CHAPTER 3
FIRST STAGE PROJECT IMPLEMENTATION

3.1 IMPLEMENTATION SCHEDULE

3.1.1 GENERAL

The Santiago's wastewater system needs urgent rehabilitations and provisions of new systems to support its residential, commercial and industrial development. And, also the provision of an integrated operation and maintenance system is one of the prime importances to maintain and improve the efficiency of the systems.

From the background of the above, this chapter is to deal with the implementation plan and the cost estimate for the "First Stage Project"

3.1.2 IMPLEMENTATION PLAN FOR FIRST STAGE PROJECT

Project implementation plan is proposed assuming that the Project will require international funding for its implementation and will require an assignment of contractor(s) to be selected through an international competitive bidding.

(1) Project Component and Contract Package

The First Stage Project will be composed of 1) the new construction for Zona Sur WWTP, 2) the rehabilitation of existing WWTPs in Rafey, Cienfuegos and Los Salados sewerage districts, 3) the rehabilitation of existing pump stations in Rafey and 4) the new construction of sewers in Rafey, Cienfuegos, Los Salados, Zona Sur and Embrujo sewerage districts.

Project is proposed to be divided into two contract packages; the one is "Wastewater Treatment Plant" which consists of mechanical and electrical works as a majority of works and the other is "Collection System", which consists of civil and plumbing works as a majority as shown in following table.

Proposed Contract Packages for First Stage Project

Contract LOT-1: Waste Water Treatment Plant		Contract LOT-2: Collection System	
110: Construction of New WWTP		210: Rehabilitation of Existing Pump Station	
111	New Zona Sur WWTP	211	Cerro Alto Pump Station (Rafey)
		212	Otra Banda Pump Station (Rafey)
120: Rehabilitation of Existing WWTPs		220: Construction of Sewers	
121	Rafey WWTP	221	New Sewers in Rafey district
122	Cienfuegos WWTP	222	New Sewers in Cienfuegos district
123	Los Salados WWTP	223	New Sewers in Los Salados district
130: Supply of O&M Equipment		224	New Sewers in Zona Sur district
		225	New Sewers in Embrujo district

Source: JICA Study Team

Detail components of each contract package are shown in Table A15.18 to Table A15.21 in Appendix-15.

(2) Implementation Schedule

The First Stage Project is to be implemented according to the following schedule:

Implementation Schedule of the First Stage Project

Project Components	2002	2003	2004	2005	2006
A Pre-construction Stage					
A1 Financial Arrangement					
A2 Detail Design					
A3 Procurement of Contractor		LOT-1	LOT-2		
B Construction Stage					
LOT-1: Wastewater Treatment Plant					
110 Construction of new WWTP					
111 Zona Sur WWTP					
120 Rehabilitation of existing WWTPs					
121 Rafey WWTP					
122 Cienfuegos WWTP					
123 Los Salados WWTP					
130 Supply of O&M Equipment					
LOT-2: Collection System					
210 Rehabilitation of Existing P. S.					
211Cerro Alto Pump Station					
212 Otra Banda Pump Station					
220 Construction of Sewers					
211 Rafey District					
212 Cienfuegos District					
213 Los Salados District					
214 Zona Sur District					
215 Embrujo District					

Source: JICA Study Team

The Project will be commenced by Financial Arrangement for securing financer(s). Upon authorization of financial arrangement, an engineering consultant will be selected and he will carry out Detailed Design for the Project.

Design of collection system, which requires detail site survey, is expected longer period than design of WWTP. However, since the rehabilitation of existing WWTP is one of the most urgently required works and can contribute earlier improvement of current public water contamination, the contract "Lot-1" is scheduled to commence ahead of "Lot-2".

The tender documents will also be prepared by the consultant. Through the tender of bidders for each contract package, contractor(s) will be selected and the Construction Stage will be commenced.

Constructions of Lot-1 "Wastewater Treatment Plant" and Lot-2 "Collection System" are scheduled to be implemented from year 2003 to 2006 and from 2004 to 2006 respectively.

(3) Construction Plan

This section is to supplement concerns about construction in addition to the design of project systems for the First Stage Project described in Chapter 2.

1) Construction of new Wastewater Treatment Plant (Contract Lot-1: item 110)

One new wastewater treatment plant will be constructed in Zona Sur sewerage district. The plant is designed as oxidation ditch process with nominal 5,000 m^3 per day capacity. The construction site is located nearby the Arroyo Hondo River as a tributary of the Yaque Del Norte River and approximately 200 meter upstream from their concourse.

The candidate site is a roughly flatland with scrubs and bushes but no residences nor farmland, therefore no significant land development will be required except removal of vegetation and topsoil and grading before the construction work.

Major plant facilities and machineries will be equipped on reinforced concrete tanks which are to be built by a conventional construction method such as cast-in-situ concrete. Fundamental materials of reinforced concrete, such as fine and course aggregate, cement, reinforcing bar and mixing water are available in or nearby Santiago. It is known by the geotechnical investigation that a special kind of foundation, for example, piled foundation, subsoil replacement, subsoil improvement, etc. are not necessary.

Machinery equipment is planed to be imported from outside of Dominican Republic. Items of machinery equipment installed are as shown in Table A15.18 of Appendix-15.

As general facilities, security fence and gate, road, parking and administration building are to be provided.

2) Rehabilitation of Existing WWTPs (Contract Lot-1, item 120)

Three existing WWTPs in Rafey, Cienfuegos and Los Salados, are proposed to be rehabilitated in the First Stage Project. These plants are designed as the conventional activated sludge process with nominal capacity of 35,800 m^3 per day for Rafey and 10,000 m^3 per day for Cienfuegos and Los Salados WWTPs.

The major works for rehabilitation consist of replacements for deteriorated equipment, provisions of new sludge collectors in primary and final sedimentation tank for Cienfuegos and Los Salados WWTPs, provisions of new chlorinator units with 1.3 liters per minutes dosing rate for three WWTPs, provision of a new emergency generator of 300 kW output for Rafey WWTP, interconnecting pipeline inside the plant and miscellaneous civil work. Detail items rehabilitated or provided newly are as shown in Table A15.19 of Appendix-15.

3) Supply of O&M Equipment (Contract Lot-1, item 130)

Equipment for an improvement of operation and maintenance by CORAASAN will be supplied. Items to be supplied are listed in Table A15.32.

4) Rehabilitation of Existing Pump Station (Contract Lot-2, item 210)

Existing pumps are to be replaced by new ones at two existing pump stations, Cerro Alto and Otra Banda. The work includes associated electric wiring, panel and miscellaneous civil work.

5) Construction of Sewers (Contract Lot-2, item 220)

New sewers are to be constructed in five sewer districts, Rafey, Cienfuegos, Los Salados, Zona Sur and Embrujo. All of the new sewer pipes with various diameters from 12 inches to 48 inches are designed to collect wastewater from un-sewered residential areas, to convey it by gravity without pump stations, and to connect and discharge it to existing sewer collection systems.

It is desirable that the sewer pipes should be installed with a proper gradient to convey the wastewater by gravity. However, desirable pipeline routes with a proper gradient are quite limited by geographical features of Santiago city. Santiago city is on the tableland which has been eroded by the Yaque Del Norte River and its tributaries. Consequently, residential land is located at the higher parts of the city and generally slopes down towards the river or stream. And the rivers and streams form small to medium sized valleys in the city area. Therefore, areas along the river and streams are the only suitable locations for the gravity sewer systems. Detail discussion for suitable sewer route was made in Appendix-8 about the technical and cost evaluation of the sewer pipeline route, which compares between the gravity sewer along the

waterway and the sewer with pump stations along the existing road. Through the discussion in Appendix-8, the waterway-side sewer is recommended as a suitable sewer system.

CORAASAN has already studied the waterway-side sewer and completed the design for most of the parts, which is named "Collector 10" along the waterway, Arroy Nibaje and Arroyo Pontezuela. However, some parts of the construction for Collector 10 has been contracted and commenced, but it has been suspended due to a financial reason.

CORAASAN has planed to construct the waterway-side sewer with a provision of an erosion protection of riverbanks made by gabions with dewatering. They are required additionally to an ordinal underground sewer construction. The construction method, which utilizes gabions to protect the right of way for the sewer beside the waterway, is not unique in Dominican Republic. It has been practiced and experienced at not only other CORAASAN's sewers but also sewers in Santo Domingo city. The advantage of gabion is that the gabion can be installed by manpower without heavy construction equipment and a consequent cheaper installation cost than other erosion protection materials, such as concrete block, sheet pile etc. More detail about the gabion is described in Appendix-8.

CORAASAN has also planed to adopt a polyethylene pipe as the waterway-side sewer. Even where the pipeline is installed above the mean water elevation of waterway, the water level may rise over pipes while heavy rainfall period. Therefore, pipes for waterway-side sewer should be preferably watertight material in order to prevent an inflow of storm water into the sewer system. It is considered reasonable that CORAASAN has selected polyethylene pipe for waterway-side sewer.

In addition to CORAASAN's plan, it is suggestible to provide a permanent access road along pipeline, additional manholes and concrete blocks as counter weights against a buoyancy force to pipeline, in order to ensure continuous and periodical maintenance and longer operation life of the system.

3.2 PROJECT COST ESTIMATE FOR FIRST STAGE PROJECT

3.2.1 BASIS OF CAPITAL COST ESTIMATE

The capital costs for the rehabilitation and construction work including indirect cost under the First Stage Project were estimated with following basis.

(1) Composition of Capital Cost

The capital cost comprises following compositions and each cost item was estimated.

a) Direct Construction Cost

b) Land Acquisition and Compensation

c) Administrative Expenses

d) Engineering Services

e) Physical Contingency

f) ITBIS (Value Added Tax)

g) Price Escalation

(2) Conditions and Assumptions for Cost Estimate

The capital cost was estimated based on following conditions and assumptions.

1) Price Level

The price level of capital cost is in the end of November 2001. The exchange rate applied for the cost estimate is as follows:

1US$ = 17 RD$ = 125 JPY

2) Unit Prices

The direct construction cost was estimated on the Bill of Quantity (BOQ) with unit price basis, which includes material, labor and construction equipment cost. The unit costs for civil work are referred to ones actually expensed by CORAASAN for recent construction and rehabilitation work in Santiago. Since the First Stage Project will be executed under the contractor selected through International Competitive Bidding (ICB), contractor's indirect cost, overhead and profit are assumed as 30 % to these unit prices.

Most of the materials for the civil works are locally available with qualities generally meeting with internationally acceptable standards, whereas those for the machinery equipment are to be imported.

The unit prices are summarized in Table A15.4 to A15.10.

3) Foreign and Local Currency Portion

The capital cost has been estimated both for Foreign Currency (F.C.) and Local Currency (L.C.) portions, considering percentages for the different categories such as civil works, building, mechanical and electrical works as described in Subsection 15.1.1 (3) of Appendix-15.

Both currencies were estimated in terms of US Dollar.

4) Land Acquisition and Compensation

Land Acquisition only for the new Zona Sur WWTP will be required and was estimated as 350,000 US$ using unit price of the land advised by CORAASAN. However, there are no residential nor farmland in candidate site, therefore no compensation cost will be expected.

5) Administrative Expenses

The cost for administrative expenses required for the implementation of the project was estimated at 3 % of the direct construction cost.

Cost for setting up and initiating of CORAASAN's cost reduction program and investigating of unpaid account, which is proposed for institutional improvement program in Section 3.4, are accounted in Administrative Expenses.

6) Engineering Services

The cost for engineering services was estimated at 10 % of the direct construction cost, including basic design, detail design, preparation of tender documents and construction supervision. The cost is allocated both L.C as 2% and F.C. as 8 %.

Cost for technical assistance for institutional improvement, such as training program, is accounted in Engineering Services.

7) Physical Contingency

Physical contingency is estimated at 5 % of the direct construction cost, which is smaller ratio than cost estimate for the master plan, considering that future uncertainties should be mitigated by the deeper study and geotechnical investigation carried out after the master plan study.

8) ITBIS (Value Added Tax)

The ITBIS was estimated at 12 % of all the expense described above in accordance with Dominican Republic law.

9) Price Escalation

Annual price escalation is estimated at 2 % and 8 % for F.C. and L.C. portion respectively, referring to recent trend of consumer price index for G7 countries and Dominican Republic as described in the item 9) of Subsection 15.1.1 (3) of Appendix-15.

3.2.2 PROJECT COST

The exact numbers and sizes of the wastewater component facilities to be built under the First Stage Project can only be determined when the detailed design work will be completed. Nevertheless, for the budgetary purpose, sufficiently accurate preliminary estimates of the Project components have been made based on the presently available information and field investigations conducted under the present study.

The wastewater facilities improvement works to be undertaken in the period from2002 to 2006 will require an estimated total capital costs of approximately US$ 47 million (at 2001 price levels) and 59 million (including future escalation), including those required for the project administration and engineering, in accordance with the proposed facilities and cost estimate presented in the following Table.

Summary of Capital Cost

Unit: 1,000 US$

Cost Item		FC	LC	Total
Direct Construction Cost				
Contract LOT-1 Wastewater Treatment Plant				
110	Construction of New WWTP	4,126	2,868	**6,994**
120	Rehabilitation of Existing WWTP	4,784	1,123	**5,907**
130	Supply of O&M Equipment	331	0	**331**
	Subtotal of LOT-1	*9,241*	*3,991*	***13,232***
Contract LOT-2 Collection System				
210	Rehabilitation of Existing Pump Station	88	20	**108**
220	Construction of Sewers	6,657	15,534	**22,191**
	Subtotal of LOT-2	*6,745*	*15,554*	***22,299***
Total of Direct Construction Cost		**15,986**	**19,545**	**35,531**
Indirect Cost				
301	Land Acquisition and Compensation	0	350	**350**
302	Administrative Expense	0	1,066	**1,066**
303	Engineering Services	2,842	711	**3,553**
304	Physical Contingency	800	977	**1,777**
305	ITBIS (Value Added Tax)	0	5,073	**5,073**
Total of Indirect Cost		**3,642**	**8,177**	**11,819**
Total Capital Cost at 2001 Price		**19,628**	**27,722**	**47,350**
306	Price Escalation	1,551	10,375	11,926
Total Capital Cost (Escalated Price)		**21,179**	**38,097**	**59,276**

Source: JICA Study Team

Breakdown of direct construction cost is shown in Table A15.22 to Table A15.30 in Appendix-15.

3.2.3 OPERATION AND MAINTENANCE COST

Annual expense of CORAASAN was estimated, considering estimated increment or decrement of power consumption, numbers of staffs and materials, such as chlorine, required as of year 2006. Estimated incremental annual operation and maintenance cost is US$ 1.6 million and as shown in following table.

Operation and Maintenance Cost as of year 2006

Item	Quantity Increment from 2001	Cost increment from 2001
Staff Cost	74 Persons	730,000 US$
Power	6,000 kWh/day	782,000 US$
Materials	120 kg/day(chlorine)	45,000 US$
Other		50,000 US$
Total		**1,607,000 US$**

Source: JICA Study Team

3.3 DISBURSEMENT SCHEDULE

The table below presents costs of the First Stage Project components on an annual basis, in accordance with the four-year construction schedule:

Disbursement Schedule for Capital Cost

Unit: million US$

	2002			2003			2004			2005			2006		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
Direct Construction	0.00	0.00	0.00	0.32	0.08	0.40	3.61	2.32	5.93	8.07	10.54	18.61	3.99	6.61	10.60
Indirect Cost	0.28	0.11	0.39	0.87	0.80	1.67	1.03	1.40	2.43	0.83	3.67	4.50	0.63	2.19	2.82
Price Escalation	0.01	0.01	0.02	0.05	0.15	0.20	0.28	0.97	1.25	0.73	5.12	5.85	0.48	4.13	4.61
Total Disbursement	0.29	0.12	0.41	1.24	1.03	2.27	4.92	4.69	9.61	9.63	19.33	28.96	5.10	12.93	18.03

Source: JICA Study Team

Detailed disbursement schedule for each project components are shown in Table A15.33 in Appendix-15.

The First Stage Project requires a soft loan of about US$ 59 million from one or more international development agencies and should be implemented in the period of 2002 to 2006.

3.4 ORGANIZATION AND MANAGEMENT

This section contains proposals for the improved organization and management of those parts of CORAASAN of particular relevance to the First Stage Project. Other proposals will be found in Part I of the Main Report which deals with the Master Plan.

3.4.1 PROPOSED REFORMS

(1) Community Relations Section

CORAASAN's customers and the community generally, especially in the low income areas, are ill-informed about their roles in the water sector. This is demonstrated by large scale misuse of the sewerage system, non-payment of bills, lack of understanding why these services are billed, etc. CORAASAN should establish a community relations section, preferably combined with the Public Relations Office to limit the number of units reporting to the DG, to address these problems, and to establish a continuing dialogue with the public, making use of local

community groups. The section's objectives would include the development of cooperation between community and CORAASAN, development and delivery of training and promotional programs. It is understood that CAASD has recently established such a group with similar terms of reference. This proposal is further discussed in section 3.4.3 below.

(2) Mission Statements

Mission statements (particularly for ESM) based on those proposed in Part I of Appendix 13, should be finalized by the Managers and department heads concerned, and then agreed by the DG.

(3) Engineering Management

EM should transfer responsibility for the water quality control laboratories to O&MM to allow better control of potable water treatment overall and increase EM's capacity to achieve engineering objectives. At the same, responsibility for planning, designing and supervising implementation of domestic and commercial sewage connections should pass from NMD to EM. This work does not fit well with NMD's sewer operation, cleaning and maintenance role.

The shortage of EM capacity should be confirmed by a formal training needs analysis conducted against a review of the departmental workload. Any genuine shortage identified should be made good in the relevant areas via the normal procedure. It is important that before any additional staff are requested there is full investigation into the training needs of existing staff in order to improve productivity.

(4) Commercial management

The most important project to be tackled in Commercial Management is the correction of significant errors in the connections database from which bills are issued. The main task will be to check the details of every one of the approximately 19,500 accounts (at 20 November) unpaid for more than 8 months. Commercial Manager has received the eight-man task force for this work that he asked for, six of whom are directly checking the accounts. This small group could take up to 2 years to complete the project, however. It might be better to recruit up to 20 (in total) reliable people, properly supervised. This project could take less than one year, a more practical period. Technical assistance might be available from the project for this. At an assumed RD$5,000 per month, 14 persons for 6 months, say, would cost about US$25,000.

(5) Environmental Sanitation Management

1) Industrial wastewater quality control

A unit should be created within ESM to control the quality of industrial wastewater entering the sewerage system. This is to ensure compliance with Environmental Law No. 6418-2000 and the new Norms for discharging to sewerage and the environment. The unit could be named "Industrial Wastewater Quality Control Section" (IWQCS). Its functions should include:

- Processing applications from firms for CORAASAN to treat new or modified industrial wastewater,
- Ensuring periodical measurement and reporting of wastewater quality by firms,
- Monitoring firms' wastewater quality by check sampling and analysis,
- Preparing and issuing improvement orders to firms if needed.

Considering the potential workload on this unit, there are 140 firms discharging to CORAASAN's sewerage system which would have to reapply to CORAASAN for approval under the New Norm AG-CC-01 in addition to any new applicants, after which there would be the routine review of quality reports and periodic wastewater quality monitoring.

The frequency of physical monitoring by CORAASAN of industrial wastewater in Santiago could vary from one month (for heavy polluters) to three months (for light polluters), with an average interval of two months for initial planning purposes. To cope with the total ongoing workload outlined above, the unit should probably contain 4 persons, including the head. The special one-off work of initially authorizing the 140 firms currently discharging wastewater to sewerage would need an additional task force of local analysts, maybe 5 to 10 persons, to complete the work in a reasonable timeframe[1]. Technical assistance could perhaps be provided for this task.

IWQCS could be used, at least initially, for monitoring industrial wastewater discharged to the environment on behalf of SEMARENA. In this case, SEMARENA would arrange a contract with CORAASAN to undertake this monitoring work, which would be similar to that needed for industrial discharge to sewerage. A disadvantage of this approach is that there would be no agency able to monitor independently CORAASAN's discharge to the environment from its WWTPs, at least in the short term.

2) Maintenance Organization

The reorganization of ESM maintenance might be implemented in two stages. In the first stage, the current routine maintenance brigade of mechanics and electricians (most of whom are on the O&MM payroll) would be transferred to the ESM payroll. In addition, in the Electromechanical Maintenance Department (EMD) of O&MM, a supervisor potable water and a supervisor sewerage could be created reporting to the EMD head. These two supervisors would jointly allocate resources and have responsibility for service delivery to O&MM and ESM respectively. The technical workforce in EMD would be allocated and dedicated (to the extent feasible) to O&MM or ESM *and this arrangement would not be changed without approval from both Managers.*

The second stage could be a longer term and relatively expensive solution involving the physical separation of ESM maintenance staff and facilities (mainly in the electromechanical workshop) from those in O&MM. If the first stage improvement provides an adequate maintenance service for ESM and there is genuine separation of staff and facilities under this scheme as intended, the second stage could be delayed or even abandoned. It is thus in the interest of CORAASAN that the first stage solution functions well.

3) ESM Organization

The Study team suggests the following amendments to the ESM organization structure (see Figure 3.1) in view of ESM's increased responsibilities and the additional workload arising from the extra facilities in the Master Plan:

- Rafey WWTP laboratory (and any others that are operational) should be grouped with the proposed Industrial Wastewater Quality Control Section (IWQCS) in a new division (which could be named Process Control Division (PCD)) reporting to the ES Manager. The PCD head would mainly supervise the Rafey laboratory, but would allocate sufficient time also for the IWQCS particularly during the start-up phase. The head of PCD would collaborate closely with the head of WWTD.
- A small Electromechanical Maintenance Division (or Section) should be set up under the WWTD head as proposed in 2) above and would provide maintenance services to NMD as well as WWTD. If maintenance services in the longer term are separated more completely from O&MM, this larger division should report to the ES Manager.
- Responsibility for the pumping stations should be operationally under the head of

[1] If 3 factories can be processed in one person week, about 47 person weeks would be needed to complete the work.

NMD[2], although maintenance services would be under the WWTD head. However, this presumes that the planned upgrade of technical expertise in NMD is fully accomplished. (See section 2.5.3 for more discussion.)

It is assumed that such reorganization could be achieved in-house with EM involvement and without external technical assistance (except to establish IWQCS).

(7) General Services Department

It is recommended that the scope for improved service delivery to user departments is investigated, especially in building maintenance, in view of the complaints made to the Study Team in this regard.

3.4.2 CAPACITY BUILDING PLAN

Capacity building in the context of this First Stage Project means 1) agreeing and implementing the proposed organization and management reforms described in section 3.4.1 together with the proposed changes in staff levels specified in section 2.5.3, and 2) delivering the necessary training when needed. Training will be needed at most levels, at present and after the proposed staff increases have been appointed from now until 2006.

It is expected that the Project Final Report will be issued about the end of January 2002, project finance will be arranged by mid-2002, and that detailed design will begin soon afterwards. Procurement of contractors for work on WWTPs (Lot-1) and the wastewater collection system (Lot-2) will occur in the second quarter and last quarter of 2003 respectively.

(1) Project Management

In light of the above overall schedule, the Project Management Office (PMO) headed by a Project Manager would be set up by the selected engineering consultants around the beginning of the detail design work in mid-2002. The PM would normally report to the DG but would coordinate closely with the relevant Managers [Gerentes] via the proposed steering committee (see 3.4.2(2) below). Appropriate members of CORAASAN technical and support staff would be seconded to the PMO. The PM would also coordinate implementation of an information program for the general public. This would be done with the involvement of the CORAASAN PR Office and its proposed Community Relations Section. It would be part of a wider public education program referred to in section 3.4.3 below.

(2) Institutional and Staff Changes

Details of the proposed staff levels for ESM between now and 2006, and the main reforms proposed that are directly relevant to the First Stage Project, are given in sections 2.5.3 and 3.4.1 above. (More information can be obtained from Appendix 13 Part II.) It is suggested that once these proposals are agreed, a small project steering committee should be formally established comprising the principal managers involved and a senior secretary. The task of the steering committee would be to plan the implementation of the various proposals, and then monitor and control their implementation, and report the result to the DG and Board of Directors.

The proposed change program would be planned and executed in light of the Santiago Sewerage Improvement Project implementation.

(3) Training

Training will be crucial to the capacity building process in CORAASAN's wastewater collection and treatment work. The training objective should be to ensure that there will be

[2] Pumping stations are currently the responsibility of the head of WWTD.

adequately skilled staff to supervise the planning and construction activities and to manage, operate and maintain the existing and future wastewater collection, treatment and disposal facilities and process.

During the Feasibility Study a preliminary review of ESM training needs was undertaken with ESM management and some training options were discussed in outline with the heads of WWTD and NMD. It became clear that training resources and organization within CORAASAN were not adequate to allow the above training objective to be achieved. Moreover, CORAASAN's knowledge and experience of external training resources (institutions, programs, courses), whether in Dominican Republic or elsewhere in Latin America, were limited. Also operating manuals for existing plant and equipment were either non-existent or inadequate for operator training and monitoring purposes.

These limitations suggest that to mount the necessary training campaign will need a major input of expertise and effort in order to:

1) Prepare or upgrade the necessary operating manuals for all existing plant and equipment to use as training material;
2) Assess (or help CORAASAN management to assess) the training needs of individuals or groups;
3) Develop courses and methods of instruction appropriate for all main groups including operators, trades people, technicians, mechanics, electricians, engineers and supervisors, starting with those groups most in need and most likely to benefit CORAASAN with their improved performance;
4) Identify suitable external training and assessment services in Latin America (giving preference to the Dominican Republic) to cater for more advanced training;
5) Develop within CORAASAN a small but highly focused unit (probably based on the existing Qualifying and Training Section in the Human Resources Office) to promote, advise on and organize, training and education. This should start with wastewater management and engineering, but be extended as soon as possible to the other main sub-sectors of potable water supply, commercial and finance. (As far as possible the actual training should be decentralized to line managers and their technical subordinates as one of their main responsibilities.) This unit should also build up a library of audio-visual training and information material for O&M and other activities;
6) Train trainers from both the line functions and the central training unit.

A table of training programs is suggested below to be developed into course material for delivery to CORAASAN staff in wastewater management and engineering.

Suggested Training Programs

Series	Modules	Recommended Coverage
Sewerage operation and maintenance	Sewer cleaning, rehabilitation and maintenance	Sewer connections; site investigation; sewer cleaning; sewer rehabilitation; work safety procedures; emergency procedures; record keeping (log book), operations reporting system; efficiency and cost-effectiveness; testing procedures; equipment and tools maintenance; work organization and control
	Operation and maintenance of pumping stations	Routine maintenance (e.g. daily); periodic maintenance; work safety procedures; emergency procedures; operations reporting system; efficiency and cost-effectiveness; testing procedures; equipment and tools maintenance; work organization
	Operation and maintenance of WWTPs	All WWTP processes including activated sludge; odor prevention; work safety procedures; emergency procedures; operations reporting system; efficiency and cost-effectiveness; operation and testing procedures; trouble shooting; system failure prevention; equipment and tools maintenance; work organization
	Engineering and management of wastewater systems	Treatment efficiency (BOD removal rates); sludge management; wastewater effluent standards and laboratory methods; operations planning and cost control systems; industrial wastewater management, including quality control
Project management and development	Preparation of technical specifications, bidding and tendering documents	Legal documentation. Technical specification writing; bid evaluation and award criteria and procedures.
	Procurement guidelines	Materials testing and acceptance
	Construction, inspection, supervision and monitoring	Role of construction inspectors and working relationships. Construction standards, inspection and testing procedures for: - sewer pipe laying; soil compaction and surface restoration; reinforced concrete; equipment installation and general civil works. Safety; logbooks and progress reports; progress payment procedures

It is suggested that 1) technical assistance will be needed to undertake at least some part of the six tasks identified above through the appointment of a Technical Training Advisor and that 2) CORAASAN should provide counterpart staff from the wastewater and engineering managements to work with this person. It would seem that the TTA should be appointed for at least 6 and preferably 12 months to make a significant and sustainable impact on the six major tasks above.

Preliminary terms of reference for the TTA are given in Appendix 13 Part II of this report.

(4) Technical Assistance

The following technical assistance is a summary of that suggested elsewhere to help the design and implementation of proposed improvements:

- Investigation of about 19,500 unpaid accounts in Commercial Management: 84 person months at about RD$5,000 per month amounts to about US$25,000;
- Setting up the Industrial Wastewater Quality Control Division in ESM: 3 person months plus additional laboratory facilities and analytical procedures;
- Re-authorizing 140 firms to discharge industrial effluent into CORAASAN sewerage: 3 factories for one person week, therefore about 47 person weeks to complete;
- Appointment of an external Technical Training Adviser (TTA) for, initially, wastewater

collection and disposal and related engineering services: needed for a minimum of 6 months and preferably 12 months. Cost of the TTA would be in the order of US$65,000 to US$130,000 depending on the source and the length of the assignment.

3.4.3 PUBLIC INFORMATION, EDUCATION AND COMMUNITY RELATIONS PROGRAM

It may be stating the obvious to say to an experienced water and wastewater service provider like CORAASAN that the attitude of the public towards the provision of these services is of great importance. Nevertheless, for the public to gain full advantage of the present and proposed wastewater services the demand of house owners and occupiers for such services should be determined and constraints identified. This is because to achieve the full effect of improved sanitation 1) improvements to the household water and toilet facilities may be needed, 2) householders have to agree to connect to the system (or improve their on-site facility), and 3) the system will have to be properly operated and maintained. Householders and businesses have to pay for these costs. Can they afford to pay?

Major benefits of the availability of wastewater disposal for consumers in general should be better health and hygiene, improved environmental conditions including river water quality, removal of stagnant wastewater from drains, and improved business prospects. For landowners, land values rise when wastewater collection and treatment facilities are available.

A good understanding by consumers of the service benefits and costs and their obligations is therefore necessary to ensure the sustainability of the service.

(1) Objectives and Strategy

The objectives of the public information and education program are, it is suggested, to increase demand for improved sanitation and wastewater management at the local level and make the community aware of and agree with their obligations as responsible users of the services. An important feature of the program will be to obtain feedback from the public and channel this to the appropriate CORAASAN management.

The strategy will be to identify the various types of target audience and develop appropriate dissemination methods for each type.

(2) Target Audiences and Key Messages

From previous experience of similar projects, the following table is a summary of some recommended key messages targeting specific audiences:

Target Audiences and Key Messages

Sample Messages	Target Audience					
	Domestic (income level)			Business		Govern-ment
	High	Middle	Low	Major	Minor	
"Sewerage is different from the stormwater drainage system!"	*	*	*			*
"Sewer system is not intended to carry garbage (solid waste)!"	*	*	*	*	*	*
Uncollected wastewater is a serious health risk	*	*	*			
Industrial wastewater should not be accepted in a domestic sewerage system				*	*	*
Lakes and rivers are polluted due to uncontrolled wastewater	*	*	*	*	*	*
Shallow tube well supplies can be polluted by wastewater	*	*	*			
Septic tanks must be cleaned regularly to be effective	*	*	*	*	*	
How to apply for a sewer connection	*	*	*	*	*	
Sanctions for system abuse	*	*	*	*	*	*
How and where to pay for service	*	*	*	*	*	
How and where to report problems and complaints	*	*	*	*	*	
New sewer connection policies	*	*	*	*	*	
Annual financial and operating highlights of CORAASAN	*	*	*	*	*	*
Benefits of improved sanitation and sewerage	*	*	*	*	*	*

The following table is a summary of suggested dissemination media targeting specific audiences:

Target Audiences and Media

Dissemination Media	Target Audience					
	Domestic (income level)			Business		Govern-ment
	High	Middle	Low	Major	Minor	
Radio and TV	*	*	*	*	*	*
Newspapers	*	*		*	*	*
Handbills and fliers		*	*			
Public meetings		*	*			
Posters and billboards	*	*	*	*	*	
Consumer newsletters	*	*				
School system activities	*	*	*			
Sponsored facilities tours		*	*			
Special events	*	*	*	*	*	*

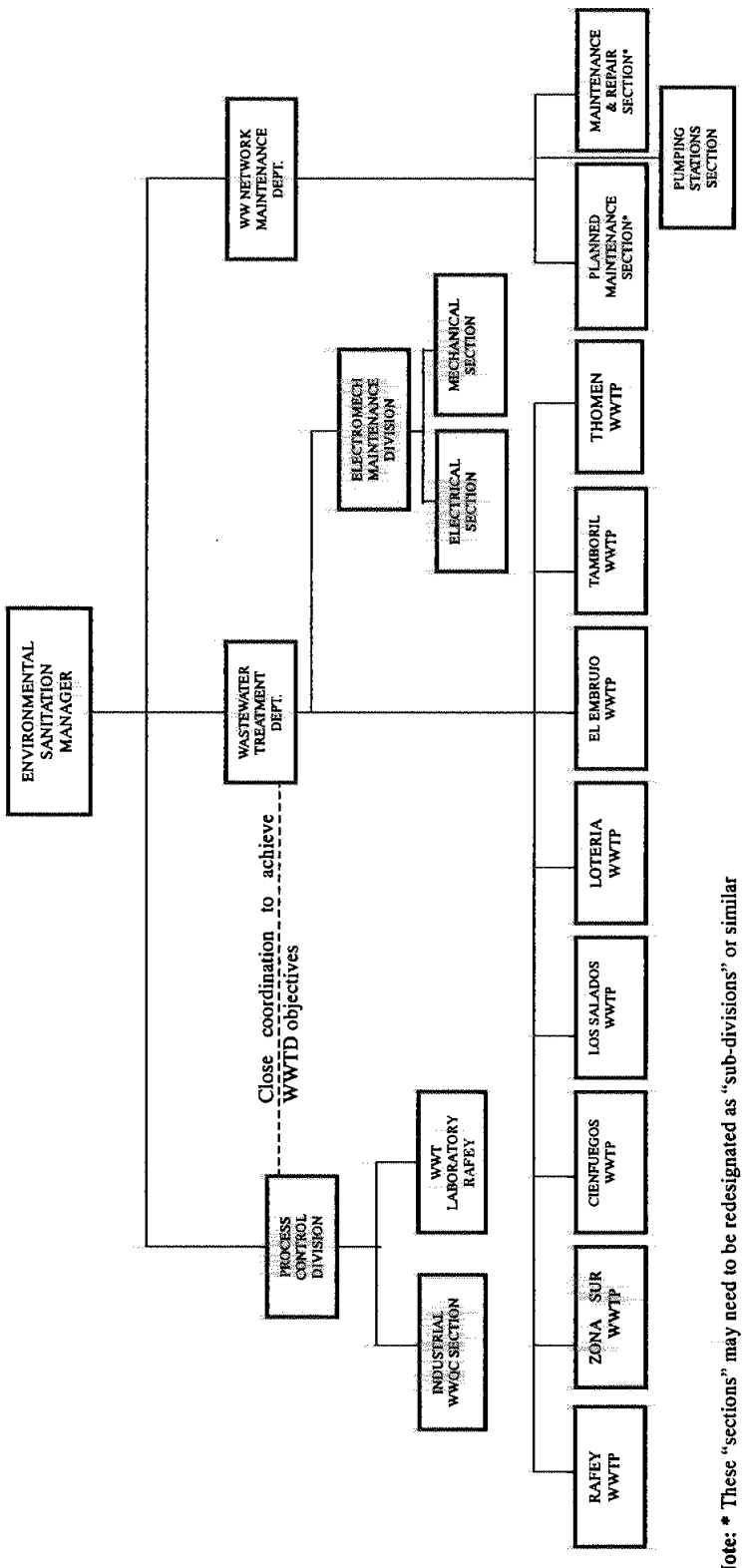
CORAASAN's PR Office in conjunction with its proposed Community Relations Section (see section 3.4.3(3) below and the Santiago Sewerage Improvement Project would be responsible for planning and implementing public information and education programs, in consultation with relevant line managements (Commercial Management in particular) and departments. This will probably require some reorientation of the PR Office's responsibilities and activities.

(3) Community Relations Section

As has been noted earlier, there is at present large scale misuse of the CORAASAN sewerage system, non-payment of legitimate service bills, a lack of understanding why these services are

billed, and so on. It is suggested that CORAASAN should establish a Community Relations Section (CRS), preferably under the Public Relations Office to limit the number of units reporting to the DG, to help address these problems.

The CRS's objectives would include 1) the establishment of a continuing dialogue with the public via local community bodies, 2) assisting the PR Office with the dissemination of information to and education of the public, 3) development of cooperation between community and CORAASAN, 4) development and delivery of training and promotional programs, and 5) resolving, with the help of appropriate CORAASAN units, specific and important issues that have not been addressed (e.g. the provision of micro-credit to finance connections to the wastewater collection system). The CRS could also supervise any agreements entered into by CORAASAN and community organizations for the execution of local water supply or sanitation works. The CRS should initially have about 3 or 4 staff: a section head, community promoters and assistants and a secretary. It is understood that CAASD has recently established such a group with similar terms of reference.



THE STUDY ON THE IMPROVEMENT OF SEWERAGE SYSTEM AND ENVIRONMENT IN THE CITY OF SANTIAGO

JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 3.1.
Suggested CORAASAN Organization: Environmental Sanitation Management