traitée
- paramètres de qualité de l'eau distribuée : turbidité, chlore résiduel, pH, ...
- fonctionnement des groupes électrogènes
- paramètres de qualité de l'eau brute
- nombre de filtres en service
- état des vannes d'eau brute et d'eau traitée (manuel/auto, % d'ouverture, Défaut alimentation électrique)
- défauts des équipements

Supports de communication préconisés :

- liaison radio point à point entre le réservoir d'Hadath et le poste central de l'OEB
- fibre optique entre le réservoir d'Hadath et la chambre de vanne de régulation de Khalde
- liaison spécialisée entre le réservoir d'Hadath et l'usine de traitement
- liaison réseau téléphonique commuté entre la prise d'eau de Joun et l'usine de traitement

1.2.5. Station de DEKOUANE et ses forages

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur les sites contrôlés
- la mise place d'un superviseur en salle de commande permettant une gestion et une supervision globale, facile et précise de l'ensemble des installations suivant les listes ci-jointes.
- l'intégration au système de supervision des sites distants gérés par les exploitants :
  - le forage de Mar Antonios
  - le forage de Nacouzi
  - le forage de Rawda
  - les 2 forages de Salomé
  - les 2 forages de Aïn Ech Cheikh
  - le forage de Jisr el Bacha (ancien)
  - le forage de Jisr el Bacha (nouveau)
  - le forage de Karmid
  - le forage de Anwar
  - le forage de Baouchrieh
  - le forage et la station de reprise de Dékouané
  - le forage et la station de reprise de Zoghzoghi
  - la station et le réservoir de Mkallès (futur)
  - le réservoir de Mar Roukoz
  - le réservoir de Sabtieh

1.2.6. ACHRAFIEH

1.2.6.1. Réservoirs inférieurs ACHRAFIEH cote 63

Ces réservoirs sont situés au centre ville de Beyrouth.

Au nombre de 5 et d'une capacité totale de 37 000 m^3, ils sont tous interconnectés et en équilibre statique. Le réservoir R1 est alimenté à partir du radier des 4 autres par une conduite. Les réservoirs R2, R2', R3 et R3' sont alimentés par l'usine de Dbayeh par une conduite 1 000 mm.

L'eau des 4 réservoirs est pompée en partie vers le réservoir du réseau supérieur par une station de pompage obsolète qui est remplacée par une nouvelle station. Une partie de l'eau pompée est directement distribuée.

L'eau du réservoir R1 est distribuée sur le réseau bas de la ville.

1.2.6.2. Réservoirs supérieurs ACHRAFIEH

A partir des réservoirs, l'eau est en partie distribuée gravitairement et le reste est pompé sur un réseau surpressé situé à une côte plus élevée.

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur le site contrôlé

- la mise place d'un superviseur permettant une gestion et une supervision globale, ergonomique et précise de l'ensemble des installations suivant les listes ci-jointes

- l'intégration au système de supervision des sites distants gérés par les exploitants :

  . la station et les réservoirs d'Achrafieh inférieur
  . la station et les réservoirs d'Achrafieh supérieur
  . la station de reprise de la corniche du fleuve

1.2.7. Station et réservoirs de TALLET EL KHAYAT

Le projet concerne :

- la mise en place d'équipements de dialogue homme-machine sur le site contrôlé

- la mise place d'un superviseur permettant une gestion et une supervision globale, facile et précise de l'ensemble des installations suivant la liste ci-jointe

- l'intégration au système de supervision des sites distants gérés par les exploitants :

  . la station de Naameh
  . les 5 forages de Damour
  . les 3 réservoirs de Damour
  . les 3 forages de Naameh
  . les 3 forages de Mechref
  . les forages et la station de Bir el Hadath
  . le réservoir et la reprise de Borj abi Haïdar
  . le réservoir et la station de Tallet el Khayat
  . la station de reprise de Malaab Baladi
  . les 4 comtages de ∅ 600 sur réseau de distribution (sur 2 sites)

Un automate programmable ou un télétransmetteur assurera les fonctions :

- de collecte des informations
- de surveillance des équipements
- de communication avec le poste central de la salle de commande

8. BORDEREAU DE PRIX

8.1. GENERALITES

Dans le bordereau de prix, les sous-titres et les descriptions identifient les prestations correspondantes aux différents items et l'exacte nature et étendue des travaux à réaliser. Les tarifs et prix notés dans ce bordereau devront être fermes et définitifs, couvrir la totalités des prestations décrites et inclure les points suivants sauf spécifications particulières par ailleurs :

- les travaux et tous les coûts annexes de l'ensemble des prestations
- l'approvisionnement des matériels, produits et équipements, ainsi que tous les coûts associés incluant l'entretien du chantier et la restitution des installations dans l'état de propreté initiale
- les sujétions d'horaire et les précautions particulières liées aux travaux réalisés sur des installations de production et de distribution d'eau potable
- la mise en place et les raccordements des équipements fournis tenant compte de l'outillage particulier nécessaire, des alimentations et des équipements provisoires pour assurer la continuité du service public pendant les travaux. Cet outillage particulier nécessaire à la maintenance sera remis à l'OEB à la fin des travaux.
- toutes les obligations, responsabilités et risques entraînés par la réalisation des travaux correspondants dans les documents d'appel d'offre
- les taxes, frais généraux et marges.

L'entrepreneur tiendra également dans ses prix tous les frais annexes liés au transport, au logement et la subsistance de ses techniciens.

Les coûts proposés comprendront également le conditionnement, le transport, le stockage et le gardiennage des équipements sur site avant leur mise en place.

L'entrepreneur devra mettre en place le type de matériel ou d'équipement proposé dans les fiches techniques. Mais si, en cours de réalisation, l'entrepreneur désirait remplacer un matériel ou un équipement par un autre il ne pourrait le faire qu'après accord de l'Office Des Eaux De Beyrouth. Les coûts indiqués dans le bordereau devront tenir compte de ces possibilités sans donner lieu à aucune plus value.

Les coûts des enveloppes et éléments métalliques comprendront les protections contre l'oxydation, les peintures et galvanisation à chaud si nécessaire (coupe des chemin de câbles par exemple). Ils comprendront également tous les raccords, reprises partielles ou totale rendues nécessaires pour répondre aux spécifications du présent document.

Le bordereau de prix doit être rempli en relation avec les différents chapitres et paragraphes du présent document.

Le bordereau de prix sera utilisé par l'Office Des Eaux De Beyrouth comme référence en cours de réalisation (si nécessaire).

En complément des détails de prix fournis dans ce chapitre, l'entrepreneur indiquera les coûts unitaires des équipements suivants :

- chaque élément de chaque automate programmable proposé
- chaque élément de chaque télétransmetteur proposé
- chaque type de modem
- chaque type d'alimentation secourue.

Paiement des prestations :

Toutes les prestations seront payées en livres libanaises suivant le taux de change de la Banque du Liban au jour de la présentation des offres.

8.2. LISTE DES COUTS DETAILLES

Le devis ci-après est une estimation de la Lyonnaise des Eaux -CA2i. Les trames vierges du devis à remettre aux soumissionnaires se trouvent dans le "cahier des charges relatif à la fourniture" de la partie administrative C pièce 5.

DEVIS QUANTITATIF ET ESTIMATIF

SOMMAIRE

1.RESEAU DE HAZMIEH

STATION DE DACHOUNIEH	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	3	172.500,00 FF
- Comptage	3	34.500,00 FF
- Capteur de pression	1	57.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		573.390,00 FF

STATION DE HAZMIEH	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Capteur de débit	2	115.000,00 FF
- Comptage	2	23.000,00 FF
- Capteur de pression	1	57.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
- Automate programmable industriel	1	115.000,00 FF
- Radio	2	184.000,00 FF
- Modem	2	69.000,00 FF
- PC + printer +logiciels + supervision	1	115.000,00 FF
- Raccordement - mise en service	1	161.460,00 FF
- Matériel électrique (cablage, schéma...)	1	115.000,00 FF
TOTAL		1.098.940,00 FF

2.RESEAU DE HADATH

STATION DE HADATH	*QUANTITE*	*PRIX*
- Automate programmable industriel	1	230.000,00 FF
- Radio	2	184.000,00 FF
- Modem	1	39.000,00 FF
- PC + printer +logiciels + supervision	1	195.000,00 FF
- Raccordement - mise en service	1	182.520,00 FF
- Matériel électrique (cablage, schéma...)	1	130.000,00 FF
TOTAL		**960.520,00 FF**

3.RESEAU DE DEKOUANE

STATION DE MAR ANTONIOS	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**350.980,00 FF**

STATION DE NACOUZI	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**350.980,00 FF**

STATION DE RAWDA	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**350.980,00 FF**

FORAGE DE SALOMEH 1	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de conductivité	1	17.250,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**368.230,00 FF**

FORAGE DE SALOMEH 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.480,00 FF**

FORAGES AIN ECH CHECK 1 ET 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de débit	2	115.000,00 FF
- Comptage	2	23.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**396.980,00 FF**

FORAGE DE JISR EL BACHA	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de conductivité	1	17.250,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**310.730,00 FF**

FORAGE DE KARMID	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.480,00 FF**

FORAGE DE ANWAR	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.480,00 FF**

FORAGE DE BAOUCHRIEH	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.480,00 FF**

FORAGE DE ZOGHZOGHI	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de conductivité	1	17.250,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**368.230,00 FF**

FORAGE DE MAR-ROUKOZ	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**350.980,00 FF**

FORAGE DE ROUKOZ	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**223.340,00 FF**

FORAGE DE SABTIEH	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**197.570,00 FF**

STATION DE DEKOUANE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	2	46.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de pression	1	51.750,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
- Automate programmable industriel	1	287.500,00 FF
- Radio	2	115.000,00 FF
- Modem	2	69.000,00 FF
- PC + printer +logiciels + supervision	1	115.000,00 FF
- Raccordement - mise en service	1	322.920,00 FF
- Matériel électrique (cablage, schéma...)	1	287.500,00 FF
TOTAL		**1.592.060,00 FF**

4.RESEAU DE DBAYEH

FORAGE DE NACCACH 1	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**350.980,00 FF**

FORAGE DE NACCACH 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.480,00 FF**

FORAGE DE L'ECOLE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Modem récepteur	1	34.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**412.390,00 FF**

FORAGE DE NARH	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**350.980,00 FF**

FORAGE DE NARH EL KALB 1	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**197.570,00 FF**

FORAGE DE NARH EL KALB 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

FORAGE DE MAKHADA 1	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**197.570,00 FF**

FORAGE DE MAKHADA 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

FORAGES SOURCES JITA 1-2-3-4-5	*QUANTITE*	*PRIX*
- Armoire	5	32.500,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	5	325.000,00 FF
- Capteur de niveau	5	115.000,00 FF
- Capteur de débit	5	325.000,00 FF
- Capteur de turbidité	5	260.000,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**1.113.890,00 FF**

SOURCE ACH'OUCHE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de turbidité	1	52.000,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**281.980,00 FF**

SOURCE SALTANE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Raccordement - mise en service	1	26.910,00 FF
TOTAL		**147.660,00 FF**

SOURCE FAQUAR	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Raccordement - mise en service	1	26.910,00 FF
TOTAL		**147.660,00 FF**

STATION DE REPRISE ANTELLIAS	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de pression	1	57.500,00 FF
- Raccordement - mise en service	1	26.910,00 FF
TOTAL		**301.070,00 FF**

ANCIENNE USINE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Modem	2	69.000,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	3	69.000,00 FF
- Capteur de débit	2	172.500,00 FF
- Comptage	2	23.000,00 FF
- Capteur de pression	1	57.500,00 FF
- Capteur de turbidité	2	92.000,00 FF
- Capteur de chlore résiduel	2	115.000,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**768.890,00 FF**

NOUVELLE USINE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
-.Modem	2	69.000,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur ou API	1	57.500,00 FF
- Capteur de débit	4	460.000,00 FF
- Comptage	4	23.000,00 FF
- Capteur de pression	4	230.000,00 FF
- Capteur de turbidité	1	46.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**1.114.390,00 FF**

POSTE DE SUPERVISION DE L'USINE	*QUANTITE*	*PRIX*
- Automate programmable industriel	1	345.000,00 FF
- Radio	1	92.000,00 FF
- Modem	4	138.000,00 FF
- PC + printer +logiciels + supervision	1	172.500,00 FF
- Raccordement - mise en service	1	430.560,00 FF
- Matériel électrique (cablage, schéma...)	1	345.000,00 FF
TOTAL		**1.523.060,00 FF**

5.RESEAU DE DAMOUR

FORAGE DE NAAMET 1	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE NAAMET 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE NAAMET 3	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE MECHREF 1	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE MECHREF 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE MECHREF 3	QUANTITE	PRIX
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		293.460,00 FF

FORAGE DE MECHREF 4	QUANTITE	PRIX
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		293.460,00 FF

FORAGE DE MECHREF 5	QUANTITE	PRIX
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		293.460,00 FF

FORAGE DE MECHREF 6	QUANTITE	PRIX
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		293.460,00 FF

FORAGE DE DAMOUR 1	QUANTITE	PRIX
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		235.960,00 FF

FORAGE DE DAMOUR 2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE DAMOUR 3	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE DAMOUR 4	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

FORAGE DE DAMOUR 5	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**293.460,00 FF**

STATION DE NAAMET	*QUANTITE*	*PRIX*
- Automate programmable industriel	1	230.000,00 FF
- Radio	2	115.000,00 FF
- Modem	2	69.000,00 FF
- PC + printer +logiciels + supervision	1	230.000,00 FF
- Raccordement - mise en service	1	322.920,00 FF
- Matériel électrique (cablage, schéma...)	1	230.000,00 FF
TOTAL		**1.196.920,00 FF**

6.RESEAU DE ACHRAFIEH

RESERVOIRS INFERIEURS	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	5	115.000,00 FF
- Capteur de débit	4	345.000,00 FF
- Comptage	4	46.000,00 FF
- Capteur de pression	3	155.250,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	188.370,00 FF
- Automate programmable industriel	1	172.500,00 FF
- Radio	3	276.000,00 FF
- Modem	2	69.000,00 FF
- PC + printer +logiciels + supervision	1	115.000,00 FF
- Raccordement - mise en service	1	322.920,00 FF
- Matériel électrique (cablage, schéma...)	1	230.000,00 FF
TOTAL		**2.155.790,00 FF**

RESERVOIRS SUPERIEURS	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	2	46.000,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**247.480,00 FF**

STATION DE LA CORNICHE DU FLEUVE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de pression	2	103.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**331.890,00 FF**

7.RESEAU DE TALLET EL KAYAT

COMPTAGE N°1 ET N°2	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de débit	2	172.500,00 FF
- Comptage	2	23.000,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**423.890,00 FF**

COMPTAGE N°3 ET N°4	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de débit	2	172.500,00 FF
- Comptage	2	23.000,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**423.890,00 FF**

STATION DE REPRISE DE MALAAB BALADI	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de pression	1	57.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**327.980,00 FF**

STATION DE BIREL	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	2	46.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de pression	1	23.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Capteur de conductivité	1	17.250,00 FF
- Raccordement - mise en service	1	134.550,00 FF
TOTAL		**468.050,00 FF**

RESERVOIR DE TALLET EL KAYAT	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	2	46.000,00 FF
- Capteur de débit	4	230.000,00 FF
- Comptage	4	46.000,00 FF
- Capteur de pression	4	92.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- % ouverture vanne	2	11.500,00 FF
- Raccordement - mise en service	1	161.460,00 FF
- Automate programmable industriel	1	287.500,00 FF
- Radio	1	57.500,00 FF
- Modem	1	23.000,00 FF
- PC + printer +logiciels + supervision	1	230.000,00 FF
- Raccordement - mise en service	1	376.740,00 FF
- Matériel électrique (cablage, schéma...)	1	230.000,00 FF
TOTAL		**1.204.740,00 FF**

STATION DE REPRISE DE BORJ ABI HAIDAR	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	2	46.000,00 FF
- Capteur de débit	3	172.500,00 FF
- Comptage	3	34.500,00 FF
- Capteur de pression	2	46.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	134.550,00 FF
TOTAL		**611.800,00 FF**

8.RESEAU DE JALL ED DIB

STATION DE REPRISE DE MALAAB BALADI	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	3	172.500,00 FF
- Comptage	3	34.500,00 FF
- Capteur de pression	3	69.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	161.460,00 FF
TOTAL		**638.710,00 FF**

RESERVOIR DE RABIEH	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

RESERVOIR DE MTAILEB	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

STATION ET RESERVOIR DE DEIR ES SALIB	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	3	172.500,00 FF
- Comptage	3	34.500,00 FF
- Capteur de pression	3	69.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	161.460,00 FF
TOTAL		**638.710,00 FF**

RESERVOIR DE BQUINAYA	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

RESERVOIR DE BIAQUOUT	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

FORAGE DE NARH EL MAOUT	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**235.980,00 FF**

FORAGE DE BONJUS	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**235.980,00 FF**

FORAGE DE FANAR	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de pression	3	69.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**389.390,00 FF**

FORAGE DE ZAAITRYE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**235.980,00 FF**

RESERVOIR METALLIQUE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

FORAGE DE CHAMPVILLE HAUT	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**377.890,00 FF**

FORAGE DE CHAMPVILLE BAS	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**377.890,00 FF**

FORAGE DE CHAMPVILLE FUTUR	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	107.640,00 FF
TOTAL		**377.890,00 FF**

RESERVOIR DE HADIRA	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Raccordement - mise en service	1	53.820,00 FF
TOTAL		**140.070,00 FF**

FORAGE DE TAMICHE	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	1	57.500,00 FF
- Comptage	1	11.500,00 FF
- Raccordement - mise en service	1	80.730,00 FF
TOTAL		**235.980,00 FF**

STATION DE JALL ED DIB	*QUANTITE*	*PRIX*
- Armoire	1	5.750,00 FF
- Radio	1	57.500,00 FF
- Télétransmetteur	1	57.500,00 FF
- Capteur de niveau	1	23.000,00 FF
- Capteur de débit	3	172.500,00 FF
- Comptage	3	34.500,00 FF
- Capteur de pression	2	46.000,00 FF
- Capteur de chlore résiduel	1	57.500,00 FF
- Raccordement - mise en service	1	161.460,00 FF
- Automate programmable industriel	1	287.500,00 FF
- Modem	1	46.000,00 FF
- PC + printer +logiciels + supervision	1	230.000,00 FF
- Raccordement - mise en service	1	376.740,00 FF
- Matériel électrique (cablage, schéma...)	1	230.000,00 FF
TOTAL		**1.785.950,00 FF**

9.CENTRE DE CONTRÔLE DE L'OFFICE DES EAUX DE BEYROUTH

SALLE DE COMMANDE	*QUANTITE*	*PRIX*
- PC TOPKAPI + imprimante	2	690.000,00 FF
- Serveur de Données Généralisé	2	690.000,00 FF
- Armoire	1	230.000,00 FF
- Rack de commutation	1	115.000,00 FF
- Topcourbe	1	287.500,00 FF
- Synoptique mural et son API	1	920.000,00 FF
- Réseau local	1	115.000,00 FF
- Etude	1	372.600,00 FF
- Configuration TOPKAPI	1	331.200,00 FF
- Configuration SDG	1	165.600,00 FF
- Radio	1	115.000,00 FF
- Aménagement de la salle et mobilier	1	427.800,00 FF
- Onduleur	1	230.000,00 FF
- Modems	2	100.000,00 FF
- Raccordement - mise en service	1	621.000,00 FF
TOTAL		**5.410.700,00 FF**

2. BILAN DE L'EXISTANT

2.1. GENERALITES

Les informations importantes (signalisations, défauts, mesures, commandes) ne sont pas transmises actuellement.

Les signalisations servent localement et éventuellement animent un synoptique d'armoire électrique.

Les défauts actionnent soit une lampe soit un klaxon .

Sur ces différents sites la plupart des capteurs et des enregistreurs papier sont hors d'usage.

La marche des usines se présente généralement de la façon suivante :

- Le refoulement fonctionne par commande manuelle de l'exploitant en façade de l'armoire électrique, la marche est alors asservie au manque d'eau de l'aspiration et aux défauts électriques

- Les forages fonctionnent par commande manuelle de l'exploitant en façade de l'armoire électrique la marche est alors asservie au manque d'eau de l'aspiration et au défauts électriques, sur certains sites le démarrage est temporisé à 10 minutes

- L'usine de DBAYEH est munie de la marche en automatique et d'une filière de traitement elle même automatisée

10. DIVERS

Les schémas électriques des installations pourront être consultés auprès de l'Office des Eaux de Beyrouth.

9. GLOSSAIRE

3RD	:	Système de gestion des communications radiotéléphoniques entre des bases fixes privées et des véhicules
API	:	Automate programmable industriel
APS	:	Avant projet sommaire
APD	:	Avant projet détaillé
Bargraph	:	Plage d'une vue synoptique dont la taille et/ou la couleur varie en fonction d'une valeur numérique
B.T.	:	Basse tension
CAG	:	Charbon actif en grain
CAP	:	Charbon actif en poudre
CCTP	:	Cahier des clauses techniques particulières
Dispatching	:	Centre de Contrôle
GV	:	Grande vitesse
MIC	:	Groupe de lignes privées ou publiques, SDA ou analogiques
MT	:	Moyenne tension
Numéris	:	Produit Télécommunication du Liban aux normes internationales assurant une gestion numérique des échanges sur le réseau RTC.
PABX	:	Appellation Télécommunication du Liban d'un autocommutateur
PID	:	Se dit d'une régulation à action proportionnelle, intégrale et dérivée
PS n	:	Poste satellite numéro n
P.V.	:	Petite vitesse
RTC	:	Réseau téléphonique commuté (téléphone)
redondance	:	défini le fait de disposer de matériel, de données de fonctions en deux exemplaires pour accroître la sécurité d'un système
SDA	:	Sélection directe à l'arrivée (prestation Télécommunication du Liban qui consiste, au sein d'un système interne de téléphone, à disposer d'un numéro personnel à 8 chiffres accessible directement du réseau national et international
SCD	:	Streaming Current Detector appareil délivrant un courant électrique proportionnel à la charge en colloïde de l'eau contrôlée
SDG	:	Serveur de données généralisées (frontal de communication multiprotocole)
TGBT	:	Tableau général basse tension
TOR	:	Tout ou rien