

WATER AND SANITATION  
FOR HEALTH PROJECT



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# AN ASSESSMENT OF THE OFFICE NATIONALE DE L'ASSAINISSEMENT (ONAS) THIRTY CITIES AND GREATER TUNIS COMPLEMENTARY PROJECTS

WASH FIELD REPORT NO. 109

FEBRUARY 1984

The WASH Project is managed  
by Camp Dresser & McKee  
Incorporated. Principal  
Cooperating Institutions and  
subcontractors are: Interna-  
tional Science and Technology  
Institute; Research Triangle  
Institute; University of North  
Carolina at Chapel Hill;  
Georgia Institute of Techno-  
logy—Engineering Experi-  
ment Station

Prepared for:  
AID Regional Housing and Urban Development Office  
USAID Mission to the Republic of Tunisia  
Order of Technical Direction No. 158

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February 15, 1984

Mr. James Phippard, Director  
USAID Mission  
Tunis, Tunisia

Attention: David Liebson

Dear Mr. Phippard:

On behalf of the WASH Project I am pleased to provide you with ten copies of a report on An Assessment of the Office Nationale de l'Assainissement (ONAS) Thirty Cities and Greater Tunis Complementary Projects.

This is the final report by John Tomaro, John Topik and Thomas Zalla and is based on their trip to Tunisia from September 23 to October 15, 1983.

This assistance is the result of a request by the Mission on August 31, 1983. The work was undertaken by the WASH Project on September 1, 1983 by means of Order of Technical Direction No. 158, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

Dennis B. Warner  
Director  
WASH Project

cc. Mr. Victor W.R. Wehman, Jr.  
S&T/H/WS

DBW:ybw

WASH FIELD REPORT NO. 109

An Assessment of the Office Nationale de l'Assainissement (ONAS)  
Thirty Cities and Greater Tunis Complementary Projects

Prepared for AID Regional Housing and Urban Development Office  
and the USAID Mission to the Republic of Tunisia  
Under Order of Technical Direction No. 158

Prepared by:

John B. Tomaro  
John H. Topik  
Thomas M. Zalla

February 1984

## TABLE OF CONTENTS

### Chapter

	ACRONYMS .....	iii
	EXECUTIVE SUMMARY .....	iv
	ACKNOWLEDGEMENT .....	v
1.	INTRODUCTION .....	1
	1.1 Scope of Work .....	1
	1.2 Research Methodology .....	1
	1.3 Comment .....	1
2.	SANITATION SITUATION IN TUNISIA .....	4
	2.1 Conditions Influencing the Level of Sanitation in Urban and Peri-urban Areas .....	4
	2.2 Existing Sewerage, Storm Drainage and Solid Waste Disposal ....	7
	2.2.1 General .....	7
	2.2.2 Sewerage .....	7
	2.2.3 Storm Drainage .....	8
	2.2.4 Solid Waste Disposal .....	8
	2.3 Problems in the Urban and Peri-urban Sanitation Systems .....	9
	2.4 Coordination of Sanitation and Related Investments (Housing) .....	10
3.	SANITATION ACTIVITIES OF ONAS .....	12
	3.1 Urban and Peri-urban Sanitation and the Role of ONAS .....	12
	3.1.1 Organizational Structure and Planning Capacity .....	12
	3.1.2 Finance and Cost Recovery .....	12
	3.1.3 Implementation and Maintenance .....	18
	3.1.4 Personnel Recruitment and Training .....	19
	3.2 Review of the Thirty Cities Project (Third Urban Sewerage Project) .....	21
	3.2.1 Summary of the Project .....	21
	3.2.2 Beneficiaries .....	22
	3.2.3 Relevance to Sector Needs .....	22

3.3	Review of the Greater Tunis Sewerage and Drainage Project Complementary Program .....	24
3.3.1	Summary of the Project .....	24
3.3.2	Beneficiaries .....	24
3.3.3	Relevance to Sector Needs .....	26
3.4	Disbursement for the Thirty Cities and Greater Tunis Complementary Projects .....	26
3.5	Rationale for Using HG Funds to Support/co-finance Sanitation Projects .....	29
3.6	Summary Statement .....	30
4.	OTHER OPTIONS AND RECOMMENDATIONS FOR RHUDO INVOLVEMENT IN THE SANITATION SECTOR .....	31
4.1	Tunisian Response to Spontaneous Settlements .....	31
4.2	Innovative Approaches .....	32
4.3	Review of Sanitation Activities of Relevant GOT Agencies .....	32
	BIBLIOGRAPHY .....	35
APPENDICES		
A.	Scope of Work .....	39
B.	List of Persons Interviewed/contacted .....	43
C.	Lotissement .....	45
D.	Administrative Order of the Ministers of Plan and Finance, and of Equipment, October 2, 1982 .....	46
E.	Liste des Stages Effectues a l'etranger .....	49
F.	Liste des Seminaires entrepris .....	53
G.	Effectif et Repartition du personnel .....	55
H.	Income Distribution as it relates to Sanitation Investments in Tunisia .....	56

Tunisian Organizations: Acronyms

A.F.H.	Agence Fonciere d'Habitation
A.R.R.U.	Agence pour la Rehabilitation et la Renovation Urbaine
O.N.A.S.	Office National de L'Assainissement
S.N.I.T.	Societe Nationale Immobiliere de Tunisie
S.O.N.E.D.E.	Societe Nationale d'Exploitation et de Distribution des Eaux
S.T.E.G.	Societe Tunisienne d'Electricite et de Gaz

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US \$1 = .701 TD

## EXECUTIVE SUMMARY

In response to a request by the Near East Regional Housing and Urban Development Office (RHUDO) to assess the degree to which two projects (Thirty Cities and Greater Tunis Complementary) address the sanitation needs of low and moderate income urban residents in Tunisia, the Office of Health Bureau for Science and Technology, US Agency for International Development, authorized the WASH Project to send a team to Tunisia. The three-person team was in the country from September 23 to October 15, 1983, visited several communities selected to receive the sanitation improvements, and interviewed representatives of the organizations responsible for planning, approving, and executing the projects.

The WASH team was also instructed to gauge the extent to which the Office Nationale de l'Assainissement (ONAS) is capable of implementing the projects, managing the system and collecting revenues needed to offset the cost of installation, operations and maintenance.

The WASH team interviewed selected ONAS personnel and reviewed the organization's procedures and operations. The team analyzed the impact of the proposed tariff on revenue potential and the need for the government to continue to subsidize operations. The team concluded that revenue expectations were realistic, that compensatory payments could be eliminated by 1987, and that the organization was well run and capable of implementing the proposal projects.

The team also concluded that all the beneficiaries of the Thirty Cities Project qualify for assistance under USAID's Housing Guaranty Program, and that 30 percent of the beneficiaries of the Greater Tunis Complementary Project qualify. The WASH team recommended that Housing Guaranty resources be made available to the Government of Tunisia in order to complement other project financing and to implement the project on schedule. In addition, the WASH team recommended that RHUDO work closely with the public land development agencies (Agence pour la Rehabilitation et la Renovation Urbaine and Agence Fonciere d'Habitation) to develop and implement strategies that make developed residential sites affordable to more low and moderate income families.

## ACKNOWLEDGEMENTS

The WASH team wishes to express its appreciation to the staff of the Regional Housing and Urban Development Office (RHUDO) in Tunisia, especially Ms. Sonia Hamman, Regional Housing and Urban Programs Officer, Mr. David Leibson, Assistant Director, and Ms. Toni El Abed, secretary. RHUDO assistance made the work of the WASH team efficient, productive and pleasant. In addition to the staff of RHUDO/Tunis, the team wishes to thank Mr. Dean Swerdlin of PRE/H (Washington) for his assistance in preparing the team for the assignment in Tunisia.

Finally, special gratitude is expressed to the staff of the Office National de l'Assainissement (ONAS), especially M. Mohamed Larbi Khrouf, Mme. Faiza Ben Ammar, M. Habib Haj'Ali and M. Tahar Ghroubi and M. Fadhel Ghariani who patiently and candidly explained their agency's programs and plans, and accompanied the WASH team on the site visits.

## Chapter 1

### INTRODUCTION

#### 1.1 Scope of Work

In response to a request from the Ministry of Plan of the Government of Tunisia (GOT) to USAID to reschedule Housing Guaranty funds (Program HG-004) for sanitation, the Regional Housing and Urban Development Office in Tunisia (RHUDO) requested assistance from the Water and Sanitation for Health Project (WASH) through the Office of Health, Bureau for Science and Technology. Specifically, RHUDO asked WASH to: (1) prepare a preliminary assessment of the sanitation sector in Tunisia (sewerage, storm drainage, solid waste management), (2) determine the appropriateness of investing Housing Guaranty (HG) resources in the World Bank and Kuwaiti-financed sanitation projects in the "Thirty Cities" and "Greater Tunis," and (3) review the dimensions of the urban and peri-urban sanitation needs in Tunisia and if possible suggest other options for USAID investment according to the guidelines of the Housing Guaranty program (see Appendix A).

A preliminary assessment of the sanitation sector in Tunisia, based on documents extant in the U.S. and available to WASH, was completed by Robert H. Thomas in August, 1983. From September 23 to October 15, 1983 a three-person team visited Tunisia to complete the tasks designated above and defined in the Order of Technical Direction (OTD) Number 158, issued by the Office of Health (S&T/H) on Sept. 1, 1983. The team consisted of Dr. John B. Tomaro, Mr. John H. Topik and Dr. Thomas M. Zalla.

#### 1.2 Research Methodology

Before and during the in-country visit the three-person team reviewed documentation on the sanitation sector in Tunisia and gave special consideration to those projects for which the Government of Tunisia is requesting HG financing. Documents reviewed are listed in the bibliography and referred to throughout this report.

In the course of completing the mission in Tunisia, the WASH team met with individuals familiar with sanitation problems and responsible for urban and peri-urban sanitation programs and projects. A list of those interviewed is attached (see Appendix B).

The team also visited eight of the 30 cities scheduled for development under the World Bank program and sections of Greater Tunis that will benefit from Kuwaiti assistance. In addition, sites where sanitation systems are being up-graded, installed and maintained were also visited. The sites visited by the WASH team are designated on the following map.

#### 1.3 Comment

The findings and suggestions set forth in this report were developed using the above-mentioned methodology -- namely, document review, personal interviews and site inspection. With the exception of the RHUDO staff, the WASH team did not

have an opportunity to review the findings and suggestions with the Tunisians interviewed. The WASH team encourages RHUDO/Tunis to discuss the observations and suggestions set forth in this report with those responsible for urban and peri-urban programs - especially water supply and sanitation. Such discussions should allow RHUDO to judge the degree to which the approaches suggested in this report are acceptable and can be implemented.

**INTERNATIONAL ASSISTED URBAN SEWERAGE PROJECTS IN TUNISIA**  
**LOCATION OF PROJECT ZONES**

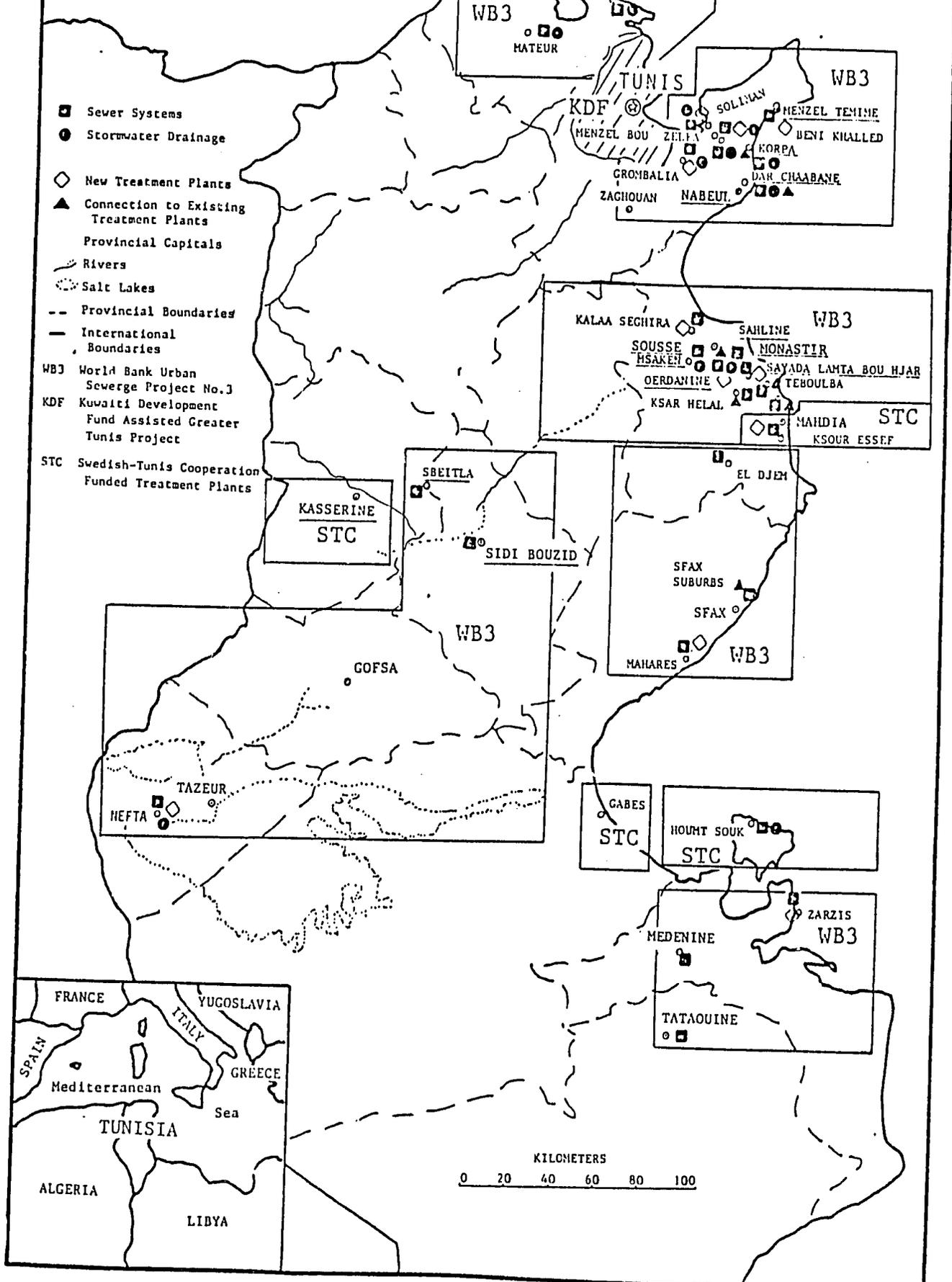


FIGURE 1

## Chapter 2

### SANITATION SITUATION IN TUNISIA

#### 2.1 Conditions Influencing the Level of Sanitation in Urban and Peri-urban Areas

Tunisia, a country comprised of 164,000 km<sup>2</sup> and located in North Africa between Algeria and Libya, is semi-arid in the North and arid in the South. The population is estimated to be in excess of 6.4 million (World Bank, 1980) and increasing at a rate of 2.3 percent annually. More than half the population resides in cities and towns located along the coast. One-third of the urban dwellers are in Tunis and Sfax.

While the bulk of Tunisia's population is found in coastal cities, most of the water needed to serve this population is located in the mountains, inland and to the West. Water supplies for the cities and towns are scarce, irregular and often contain a high degree of salinity. It is one of the ironies of Tunisian development that key administrative and economic centers are located far from the water sources on which the populations depend.

Since water is in scarce supply and often distant from population centers, there is competition among water users -- households, industries, tourist centers and agriculturalists -- and generally high costs associated with its supply and distribution. The increasing exploitation of marginal sources of water in even more remote areas, and attempts to store rainwater runoff through construction of dams and conveyance systems, increases the unit cost of water supply project. (Sector Operations Review: The Water Supply and Waste Disposal Program in Tunisia, World Bank, p. 1). At times these costs are prohibitive, especially when attempts are made to serve small (10,000 inhabitants or less) and widely dispersed population centers.

The already high demand for water in urban centers is increasing by the rate at which urbanization is occurring in Tunisia -- approximately 4 percent annually with a range from 3 percent to 6 percent.

<u>Population Statistics</u>	<u>1960</u>	<u>1970</u>	<u>1980</u>
population/mid-year (000s)	4,221	5,127	6,354
urban pop (% of total)	36	43.5	51.7
population growth rate			
urban	3.2	3.8	3.9
total	1.8	1.9	2.3

(Source: Tunisia: Review of the VI Development Plan (1982 - 1986), World Bank, Report No. 4137-TUN, March 16, 1983, p. 6.)

Migrations from the interior to the coastal cities have placed considerable demands on the local and national authorities to provide basic urban services. Since most new urban residents dwell in peripheral areas where land prices and housing costs are less expensive, the demands are greatest in those areas where few services are in place and the cost of provision is comparatively high. While the authorities are, in principle, attempting to develop and implement programs that address urban needs in a systematic manner and at the least possible cost, urban settlement is proceeding in a rapid but somewhat spontaneous and uncontrolled manner (Near East Bureau Countries: Current and Projected Urbanization and Associated Indicators, PADCO, pp. 1-12).

The rate and manner in which urbanization is occurring in Tunisia has created heavy demands for water and increased the difficulty of following up with associated wastewater and solid waste disposal programs. In response to the demand for increased supplies of water and wastewater removal, Tunisia has moved to upgrade the systems put in place by the French during the colonial period, and to install systems similar to those found in more developed nations. Urban water and sanitation programs have been justified on the basis of their impact on the population's well-being and overall productivity.

Initially, Tunisia moved to meet the needs of the largest number of urban residents (Tunis) before attempting to expand or install systems in cities with fewer inhabitants. At Independence (1956), responsibility for water supply, wastewater disposal and solid waste management was in the hands of a number of ministries and municipal authorities. Gradually the Central Government prompted by World Bank assessment missions began to realize, first in regard to water supply and then sanitation, that the operation of the systems called for the creation of entities with sufficient resources and abilities to address the needs of growing urban populations. This realization and World Bank financing spurred the government to establish the Societe Nationale d'Exploitation et de Distribution des Eaux (SONEDE), the water authority, in 1968, and the Office National de l'Assainissement (ONAS) some seven years later.

Both are autonomous agencies reporting to different ministries (SONEDE to the Ministry of Agriculture and ONAS to the Ministry of Equipment). In large part they are modeled on water and sewer authorities commonly found in more developed nations. Since their establishment, both agencies have moved steadily to take control of, upgrade, and extend municipal water and sewer systems. At present, SONED E has a mandate to provide water to communities with as few as 500 inhabitants. (Communities of a smaller size are to be served by Genie Rural of the Ministry of Agriculture.) By decree, ONAS is to respond to the wastewater needs of all communities with populations greater than 2,000.

Although water supply and sewerage are intimately connected by virtue of the fact that piped systems need water to operate and the fact that the installation of household water creates a wastewater disposal problem, SONED E and ONAS were not established at the same time, nor are they currently linked administratively, except for common bill collection. (Note: The President Director General (PDG) of ONAS is one of the 12 Directors of SONED E and vice versa.)

In general, water supply programs, financed principally by loans from the World Bank, have successfully increased the extent of coverage of the population. Household connections are increasing while public fountains and individual wells are slowly being phased out, especially in the cities and larger towns.

Unfortunately, improvement in the water supply systems has, until recently, been unaccompanied by a similar and harmonious extension of sanitation systems and services. SONEDE began operations some seven years before ONAS came into existence, and has been highly successful in increasing service and providing water to new construction as it takes place. Consequently, ONAS finds itself in a "catchup" situation. Currently, the sanitation sector is behind water supply activities and is being adversely affected by the continuing expansion of the system. As the President Director General of ONAS recently indicated, the availability of water encourages urban development in the form of high density, low-cost housing. Without programs to deal with the large volume of wastewater that such projects generate, the sanitation problems become acute, perhaps to the point of affecting the health of the residents. (Sector Operations Review: The Water Supply and Waste Disposal Program in Tunisia, World Bank, p. 73.)

<u>Key Water Supply Statistics</u>	<u>1967</u>	<u>1981</u>
Production of water (mil. m <sup>3</sup> )	83.1	200.3
Population served (000s)	2,175	4,064
Population served by SONEDE as % of total population	45	62
Number of Connections (000s)		
urban	n.a.	440
total	96	465
Population served by connections (000s)		
urban	n.a.	2,617
total	816	2,764
Ratio of Population served/connection		
urban	n.a.	5.9:1
total	8.5:1	5.9:1

(Source: Sector Operations Review: The Water Supply and Waste Disposal Program in Tunisia, World Bank, 1982, p. 45.)

The difference in the total number of people served by SONEDE and ONAS, 4,064,000 vs. 1,652,000 (1981 totals), is by no means a reflection on ONAS' capability. It is the result of SONEDE's seven year head start, its access to greater funding, and the fact that sewerage systems are more costly and more difficult to rehabilitate and construct than potable water systems. At this time, the number of communities served by ONAS is considerably smaller than the number served by SONEDE. However, in the towns where ONAS has taken over, it has done a very creditable job.

<u>Key Sewerage Statistics</u>	<u>1975</u>	<u>1980</u>
Total Urban Population (000s)	2,656	3,433
Population served by ONAS (000s)	n.a.	1,652
Water connections in areas served by ONAS (000s)	125	
Sewer connections in areas served by ONAS (000s)	125	147
Total population connected for water (000s)	n.a.	2,499
Total population connected for sewers (000s)	n.a.	1,054
Population with sewer connections as % of:		
urban population	n.a.	30
population with water connection	n.a.	42
population served by ONAS system	n.a.	64
Water consumed by ONAS customers (mil m <sup>3</sup> )	40	64

(Source: Sector Operations Review: The Water Supply and Waste Disposal Program in Tunisia, World Bank, 1982 p. 46.)

## 2.2 Existing Sewerage, Storm Drainage and Solid Waste Systems

### 2.2.1 General

In general, the quality and coverage of wastewater and solid waste disposal systems vary considerably throughout Tunisia. Observations of prevailing conditions related to sewerage, storm drainage and solid waste in towns, where organized disposal systems do and do not exist, suggest that conditions are relatively good although there are obvious deficiencies and problems.

### 2.2.2 Sewerage

In the past, organized sewage disposal systems were built and operated by the municipalities according to varying standards. Generally, the collection systems served only the innermost part of town and sewage was disposed of, without treatment, in a convenient oued (river bed), in the ocean, or even in a field. Most of these systems are combined for sewage and storm drainage. All have heavy infiltration through manholes, pipe joints and broken pipe during the rainy season, reducing the capacity of the systems and resulting in back-up and overflow. House connections, which must be maintained by the owner, are frequently blocked by the disposal of improper waste. This occurs most often in multi-family and multi-story buildings. At the discharge end of the collector pipe, the raw sewage creates obvious health hazards. Although the Ministry of Health prohibits the agricultural use of raw sewage, and limits use of treated sewage effluent to certain types of irrigation, these regulations are frequently not enforced.

Existing sewerage conditions appear greatly improved in the 26 towns where ONAS has taken over operations since 1974, in relation to management, maintenance, treatment, disposal and in the number of connections. The program of ONAS includes the extension of house connections into unsewered areas of towns to the extent this can be economically justified, together with the construction of primary collectors and sewage and storm drainage whenever practical and possible, especially where treatment plants are foreseen.

The ONAS program requires pre-treatment of industrial waste since existing agricultural processing plants, abattoirs, chemical and metallurgical industries produce wastewater which is difficult for treatment plants to handle. The cost of pre-treatment is borne entirely by the industry. ONAS tariffs are graduated according to the degree of pollution. To encourage pre-treatment ONAS charges service fees to all industries with access to the system whether connected or not. Nationally, industrial wastewater contributes less than 10 percent to the flow of the sewerage systems although that ratio is undoubtedly higher in larger cities, e.g. Sfax.

Existing house connections built by ONAS are practical and of high standard. A boite de branchement in front of the house permits the clean out and removal of grease and large objects before the sewage enters the secondary or primary collector. Downspouts for roof drainage and wash water from the court yards are usually not connected to the boite de branchement. In such cases, this water is discharged separately into the street. Wastewater from kitchens may go into the sanitary house connection or run directly into the street.

House connections are 160 mm PVC or asbestos cement pipe. Secondary collectors range from 250 mm to 400 mm PVC or asbestos cement. Primary collectors have a minimum diameter greater than 400 mm and are built of reinforced concrete with concrete manholes. ONAS' piped wastewater system reflects traditional European and American design approaches, installation practices and equipment standards. However, in an effort to control the costs of installation and operation, ONAS has modified some of the standards.

### 2.2.3 Storm Drainage

The rainy season extends generally from mid-October through March and is characterized by short, high intensity storms. In rural areas, the runoff collects in oueds (intermittant streams) since the rainfall exceeds the absorptive capacity of the soil and ground cover. Towns located along the oueds frequently suffer flood damage. Protection against these acts of nature is the responsibility of the Service Hydraulique.

In towns with existing sewers, the storm runoff is generally carried off by combined sanitary/storm drainage collectors; these invariably have inadequate capacity. While the heavy storms help to flush out the collectors, overflows result in producing flooded streets and sewage back-up in the houses. When treatment plants experience floods that exceed their capacity, wastewater must be diverted around the plant and discharged without purification. Whenever possible, ONAS is constructing separate storm drains, either pipe or rectangular cut-and-cover construction, that will permit discharge of storm runoff without treatment. In some locations, especially in towns without sewers, the municipalities frequently construct open channels (rigoles) along major streets to alleviate flooding.

### 2.2.4 Solid Waste Disposal

Solid waste collection and disposal, as well as street and market cleaning have been and remain the responsibility of the municipalities. Indications are that garbage collection is regular and well-organized. Although there are some reports that collection equipment is under-utilized and collection schedules are unsystematic, the municipalities appear to be doing a very good job of collecting and

transporting solid wastes, and keeping streets and markets clean. Most towns truck or cart solid waste to provisional dump sites where scavenging occurs. Subsequently, the remains are collected, taken to a more permanent site, usually a oued or ravine, and dumped. There is no indication that solid wastes are incinerated or buried systematically in a sanitary landfill, except in Tunis where ONAS is at present building sanitary landfills under the World Bank assisted Second Urban Development Project. However, in Tunis as in the rest of the country, ONAS is not involved in the collection of solid waste.

Reports suggest that solid waste is produced at the rate of 1/2 Kg/inhabitant/day and collected at a cost of US \$4.20/inhabitant year. The costs of solid waste collection and disposal are met by municipal taxes and central government budgetary allocations.<sup>1/</sup>

### 2.3 Problems in the Urban and Peri-urban Sanitation Systems

Problems arise mainly from two sources: the rapid growth of towns due to immigration from rural areas and natural population increase, and insufficient funds for sanitary improvements. Existing systems are frequently old, inadequate and in need of repairs. They have not been expanded to keep pace with the new settlements (new, often multi-story, housing projects and spontaneous squatter settlements) and funding for proper maintenance and repairs is not available, especially where the municipalities are still in charge.

Many houses without sewer connections have two separate disposal systems for wastewater generated in the house. One is connected to the toilet, latrine and sometimes the kitchen and washing area. This connection usually leads directly to a covered pit (puit perdue) in the courtyard or in front of the house. These pits can be excavated and/or later connected to a municipal sewer system. They have the disadvantage that the liquid waste, discharged into the sewage pit, soaks into the ground and may eventually reach the water table and pollute the ground water. During the rainy season when the ground is saturated, the liquid wastes overflow into the street, creating unsightly, bad smelling and unsanitary pools where insects breed and children play.

The larger municipalities have trucks and pumps to empty the sewage pits for a moderate fee upon the request of the house owner. When conditions become hazardous to the community's health, municipalities remove the waste at their own expense and without a request from the property owner.

The other household system drains water from the roof and interior court, and sometimes the kitchen. This wastewater is usually discharged directly into the street, creating unsightly, stagnant pools. The ONAS system is designed to handle both systems. However, ONAS cannot compel households to connect both sources of household wastewater to the system, suggesting that the unsightly and perhaps unhealthy situation created by this practice is likely to continue.

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<sup>1/</sup> See: La Collecte et le Transport des Ordures Menageres dans la region de Tunis, Ministere de l'Interieur, District de Tunis p. 21-31.

Poor site preparation, or the improper placement of too many houses, poses a problem for all unsewered and spontaneously settled urban areas. Frequently, the floor level of the house is below the level of the street and the proposed sewer. Unless the homeowner raises the level of the toilet inside his home, the wastewater will not flow into the sewer collector. Even where toilets are raised, wastewater from the courtyard must be discharged into the street.

Where municipal or ONAS operated systems exist, the system is frequently blocked due to the introduction of inappropriate materials and dry season water flow insufficient to flush the system. There is also a problem of using untreated sewage for agricultural purposes, which municipal and public health authorities are frequently unable to address.

Important coordination problems in the sanitation sector often arise from the common practice of the Societe Nationale Immobiliere de Tunisie (SNIT) and other construction agencies building housing projects on more remote and less expensive development locations. The long sewerage collector lines required to service these projects often cannot be justified until the area between the housing project and the nearest existing sewer becomes more densely populated. (Coordination is discussed more fully in the next section.)

In regard to solid waste, the accumulation of construction debris, paper, bottles and plastics on empty lots and in unused areas poses an aesthetic problem. Use of the provisional transfer stations and other open dumps cause rat and insect infestation and associated health hazards. These problems are diminished where dump sites are located at some distance from town. In any event, solid waste problems certainly have a lower priority than sewerage problems.

#### 2.4 Coordination of Sanitation and Related Investments (Housing)

For practical purposes, the wastewater systems operated by ONAS closely follow the water supply network of SONEDE, in effect if not in planning and coordination. ONAS is currently operating in 26 cities and towns and plans to begin operations in an additional 28 urban centers over the next seven years. ONAS has based its operation on plans developed by the Ingenieurs Conseils Neerlandais in 1978. The plan defines Tunisia's priorities in wastewater disposal, sets the standards, and calls on ONAS to upgrade existing systems in the largest centers and towns before extending the system to new towns or unserved areas. Eventually, according to the plan, all areas are to have piped-systems congruent with the areas served by SONEDE.

In towns, or certain unsewered peri-urban areas, without wastewater systems, ONAS is to provide appropriate non-piped systems. Non-piped sewerage alternatives are regarded by ONAS as intermediate steps in the execution plan that calls for the extension of piped systems to all urban centers of Tunisia.

Coordination among the agencies responsible for installing and maintaining infrastructure services is defined by administrative decree as is coordination between these agencies and the authorities charged with developing residential sites -- Agence Fonciere d'Habitation (AFH) Agence pour la Rehabilitation et la Renovation Urbaine (ARRU), and building houses (SNIT) (See Appendix C). Coordination is most evident at the project level but minimally apparent at the level of planning.

There are no inter-agency boards responsible for long-term planning. Each agency develops its own strategy, although ONAS' plans are largely defined in response to the need to install sanitation systems in the areas serviced by SONEDE.

The absence of a long-range planning capability results, in part, from the fact that the agencies charged with developing sites and services were established at different times. While complementary to one another, each has significantly different capabilities, resources and mandates. Given these different levels of resources, the plans of one agency sometimes have to be altered to accommodate the abilities of another. ONAS, for example, does not presently have the ability to respond to all requests for service. Yet, SONEDE and SNIT cannot afford to wait for ONAS to catch-up. This situation makes inter-agency coordination more difficult to implement, and creates competition for the financing needed to maintain and expand activities.

## Chapter 3

### SANITATION ACTIVITIES OF ONAS

#### 3.1 Urban and Peri-urban Sanitation and the Role of ONAS

##### 3.1.1 Organizational Structure and Planning Capacity

ONAS is divided into five departments: (1) Engineering and New Works-Interior, (2) Projects and New Works - Greater Tunis, (3) Operations and Maintenance, (4) Planning and Studies, and (5) Finance and Administration. The World Bank played a significant role in the establishment of ONAS and continues to work closely with all these departments.

Available evidence suggests that ONAS is an evolving, increasingly effective organization. ONAS exhibits a remarkable ability to integrate politically sensitive income distribution issues with its need to establish a sound financial basis for its investments and operations. With experience and improved management capabilities, ONAS has increased its responsibilities. This growth is projected to continue through 1990 at 9.5 percent annually (growth in sewage flow under ONAS responsibility). While this rate is slower than many would like to see, it reflects ONAS' ability to assume an increasing responsibility for sanitation, and documents the organization's effectiveness.

ONAS will eventually have responsibility for wastewater disposal in all towns of 2000 or more inhabitants. At the present time it is in the process of taking over the sewerage systems of agglomerations of 10,000 inhabitants. Both the Thirty Cities Project and the Greater Tunis Complementary Program reviewed in this report cover towns of this size. Some of these towns have no communal sanitation facilities at the present time; others have either incomplete or badly deteriorated systems.

##### 3.1.2 Finance and Cost Recovery

ONAS obtains its operating revenues from the following sources:

1. User charges based on the amount of water consumed per quarter. These include both fixed and variable cost components covering sanitary and storm drainage (See Appendix D). Fees are collected by SONEDE as an addition to quarterly bills for water.
2. Connection fees that cover a portion of secondary and tertiary lines plus the full cost of household connections, and charges made for repairs and service on connecting lines based on the cost of providing the service.
3. Municipal Tax receipts amounting to 8% of collections by the Fonds Communs des Collectivites Locales.
4. A direct subsidy or compensatory contribution by the Government of 0.040 DT/M<sup>3</sup> for drinking water supplied in areas served by ONAS.
5. Sale of by-products and services.

The 1982 distribution of revenues from these sources was as follows:

User charges and connection maintenance fees	38%
Taxes	23%
Government Compensatory Contributions (Direct Subsidy)	34%
Sale of by-products, miscellaneous services	5%

User Charges

Average annual revenues do not at present cover the long run incremental financial cost of providing sewage service. To resolve this problem ONAS has initiated a cost recovery policy aimed at maintaining its financial integrity while ensuring affordable service for lower income users. In October, 1982, ONAS' progressive tariff structure was modified for the second time in a year in order to increase charges to all but the lowest users of water. The tariff structure is the same for all towns served by ONAS. Current rates are as follows:

Table III - 1: ONAS Sewage Tariffs as of October, 1982

Tunisian Dinars per Quarter (TD)\*

User Category/Quarterly Water Consumption

<u>Domestic and Public</u>	<u>Fixed Fee</u>	<u>Surcharge per M<sup>3</sup></u>	
		<u>Range</u>	<u>Rate</u>
0 - 20 M <sup>3</sup>	.750	0-20	0
20.1-40 M <sup>3</sup>	.750	0-20	0
40.1-7 M <sup>3</sup>	1.000	20.1-40	.020
Over 70 M <sup>3</sup>	2.000	0-70	.045
		0-70	.045
		Over 70	.065
<u>Industrial</u>			
Low Pollution	2.000	all	.065
Medium Pollution	2.000	all	.080
High Pollution	2.000	all	.105
<u>Tourist</u>	2.000	all	.150

\* The exchange rate is US \$1.42 = 1 TD (1983)

(Source: Administrative Order of the Ministers of Plan and Finance and of Equipment, Appendix D.)

In addition to these charges for the use of the sewer lines, ONAS also assesses certain users for installation of the secondary and tertiary distribution system and charges all users for the full cost<sup>1/</sup> of connecting a household to the system. In the past, ONAS only recovered the cost of the secondaries and tertaries from neighborhoods not included in ONAS' Master Plan. In 1983, however, ONAS will begin to recover the full cost of this component of the system from all users.<sup>2/</sup>

ONAS extends five-year credit to its customers for the payment of the connection fee and the property area assessment. Consumers are charged interest on these credits at the current bank interest rate plus 0.5 percent, and repay in quarterly installments. The interest rate charged as of October 1983 was 11.5 percent.

ONAS' policy is to extend new service only into areas where the density of housing and the anticipated connection rate will make the system financially viable. In the context of the current backlog of needs this policy makes good sense. However, as ONAS works off its backlog and begins to coordinate its operations more closely with those of land development and water supply agencies, this policy will require revision, especially if constructive solutions to sanitation problems in areas of spontaneous settlement are to be found.

Between 1982 and 1989 ONAS has projected an increase in its service tariffs amounting to 8.5 percent per year in real terms. By 1989 average annual revenues from tariffs will amount to about .128 TD per m<sup>3</sup> in 1982 prices while the incremental long run cost<sup>3/</sup> of providing the service is estimated to be around .121 TD per M<sup>3</sup>, net of proceeds from the sale of treated sewage. At that time, ONAS would be financially self-supporting although without the investment capital needed to expand services.

This anticipated healthy financial condition rests on several key assumptions. One is that the Government will maintain its resolve to require consumers to pay a larger share of the cost of providing public services. The fact that user charges, heretofore quite heavily subsidized, will be rising in many sectors of the economy will certainly test that resolve to an unprecedented degree. Another assumption is that ONAS will continue to benefit from substantial Government contributions of equity on which it is not required to earn a return. Both lending practices reduce capital costs below those that would prevail in an environment where public enterprises are required to earn competitive rates of return on all

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<sup>1/</sup> Labor and materials plus 10% to cover overheads.

<sup>2/</sup> This is currently estimated at 20 TD per lineal meter of frontage for labor and materials only. ONAS is awaiting the issuance of a decree authorizing it to collect this charge. Primary sewers and drains, treatment plants and overloads will continue to be paid by ONAS from its monthly fees and its investment budget.

<sup>3/</sup> Excluding any imputed return to equity capital.

invested capital. Finally, ONAS continues to benefit from loans at the most favorable rates of interest for much of its borrowed capital.<sup>1/</sup>

Table III-2 shows the impact of these alternative assumptions on the balance sheet of ONAS for the years 1982 and 1990 based on data included in the World Bank's Third Urban Sewerage Project Appraisal Report (1983). These data take into consideration all ONAS investments currently envisioned for the period, including the Thirty Cities and the Greater Tunis Projects.

The table shows ONAS having net income roughly equal to 10 percent of operating revenues in both 1982 and 1990. However, it would have just broken even if it had to pay 10 percent interest on all borrowed capital, as indicated by the nearly equal amounts for net income and unfunded interest charges. At the same time, its return on equity would have been zero. To provide a 10 percent on equity, in addition to borrowed resources, ONAS would have had to generate operating revenues 45 percent higher than those actually obtained in 1982 or projected for 1990. On the other hand, ONAS would eliminate government compensatory revenues by 1987, and by 1990 raise the contribution of revenues from operations from 14 percent of total operating expenses plus fully funded capital costs in 1982 to 58 percent. It would also generate an operating surplus (revenue net of costs) that last existed in 1982, prior to the elimination of compensatory revenues. Figure III-1 illustrates these relationships graphically for the period 1978-1990.

Essentially, Figure III-1 indicates that even with the rapid escalation in tariffs, planned for the 1983 - 1990 period, ONAS will succeed in doing little more than replacing government compensatory payments (direct subsidies) with revenue from operations. If government considers it essential to close the gap between operating revenues and total expenses including unfunded capital costs, additional actions will be necessary. However, evidence suggests that the Government will be satisfied if ONAS can cover its financial operating costs while rapidly expanding operations. In this context, the question of return on equity is an issue to be addressed toward the end of the decade, not now.

### Taxes

ONAS receives 8 percent of the revenue of the Fonds Communs des Collectivites Locales (Municipal taxes). Such revenue is projected to decline from 23 percent of total operating revenues in 1982 to less than 16 percent by 1990. Since ONAS' share of this fund is fixed by law, it would take legislative action to raise ONAS' percentage. There is no indication that the GOT intends to do this.

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<sup>1/</sup> It should be noted that most wastewater utility firms in the United States and Western Europe do not generate the returns necessary to finance expansion and capital improvements. While operating and capital costs are generally offset by revenues, expansion and capital improvements are usually financed through municipal bonds. Since this financial mechanism is not available in Tunisia, government grants and capital subsidies will be required to ensure the expansion and improvement of the ONAS network. The current thrust of the government is to establish a closer balance between revenues and the cost of operations.

Table III - 2: Income Statements, Balance Sheets and Unfunded Capital Costs for ONAS for 1982 and 1990  
(Million Tunisian Dinars)

Income Statements

	1982	1990
Operating Revenues:		
Sewerage Charges	5.22	32.53
Municipal Contributions	3.20	7.02
Connections & other work	0.38	3.16
Miscellaneous	0.27	2.62
Compensatory Revenues	4.65	-0-
Less: Bad Debt Provision	(0.07)	(0.49)
Sub-total	<u>13.65</u>	<u>44.84</u>
Operating Expenses		
Depreciation	3.67	10.62
Other	6.74	21.48
Sub-total	<u>10.41</u>	<u>32.10</u>
Net Operating Income	3.24	12.74
Interest	1.79	8.25
Net Income	<u>1.45</u>	<u>4.49</u>

Balance Sheets

Assets		
Fixed Assets	96.74	330.41
Current Assets	6.63	21.73
Total Assets	<u>103.37</u>	<u>352.14</u>
Equity and Liabilities		
Equity		
Government Contributions	44.66	137.36
Customer Contributions	11.19	37.28
Retained Surplus	5.12	23.62
Sub-total	<u>60.97</u>	<u>198.26</u>
Long Term Debt	30.79	132.87
Current Liabilities	11.61	21.01
Total Equity and Liabilities	<u>103.37</u>	<u>352.14</u>

Unfunded Capital Costs

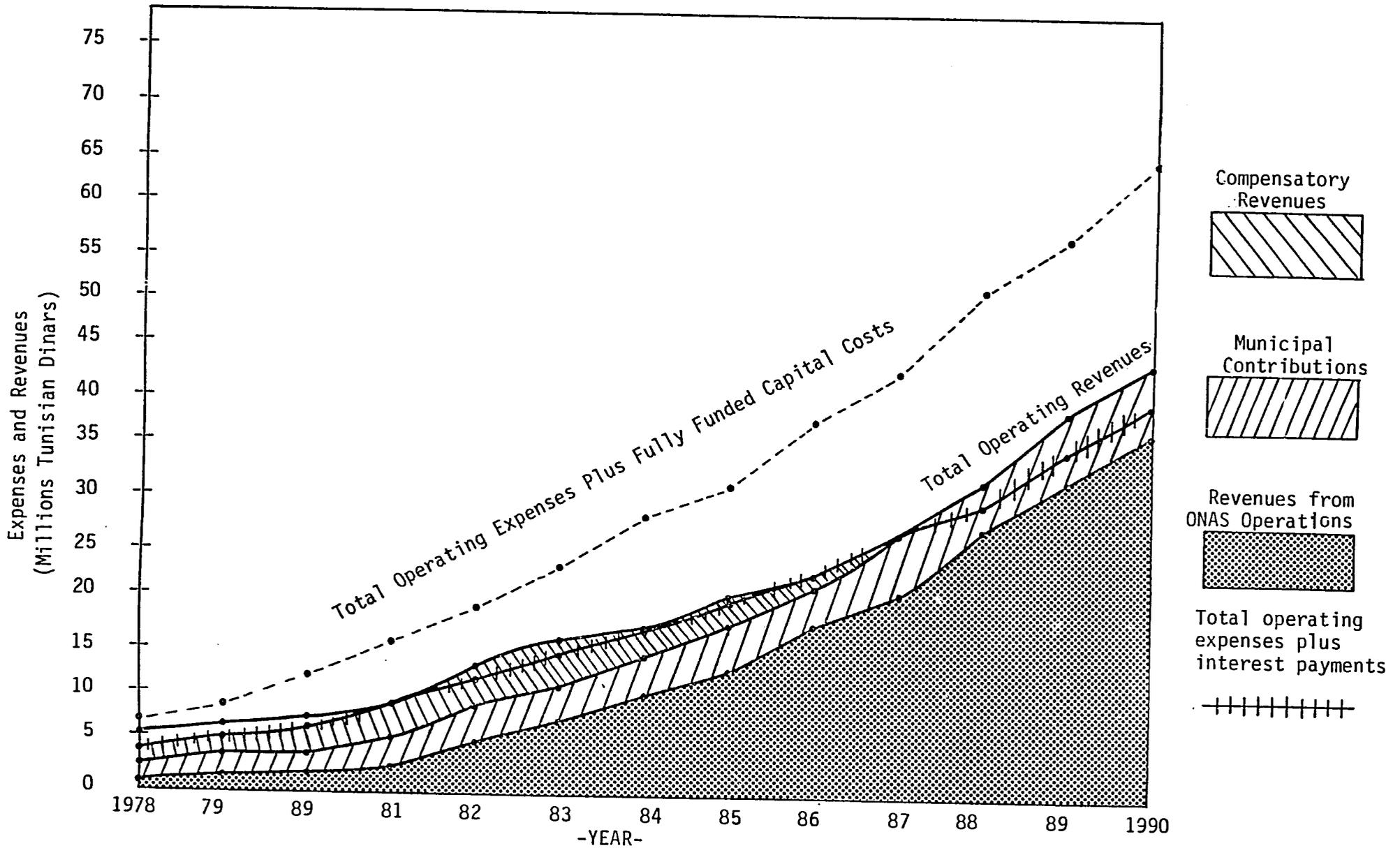
Return on Equity <sup>1</sup>	6.10	19.83
Additional Interest Charges <sup>2</sup>	1.29	5.04
Sub-total	<u>7.39</u>	<u>24.87</u>

<sup>1</sup> Equal to 10% of all equity.

<sup>2</sup> Equal to the difference between interest actually paid and 10% of all long term debt.

Source: World Bank (1983), pp. 44-46 and authors' computations.

Figure III-1 Total operating revenues by source compared to operating expenses both with and without fully funded capital costs



Source: World Bank, [1983] pp. 44-46, plus author's computations

### Government Compensatory Contributions

The Government has asked ONAS to alter its tariff structure in order to eliminate the central government's subsidy of operating revenues. Under the proposed tariff adjustments, direct compensatory payments by the Government should be eliminated by 1987.

Government equity contributions, on the other hand, are scheduled to increase from TD 5.35 million in 1982 to TD 19.5 million in 1986. (This does not include the assets of the municipal systems taken over by ONAS.) Beginning in 1986, the Government's contribution to equity is projected to begin to diminish. Still, the zero rate of return on equity capital represents a substantial and continuing indirect subsidy.

### Sale of By-Products and Miscellaneous Services

This component of ONAS revenues will increase considerably, but will never amount to an important source of operating revenues, possibly never more than 6 percent of revenue.

### Conclusion

ONAS has put into place a cost recovery program that is ambitious and can be successful. Although ONAS will not provide a positive return on government and customer equity invested in the system, it will cover all costs without direct government subsidies by 1987. Whether ONAS should be expected to earn, in addition, a competitive rate of return on equity is essentially a long run political question that calls into consideration public health benefits, consumption levels and many related issues. In the short run, ONAS is probably pushing as hard as it can on rates without generating substantial social and political opposition.

#### 3.1.3 Implementation and Maintenance

From its inception in 1975, ONAS has had the objective of taking charge of all urban sewerage and storm drainage activities throughout Tunisia. In practice this has meant taking over, upgrading and rehabilitating existing municipal systems, as well as constructing and managing new systems in towns without communal, piped sanitary facilities.

ONAS started by tackling problems in the largest cities and the tourist areas. Smaller towns were added as the staff of ONAS grew and more funds became available. In the large cities the central part was improved first while peripheral areas were left for later connection, even though the large, primary sewage collectors and drainage canals frequently ran through these areas on their way to the low lying treatment plants and discharge points, either a oued or the ocean.<sup>1/</sup>

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<sup>1/</sup> In some cities, notably parts of Tunis and Sfax, storm drainage has been actually a more immediate and noticeable problem than sewerage due to impervious soils, high water tables and flat topography. Urban storm drainage is often closely related to protection against flash floods from the oueds, but the latter requires different protective measures (e.g. reservoirs, flood walls and channeling) and is dealt with by the Service Hydraulique instead of ONAS.

Some cities, especially the larger ones, are located in more than one drainage basin. ONAS implements construction according to these individual drainage basins in which the sewage and storm water flows by gravity. Combining more than one drainage basin would require costly pumping stations in order to convey wastewaters from one basin over the dividing ridge to another basin. Construction by individual drainage basins generally requires separate sewage treatment plants for the flow from each basin. Occasionally, topography requires some pumping to evacuate a local pocket.

ONAS implements all new construction, i.e. new house connections, collector lines, pump stations and sewage treatment plants through private contractors selected through competitive bidding. ONAS field engineers supervise construction and assure compliance with the specifications and assure the overall quality of work. Maintenance of the collection systems and treatment plants is performed by ONAS personnel on a regular schedule. Maintenance records are kept, especially for the treatment plants where maintenance follows manufacturer's specific instructions.<sup>1/</sup> For the sewage collection systems, ONAS is responsible for all conduits leading from the boite de branchement, the individual household connection. Maintenance of internal house piping up to the boite de branchement is the responsibility of the customer.

In general, ONAS' implementation plan follows the original outline and schedule prepared by the Dutch consultants Ingenieurs Conseils Neerlandais in 1977 and updated in 1982. Implementation practices and construction standards follow conventional modern lines.

#### 3.1.4 Personnel Recruitment and Training

Since its establishment ONAS has moved rapidly to recruit and train personnel capable of administering a public sector agency, and designing, installing and maintaining a sanitation system. A relatively new public enterprise, ONAS has been able to learn from the mistakes and accomplishments of other public sector agencies, especially SONEDE, and has patterned its development on their experiences and successes.

Since ONAS has been able to offer the same salary structure and benefits, e.g. low interest housing loans, as other agencies, along with the possibility of rapid advancement in a fast growing organization, it has had no difficulty recruiting and retaining competent persons. When first established, however, ONAS relied heavily on foreign technical assistance to train personnel, conduct studies, manage projects and supervise the system. Over time, the degree of foreign technical assistance has declined. ONAS has been able to play an increasing role in training its personnel and managing its affairs. In some measure, however, foreign technical assistance continues (see Appendix E). Generally, some ONAS engineers continue to go abroad for special studies, and short-term training

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<sup>1/</sup> Both appeared clean, well-operated and maintained, and under competent management.

courses in Tunisia are frequently supported and directed by foreign experts. The European Economic Community (EEC) and the German Gesellschaft für Technische Zusammenarbeit (GTZ) have been particularly active.<sup>1/</sup>

In general, as the level of foreign involvement in the operations of ONAS has decreased, the capacity of the organization to train its employees has increased (See Appendix F). Aware that SONEDE and other public agencies have developed highly motivated and qualified personnel with a keen sense of organizational loyalty through special skill-enhancement training, ONAS has moved steadily to inculcate similar traits in its personnel.

Currently, ONAS has the capacity to train personnel in project planning, design, management and maintenance. Treatment plant managers and operators receive some training from the foreign companies that supply the plant equipment. Frequently, ONAS sends staff to seminars attended by members of other public sector agencies. In time, ONAS aims to establish its own training center, like STEG's, and to provide all training on an in-house basis.

The total personnel of ONAS has grown an average of 12% per year. With approximately 170 personnel in 1975, ONAS has reportedly more than 1,600 currently, although Appendix G indicates a total of 1,566 (March, 1983), all specified by category and division within ONAS.

The caliber of on-going operations and the extent of personnel retention illustrate the efficacy of personnel recruitment and training practices. Figures on loss of personnel to other public or private sector agencies are unavailable.

Indications are that ONAS has a low turnover and it appears that opportunities and programs in place are effective in training and keeping staff. On the other hand, since ONAS is a new organization that offers its personnel rapid advancement, it may be too early to gauge the degree to which the organization can retain personnel.

Key personnel of ONAS appear to have a well-defined understanding of their responsibilities, as well as the authority and cooperation of the other divisions within the organization. The sense of structure within ONAS, between ONAS and the other public sector agencies (e.g. SONEDE), and between ONAS and others involved in the sanitation sector (e.g. municipalities, SNIT, AFH), is well understood and uniformly expressed. Also, at sites visited where private sector contractors were working on ONAS projects, ONAS supervisory personnel appeared knowledgeable about the technical details of the projects and in complete control of the installation and maintenance activities. As sewage treatment is the most demanding and difficult technical part of the ONAS operation, it was particularly encouraging to observe that the plant managers appeared to be fully competent

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<sup>1/</sup> The three ONAS engineers who accompanied the WASH team on visits to the project sites were trained in different countries: Tunisia, France and the Soviet Union. Still, all held the same rank within ONAS - principal engineer - and all had the same general management approach.

and to take considerable pride in the successful operation and appearance of their plants. It should be noted, however, that the equipment at the plant sites visited came from 3 different industrial countries -- Sweden, Switzerland and France. ONAS may find it difficult in the future to operate at a uniformly high level with such a range of equipment.

Without exception, the personnel interviewed exhibited pride in their work and organization, technical competence and an eagerness to improve the sanitation conditions in Tunisia. ONAS personnel are aware of the difficulty of their assignment and candidly distinguished between what ONAS, or any organization, could do to address the country's sanitation problems, and what individual citizens could and should do. The latter refers to traditional, individual toilet habits, and general carelessness in the upkeep of in-house sanitary fixtures, issues which can only be addressed through general education. While ONAS is aware that services should be made available to those in greatest need as quickly as possible, the organization has no programs in place to involve or educate the public.

### 3.2 Review of the Thirty Cities Project (Third Urban Sewerage Project)

#### 3.2.1 Summary of the Project

The project foresees improvements in sanitary sewerage and storm drainage facilities in 34 towns in 30 urban areas with an average population of 16,300 per town (1981). Some of the towns have limited, municipality-operated sewerage and drainage facilities. The majority have only individual sewage pits (puits perdues) and no storm water collectors.

The total population of the 34 towns in 1981 was about 555,000, or 8.5 percent of Tunisia's total population. It is projected to grow to 700,000 by 1988. The sewerage connection rate of the 34 towns averaged 42 percent in 1981 vs. 82 percent for water connections. Five of the 34 towns have only individual sewage pits; 16 have a combination of individual pits with inadequate pipe collection systems, and 9 towns have a communal but limited piped collection system. Only one town, Dar Chaarbane, has a functioning sewage treatment plant. The other collection systems discharge raw sewage into a nearby oued or into an open field where it is used for irrigation and fertilization.

The proposed project includes the following construction:

1. 110 km of primary sewers and about 20 pumping stations
2. 300 km of secondary sewers
3. 12 new sewage treatment plants, expansion of the one existing plant and connection of 5 towns to existing treatment plants in other cities.

Implementation of the project is projected to take about 6 years and produce substantial improvements in the level of sanitation and the amount of treated effluent available for industrial and agricultural re-use.

The World Bank has loaned US \$34 million towards an estimated total project cost of TD 49.4 million. The Tunisian Ministry of Plan has requested USAID to make TD 15.5 million available from the Housing Guaranty (HG-004) program for the project, as part of an urban development or slum rehabilitation program.

Table III-3 lists the thirty urban centers together with their estimated populations (1981) and the projected cost of sanitary improvements for each center.

### 3.2.2 Beneficiaries

Approximately 250,000 of the 555,000 inhabitants of the 34 municipalities included in the Thirty Cities Project are presently connected to communal sewerage systems. Under the project, the number will increase by 155,000 inhabitants by 1988. The overall connection rate will rise from 42% in 1981 to approximately 60% in 1988. More significantly, the project will substantially upgrade existing sanitation facilities and have a direct impact on over 60% of the population of these towns.

Twenty of the 34 municipalities served by this project have populations under 15,000 and thirty had less than 25,000 inhabitants in 1981. According to the results of the 1980 Household Budget Survey, communes under 15,000 inhabitants have median per capita annual expenditures of TD 203 versus the national urban median of TD 244.<sup>1/</sup> Communes of 15,000-70,000 have median per capita expenditures of TD 229 (See Appendix H). Given that 60 percent of the households in the smaller towns have total expenditures below the national median and that the towns between 15,000 and 25,000 are probably not much different, the thirty cities appear to qualify for HG financing.

Recommendation: Overall, approximately 22 percent of project expenditures will go for treatment plants, items that may not be directly relevant to the needs of the lowest income strata of the 34 towns. However, since the financing requested from AID amounts to less than 78 percent of the project cost, the WASH team recommends that 100 percent of the GOT request be considered eligible for HG financing.

### 3.2.3 Relevance to Sector Needs

The sanitation problems in more than three fourths of the cities visited by the WASH team were clearly cause for concern. In terms of priorities relative to other sanitation sector problems requiring substantial amounts of resources, addressing the sewage and drainage problems of most of these towns stands near the top of the list. There can be little doubt that this project addresses important sanitation sector needs. Improved levels of sanitation in the project towns should reduce some unhealthy conditions and improve the environment. In addition, since these towns house large numbers of farmers who continue to cultivate nearby lands, investing in sanitation improvement in such areas should help maintain high overall employment levels for the national economy as well as provide significant health benefits.

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<sup>1/</sup> All municipalities over 2,000 inhabitants. Though some of these towns contain unusually large concentrations of households above average increases, the team was not able to visit enough of the towns to discriminate in any meaningful way among them.

Table III - 3: Estimated Population, Project Expenditures and Expenditures per Capita for the Thirty Cities Project

<u>City</u>	<u>Estimated 1981 Population</u>	<u>Project Expenditures<sup>a</sup></u>	(000 Tunisian Dinars)
Bizerte	76,000	523.3	
Ras. Jabel	15,000	293.3	
Mateur	22,800	215.8	
Menzel Temine	25,400	671.5	
Soliman	15,700	1431.2	
Menzel Bouzelfa	11,300	638.9	
Beni Khalled	6,300	607.2	
Grombalia	11,400	855.8	
Korba	80,200	588.6	
Dar Chaabane	19,500	683.5	
Zaghouan	9,300	186.4	
Sayada/Lamta/Bou Hajar	18,000	1218.5	
Ksor Hellal	22,700	894.9	
Teboulba	16,900	825.1	
Behalta	7,600	578.8	
Kolaa Sghira	11,500	760.9	
Sahline	10,000	848.1	
M'Saken	37,600	864.3	
Ouardanine	9,800	905.9	
Ksour Essaf	18,100	961.4	
El Djem	13,000	851.4	
Sfax Suburbs	21,100	2348.7	
Mahares	12,500	1145.7	
Sbeitla	12,400	691.1	
Sidi Bouzid	13,300	1276.5	
Nefta	14,500	1538.1	
Houmt Souk	29,500	1105.3	
Zarzis	14,400	1061.7	
Medenine	24,500	1030.2	
Tataouine	13,900	607.2	
<b>Totals</b>	<b>555,100</b>	<b>26,209.3</b>	
Total Population Affected	405,000		
Expenditures per capita (TD)		64.7	

<sup>a</sup> Excluding overheads, consulting services and contingencies.

### 3.3 Review of the Greater Tunis Sewerage and Drainage Project Complementary Program

#### 3.3.1 Summary of the Project

This project covers the third phase of a comprehensive program for providing sewerage and drainage services in Tunis. It follows two earlier projects partially financed by the World Bank, the second of which is still under implementation.

The Complementary Program is designed to address sanitation needs in Greater Tunis not covered by the two earlier projects as well as areas of new settlement not foreseen in the 1978 master plan. The allocation of financing by purpose is as follows<sup>1/</sup>:

primary sewers	13 %
secondary sewers	11 %
recalibration (inner city)	12 %
primary and secondary drains	14 %
main storm drainage canals and retention sites	49 %

The secondary sewers of this system will serve parts of the districts of El Aouina and Ariana Nord, important areas of spontaneous or lower income settlement, with a total population of 26,000 inhabitants. The primary sewers will discharge to treatment plants and will serve approximately 189,000 inhabitants by 1989. The drainage system will have a positive impact on about 660,000 inhabitants, including the city of Tunis.

The Kuwaiti Fund is providing KD 4.85 million of the TD 35 million estimated cost of the Complementary Program. The GOT has requested HG financing (TD 12.5 million) for the remainder.

#### 3.3.2 Beneficiaries

The Greater Tunis Project benefits large heterogeneous areas of Tunis. Table III-4 indicates the specific areas benefiting from the project.

The components for Ariana Nord and El Aouina address sanitation needs of areas of spontaneous settlement. The main drains for Gueriana Bardo also benefit populations that appear to qualify for HG financing, though several high income neighborhoods are drained as well. The remaining involvements, especially the large expenditures targeted for Central Tunis, Guereb-Roriche and Jebel Jalloud, benefit industrial areas and/or populations that have average incomes that appear to be well above the national median for urban areas (see Appendix H).

Recommendation: Only if AID assistance is focused on the areas of spontaneous settlement would this project clearly qualify for HG financing. Project expenditures for these areas will probably amount to no more than TD 10 million over the

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<sup>1/</sup> Excluding consulting services, technical studies and contingencies.

Table III-4:

Approximate Expenditures by District, Number of Beneficiaries  
and Expenditures Per Capita under the Greater Tunis Project  
Complementary Program.

<u>District</u>	<u>Estimated<sup>1/</sup> Expenditure (000 Tunisian Dinars)</u>	<u>Number of Beneficiaries</u>		<u>Expenditure per capita (Tunisian Dinars)</u>
		<u>Total<sup>2/</sup></u>	<u>Incremental<sup>3/</sup></u>	
Ez Zahra	2005	--	1,000	
La Goulette	863	32,000	--	132.2
Sidi Daoud	728	--	500	
El Aouina	583	--	2,500	
Jebel Jelloud	1421	99,000	29,000	14.4
Ariana Nord	4119	50,000	50,000	82.4
Gueriana-Bardo	8224	265,000	72,000	31.0
Central Tunis	2866	100,000	--	28.7
Hammam Lif	62	4,000	4,000	15.5
Guereb-Roriche	1915	166,000	40,000	11.5
El Mourouj	978	117,000	117,000	8.4
Totals	23814	833,000	316,000	28.6

<sup>1/</sup> Excluding engineering costs and contingencies.

<sup>2/</sup> 1988 population of the districts concerned.

<sup>3/</sup> Incremental increase in population served by ON from 1983-1988, including connections stimulated by first two Greater Tunis projects.

Source: I.C.N. 1982. "Greater Tunis Sewerage and Drainage Project," Complementary Programme; Period 1983-1988; pp 4-13, 4-14, 7-13; ...' computations.

life of the project in current dollars or slightly less than 30 percent of the total project costs. The team recommends that this portion of total project costs, or the amount of the GOT request for each year, whichever is less, be considered eligible for HG financing.

### 3.3.3 Relevance to Sector Needs

There is little doubt that the Complementary Program of the Greater Tunis Sewerage and Drainage Project addresses key sanitation problems in Greater Tunis. In some areas these problems appear to be more acute than those in many of the towns included in the Third Urban Sewage Project or those in many smaller towns not yet touched by ONAS services. It is readily acknowledged that giving attention to sanitation problems in Tunis serves to increase the attractiveness of Tunis relative to smaller towns and rural areas. Shifting a larger proportion of the cost of essential municipal services to land speculators, users and others may not alter the rate of spontaneous settlement in Tunis but could provide a more viable long-term solution to Tunis' sanitation problems since there could be a greater balance between the cost of implementation and operation of the network and the revenues generated.

### 3.4 Disbursements for the Thirty Cities and Greater Tunis Complementary Projects

The Government has asked USAID to provide TD 15.5 million for the Thirty Cities Project and TD 12.3 million for the Greater Tunis Complementary Program during the remainder of the Sixth Plan (1981-1986). The Third Sewerage and Greater Tunis Projects will require additional financing during the Seventh Plan (1986-1991) period amounting to TD 12.5 million and TD 10.4 million respectively.

Loans already acquired and total financing remaining to be acquired are noted in Table III-5. Table III-5 also contains a schedule of the Government's total equity contribution to ONAS scheduled for the Sixth Plan Period, the amounts expected during the Seventh Plan, and the maximum amounts qualifying for USAID/HG financing. Qualifying amounts have been calculated by accumulating all of the amount requested for the Thirty Cities Project plus 30 percent of the total cost of the Greater Tunis Complementary Program - the proportion of the project that, in the estimation of the WASH team, qualifies for HG financing. Amounts qualifying for USAID/HG financing exceed scheduled Government equity contributions as well as the amount authorized under the Housing Guaranty Program and allocated to Tunisia.

In 1979 US \$50 million was approved under the Housing Guaranty Program for urban upgrading activities; US \$25 million was authorized for disbursement. Unusually high rates of interest, among other factors, dissuaded the Government of Tunisia from borrowing any or all of the amount authorizing until 1983 when approximately US \$4 million was used to repair flood damage in Sfax.

In the same year, the Ministry of Plan asked that the US \$21 million remaining be used to complement financing provided by the World Bank for the Thirty Cities Project and the Kuwaiti Fund for the Greater Tunis Complementary Program. Equivalent to TD 14.7 million at the current rate of exchange, this amount is less than needed to complete the projects but well within the amount that qualifies for HG financing.

TABLE III-5:

Scheduled Disbursements for the Thirty Cities Project  
and the Greater Tunis Supplementary Program

<u>Project/Financing</u>	<u>Expenditure by Year</u>						<u>Totals</u>
	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	
Thirty Cities (78)							
World Bank	.8	2.5	4.6	4.1	7.0	2.2	21.2
Remaining	.7	3.0	6.0	5.8	9.3	3.2	<u>28.0</u>
							<u>49.2</u>
Greater Tunis (30)							
Kuwait	-	.4	1.7	2.1	5.0	4.4	13.6
Remaining	.3	3.9	4.2	3.9	5.5	4.9	<u>22.7</u>
							<u>36.3</u>
Anticipated GOT Equity Financing for ONAS	7.7	10.5	12.0	14.5	13.5	12.5	70.7
Maximum Amounts Qualifying for USAID/HG Financing	.8	4.3	7.8	7.6	12.5	6.0	39.0
Recommended Annual Allocations	a*						
	b*						
	-	3.5	5.6	5.6	-	-	14.7
	-	.8	2.2	2.0	8.0	4.6	17.6

\*a =US \$21 million HG authorized funds and  
b =US \$25 million HG approved but not unauthorized funds.

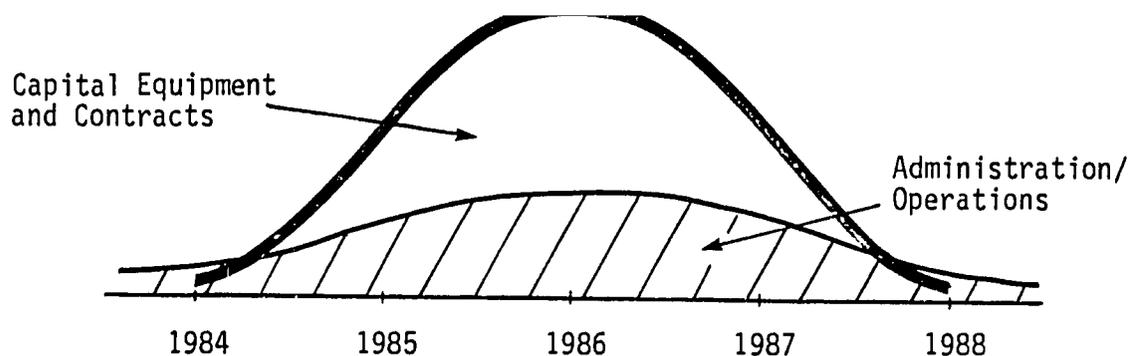
The team understands that US \$21 million has already been authorized for the HG program in Tunisia and that an additional US \$25 million has been approved. While the team recognizes that RHUDO is willing to entertain and respond positively -- assuming the projects qualify under HG guidelines -- to the GOT's request to make the US \$21 million available for the sanitation projects, there is no clear indication that the additional amount would be available for the same program or reserved explicitly for the more traditional housing programs. Discussions underway between the Ministry of Plan and the Ministry of Housing suggest that there is some general agreement that a portion of the total HG approved amount (US \$50 million) should be reserved for housing.

Since there is some uncertainty concerning the total amount that might be available for the sanitation projects, the team has set forth two separate line items for Recommended Annual Allocations in Table III-5. Line a. reflects the US \$21 million already authorized; line b. is the additional US \$25 million approved but not yet authorized.

The amounts stipulated for any given year have been determined using the following criteria:

- the absorptive capacity and financial needs of the implementing agency - ONAS;
- the requirements that the other lenders -- the World Bank and the Kuwait Development Bank -- have placed on the GOT and insisted be in effect before making capital available, and
- the cash requirements of most projects of this type in which administrative expenses increase rapidly in the start-up period of the project and continue after the period of construction, while costs for capital equipment and construction occur in the middle of the project and must be met. The graph below suggests the manner in which financing will be required by the project.

Capital Requirements for Equipment, Contracts, and Operations during the Project Period



In large measure the amounts indicated are only rough estimates of what may be required and could be allocated from HG funds. Once the lending banks indicate how much the GOT must have available in any given year and the GOT knows what it will have on hand, the actual amounts needed from the HG program in any given year can be more precisely determined.

At present the amount listed in line a. of the Recommended Annual Allocations (total 14.7 million TD) is equivalent to US \$21 million and allocated according to the criteria indicated. Line b. totals 17.6 million TD is equivalent to US \$25 million -- an amount that may be available for the sanitation projects, is allocated using the same criteria and is the difference between the amount qualifying and the amount approved under the HG program.

The figures on GOT equity contribution reflect in large measure the assignment to ONAS of systems already in place and scheduled for take-over by ONAS as well as anticipated but unspecified capital needed to meet operating expenses of the entire system.

### 3.5 Rationale for Using HG Funds to Support/co-finance Sanitation Projects

The Housing Guaranty Program was developed more than two decades ago to respond to the shelter needs of populations in developing countries. Improving infrastructure services in target neighborhoods in an important feature of the urban upgrading program. Generally, investments in services, such as sanitation, are linked directly to the neighborhoods selected for upgrading.

In Tunisia the investment situation is different. USAID has been asked to approve a loan to support two sanitation projects that will improve conditions in urban areas in general. The improvements, however, are not targeted to specific income groups. Investing in these projects under the HG program would in some aspects be a departure from past AID practice.

In addition, the loans requested are to be used as counterpart funds to a World Bank loan for the Thirty Cities Project and to the Kuwaiti Fund's contributions to the Greater Tunis Project. Co-financing is not a practice that AID enthusiastically endorses, although the agency has co-financed projects in the past. Still, while neither the World Bank nor the Kuwaiti Fund is opposed to AID's participation, AID has some reservations. First, AID usually supports projects that would not be implemented without US assistance. Second, if donors other than USAID are involved in the project, AID usually has the major share of the risk and the greatest degree of leverage.

Neither situation is operative in Tunisia. The Ministry of Plan has made it abundantly clear that the sanitation projects will be implemented with or without the HG funds. Admittedly, the timetable will have to be altered if AID chooses not to participate and other funding cannot be secured. However, the team was unable to assess the effect of AID's non-participation on the projects. Representatives of the GOT suggested that AID was the first development agency approached after the primary financing was secured for the Thirty Cities and the Greater Tunis Projects. The GOT indicated that other agencies would be approached if AID's decision was negative.

It is also important to point out that the GOT is borrowing the funds, not ONAS. ONAS is prepared to receive the funds from the government but unwilling and unable to repay either the principal or the interest. The government is aware of ONAS' position and prepared to accept it. In short, while the loan will benefit ONAS, the GOT will be responsible for repayment. Plan has also informed AID that the two sanitation projects have the highest priority and that there are no other unfunded projects that hold the government's interest and could be investment opportunities for AID.

USAID finds itself in a unique situation with respect to the Housing Guaranty Program in Tunisia. AID has been willing to support shelter programs in Tunisia since 1978 but the government has been unwilling or unable to develop appropriate projects or accept loans at the interest rates in effect over the last four years. The government is now prepared to borrow the funds but wants to use them for projects that are shelter-related but not explicitly tied to the housing sector.

On balance it would seem that AID has a great deal to gain by approving the Government of Tunisia's request. The projects will improve the living conditions of a segment of the population that falls within the HG approved beneficiary group. The projects are the "highest priority" to the government; both are well-designed and should improve conditions in those neighborhoods that are targets for AID assistance. The projects are to be implemented by an organization that has strong professional credentials and the complete confidence of the government. Finally, co-financing the projects gives AID an opportunity to work closely with the World Bank and to respond to its desire to have the Thirty Cities Project implemented on schedule.

Participating in the Greater Tunis Project to the degree recommended by the WASH team also gives AID an opportunity to collaborate with the Kuwaiti Fund, an important contributor to development in the Arab world. If the projects are effective, and every indication suggests positive results, -- measured as on-schedule implementation, competent management of the sanitation system and improved environmental health for urban neighborhoods -- AID will have forged important links with agencies centrally involved in improving the quality of urban life in the Near East.

### 3.6 Summary Statement

Use of the authorized HG funds requested by the GOT to support these sanitation projects would represent a significant departure from past USAID practices. Still, a positive responses to the GOT's request would result in the following:

- ° ensure the provision of services needed by low and moderate income urban households,
- ° affect a timely implementation of the projects, and
- ° level to a closer collaboration among development agencies working in Tunisia.

## Chapter 4

### OTHER OPTIONS AND RECOMMENDATIONS FOR RHUDO INVOLVEMENT IN THE SANITATION SECTOR

#### 4.1 Tunisian Response to Spontaneous Settlements

During the mission the WASH team kept foremost in mind the central objective of the RHUDO program, namely to improve the delivery of shelter to low-income urban dwellers. The team made a conscious effort to determine the degree to which the projects proposed by the Government of Tunisia as well as other improvements in sanitation such as better urban planning and greater coordination between public utilities and housing agencies, would contribute to the realization of RHUDO's objectives.

During visits to the sites selected for development under the Thirty Cities and the Greater Tunis Complementary Program, the WASH team assessed the degree to which identifiable low-income and spontaneous neighborhoods would benefit. Housing in these areas often had one or more of the following characteristics:

1. placed on land that was not necessarily owned by the resident;
2. built without a permit;
3. constructed by residents themselves;
4. placed on a site without giving attention to an overall development plan;
5. inexpensive and non-permanent materials used or haphazard construction;
6. lack or sparseness of infrastructure services such as water, sewer, roads;
7. located outside the boundaries of municipalities.

A distinction should be made between the "spontaneous" neighborhoods in smaller towns and those in the large cities, principally Tunis. In the smaller towns the neighborhoods are usually heterogeneous in terms of the income level of the population and quality of housing. It is not unusual to find neighborhoods with upper, middle and low income residents. On the other hand, the overall quality of housing in these towns is more homogeneous than in Tunis where more "slum" housing and neighborhoods exist. Among the locations visited, only Tunis had houses without individual water taps. Wastewater was also more apparent in the streets. (However, even the poorest neighborhoods in Tunis appeared better than the poorer urban settlements found in other North African countries, e.g. Morocco and Egypt, in terms of the quality of construction, house placement, site development and resident density.)

In general, project plans exhibit no bias in favor of excluding or including low-income neighborhoods. The project plans, particularly those for the Thirty Cities Project, appear to be based on technical issues, applicable to the upgrading or installation of the sanitation systems. ONAS engineers and project directors seem to be determined to take the steps necessary to ensure that the system ultimately provides full coverage for all inhabitants, irrespective of socio-economic level, or quality of housing.

It is a Government of Tunisia policy to rehabilitate and upgrade conditions in the poor neighborhoods rather than to destroy squatter settlements. Upgrading maintains the population in place, and poorer residents are not excluded from services, driven from their neighborhoods or forced to create new settlements.<sup>1/</sup>

#### 4.2 Innovative Approaches

Although conscious of the need to provide necessary services as economically as possible in the rehabilitated areas, ONAS does not employ what might be termed "innovative" approaches, as defined in the World Bank's Technology for Water and Supply and Sanitation. In general "appropriate technologies" are regarded as temporary and less than ideal solutions, not only by ONAS but by developers and agencies involved in residential construction, as well as municipalities charged with handling solid waste disposal. ONAS is wedded to piped systems and intends in time to install these systems in every urban center of more than 2,000 inhabitants.

ONAS realizes that it cannot achieve this objective in the next decade. Consequently, it has accepted the use of "provisional" (non-pipe) solutions to the sanitation problems of urban areas. For example, ONAS frequently approves the sanitary systems designed and installed by public and private sector developers, which call for the construction of a common cesspool. These vary in size depending on housing density and are designed and installed according to ONAS standards. They are serviced by the municipality until linked to the ONAS system.

Recommendations: Since "innovative approaches" to site development are not in the policy of the Tunisian Government, AID would have to conduct studies that could clearly show (1) that these site development practices would make land more affordable and (2) that the cost of installing and later upgrading innovative systems would warrant the investment before the GOT is likely to change its current policy. However, given the demand for low-cost housing and improved levels of infrastructure services, especially sanitation, the government might be willing to respond favorably to this suggestion. The WASH team is aware that officials of both Agence Fonciere d' Habitation and Agence pour la Rehabilitation et la Renovation Urbaine have expressed a willingness to discuss this proposal. The WASH team encourages USAID to take steps to conduct the above-mentioned studies whose results might prompt the GOT to revise current policies.

#### 4.3 Review of Sanitation Activities of Relevant GOT Agencies

The WASH team reviewed the activities, capabilities and objectives of municipal authorities, development agencies, and building authorities that deal with sanitation issues. Municipalities have traditionally been responsible for urban sewerage and solid waste disposal, and for coordinating urban development within

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<sup>1/</sup> Identification des quartiers a rehabiliter dans les villes tunisiennes, Rapport d'Orientation, Ministere de l'interieur, Direction des collectivites locales and publiques, Unite centrale des projets urbains, Republique Tunisienne, Janvier, 1981 p.3.

municipal boundaries. Solid waste disposal continues to be a municipal operation, but sewerage is being transferred to ONAS. In towns where ONAS has taken over, the agency operates with municipal support. However, there is no municipal involvement in sewerage. In towns where ONAS has not begun operations, local authorities continue past practices and await ONAS' arrival. Municipalities, on the whole, appear to give little attention to wastewater disposal since it is a problem often beyond their financial and technical capacities, and soon to be transferred to ONAS. It is difficult, therefore, to prompt municipal authorities to take an interest in waste-disposal systems because most seem pleased that their involvement in this sector is time-limited.

Public and private developers, but not necessarily individual home builders, must take wastewater disposal into account when developing sites. Where ONAS has taken charge of the system, developers are required to consult ONAS as well as other agencies responsible for infrastructure development especially municipal authorities before proceeding to develop property (See Appendix C). In urban centers where ONAS is not operating, the situation is unclear. ONAS has the paramount position in wastewater disposal, and no other existing agency has the competence to design or implement "innovative approaches."

The demand for ONAS services and for general improvements in sanitation is beyond ONAS' organizational capability. Therefore, public and private land development agencies public and private need to ensure that current and future industrial and residential construction do not pose problems for the ONAS system. Indications are that overall coordination among the public service agencies, e.g. SONEDE and ONAS, and land development authorities, e.g. AFH is excellent.<sup>1/</sup> In addition, legislation is in effect that spells out clearly the authorizations required to develop land, the sequence of steps to be followed, and the penalties for noncompliance. Enforcement of these laws, often lax in the past, is becoming more strict as the Government of Tunisia becomes more determined to avoid the problems associated with unlicensed development and moves to ensure that the general public pays an increasing share of the cost of public services. There is every indication that all agencies are aware of the dimensions of urban development problems (as they pertain to sanitation as well), and there is a general agreement on the steps that need to be taken.

Recommendations and Next Steps: The WASH team recommends that USAID respond favorably to the Government's request for assistance on the Thirty Cities and Greater Tunis Complementary Projects. Both projects provide excellent opportunities for AID to be involved in the sanitation sector in Tunisia. The projects have a high priority in the government's development plan. The willingness of the government to borrow funds at existing commercial rates is one indication of the government's resolve to address facets of the urban sanitation problem. Another is the government's expressed intention to implement the projects with or without AID assistance. Although frequently unwilling to participate in

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<sup>1/</sup> Based on visits to the authorities in Sousse and Tunis, there is every indication that there is excellent cooperation among the organizations involved in urban development, and that good personal working relationships have been established between individuals in a number of these agencies.

projects under these conditions, AID should consider these investments because they allow the agency to collaborate with other development organizations, to participate in the upgrading of low-income neighborhoods, and to develop the technical and managerial capacity of ONAS.

Finally, support of these projects will lead to the enactment of a tariff structure that will eliminate compensatory payments by the government and increase the users' contributions to general revenue by the end of the current decade. Implementation of the projects, according to these financial practices and plans, can only improve ONAS' institutional capability and give the system's beneficiaries a more realistic comprehension of the costs of wastewater disposal and storm drainage services, as well as an improved level of service.

A positive response to the recommendations of this report would require USAID to take the steps necessary to re-program the funds authorized and to begin discussions with the Tunisian housing and land development agencies. These discussions would attempt to encourage the Tunisian agencies to consider establishing site development systems that would make housing more affordable to low-income urban dwellers and reduce somewhat the uncontrolled phenomenon of spontaneous settlements. The impact of supporting the Thirty Cities and Greater Tunis Complimentary Projects would be realized quickly. More time and considerable patience would be needed to alter the current policy and to implement more innovative approaches to urban housing and infrastructure development.<sup>1/</sup>

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<sup>1/</sup> As a final suggestion, but one that is perhaps beyond the scope of this report and cannot be developed fully at this time, the WASH team proposes that AID investigate the possibility of investing HG finances in the "level 3" residential development program implemented by the Agence Fonciere d'Habitation (AFH). This package of services is designed to address the settlement needs of the poorest, usually newly resident, urban households. The following services are provided in this development program: communal water points and septic tanks, street layout and housing sites, and gutters for storm water disposal. This site development approach could make land more affordable to the poorest urban dwellers, and avoid many of the problems associated with "spontaneous" settlements. Investment in this development approach could reduce the cost of subsequent upgrading.

AID might consider supporting this program by establishing a revolving account. The account would contain funds sufficient to develop one or more sites. Income from the sales of the developed house sites would be fixed to replenish the account and to recover the administrative expenses.

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APPENDIX A

DRAFT

SCOPE OF WORK

SOIT A PROGRAM  
24000/TUNISIA

Sanitation Strategy and Programs

Objective: To undertake preliminary assessment of the sanitation sector in Tunisia and assist RHUDO and <sup>USAID</sup> Mission in development of a strategy for meeting urban <sup>sanitation</sup> needs in Tunisia utilising HG resources.

Background: The GOT has requested assistance from USAID in financing projects identified in the VIth Plan for improving sanitary conditions in urban areas. The request has been directed with the view to utilising HG resources for financing specific projects for the provision of sewerage and wastewater in <sup>drainage</sup> urban areas. The projects submitted for review include:

1. 30 Cities Project - This involves the construction of wastewater networks, rainwater drainage and the connection to treatment plants as well as the construction of treatment plants in certain cities. The project is partially financed by the World Bank and implementation studies are in the process of preparation.
2. Greater Tunis Project - This is a follow-up project partially financed by the Kuwaiti fund. It involves reinforcement of network pipes, construction of wastewater collectors and secondary wastewater networks in a variety of sites.

HG resources have in the past been utilised to finance sewerage networks in upgrading and servicing of new project specific sites to benefit low-income groups. HG legislation, in general, currently allows financing of infrastructure programs in identifiable low-income neighborhoods in large centers or to benefit small urban

centers where the majority of the residents have incomes below the urban median. Among the objectives of the Tunisia housing program is to improve the delivery of services in the sector and sanitary services have in general lagged far behind in Tunisia to the demand arising from increased urbanisation. However, for the inclusion of greater emphasis on a sanitation component in future HG financing in Tunisia, it is important that the projects be consistent with overall objectives and concerns of the HG program... such as appropriate design standards, cost recovery, and ability to pay of beneficiaries, as well as institutional development and that they benefit low-income groups. Specific tasks:

1. Assess dimensions of the sanitation needs and problems in urban centers, identify constraints in meeting those needs and analyse existing programs and policy in the sector. Assess sector institutions primarily, ONAS, the sewerage authority, in terms of organisational and financial capacity, ability to recover costs, planning capacity and overall responsibilities for planning, implementation and maintenance of sanitary systems, coordination with municipalities, and other institutions.
2. Undertake preliminary review of projects submitted for potential HG financing with respect to standards, costs, adequacy of recovery procedures, target groups reached and assessment of the extent to which these specific projects (budgeted under the VIth Plan) satisfy needs and overcome constraints <sup>identified</sup> in sector assessments. This review should identify those projects which seem eligible for HG financing according to criteria of being destined for and affordable by target groups below median income.
3. Assist in an initial development of a strategy and options for ..

undertaking financing of future programs and projects in the sanitation sector. Such programs and projects should consider linkages to other institution's programs, namely those of the Housing Ministry which is involved in urban upgrading through the Agence de la Rehabilitation et la R'novation Urbaine (ARRU); the Agence Foncier de l'Habitat and Societe Nationale Immobiliere de Tunisie which are involved in new site preparation for housing construction. Strategy should be based on sectoral analysis and focus on suggestions for ways to improve institutional linkages, and performance with regard to the provision of services, water/sewerage charges, house connection costs, and relevant municipal taxes.

Team 1. Sanitation Engineer, 2. Specialist in utility finance and management, Both team members should have 3+ French speaking capability.

Level of effort:

1. Background Preparation - (up to one week in Washington) - Team should consult with World Bank EMENA Water and Sanitation Division and avail itself of relevant documentation prepared by the Bank in undertaking appraisal report on 30 Cities Programs, (IBRD, Third Urban Sewerage Project) consultant feasibility studies and other data as available.
2. Field work - (Up to 3 weeks) - fieldwork would include site visits, review of documentation available at ONAS on specific projects being proposed and discussions of overall programs and policies of ONAS and other institutions involved in the sector, reviews of documentation on needs, costs, standards recovery of costs, income data on beneficiaries. Draft summary strategy and recommendations to be completed in the field and submitted to RHUDO.

3. Completion of Final Draft -(up to 2 weeks) - Final draft to be submitted for review to RHUDO and PRE/H not later than 2 weeks after return from the field.

## APPENDIX B

Persons Contacted: Washington, D.C. and Tunisia

### Office Nationale de l'Assainissement (ONAS)

Mons. Mohamed Larbi Khrouf  
Directeur, Etudes et Programmation

Mons. Habib Tomassi  
Chef, Division Administrative

Mons. Bourounia  
Division Administrative

Mons. Fadhel Ghariani  
Directeur des Projets dans Tunis

Mme. Faiza Ben Ammar  
Ingénieur

Mons. Habib Haj Ali  
Ingénieur

Mons. Tahar Ghroubi  
Ingénieur

Mons. Ali Jendoubi  
Chef de Service Financiere

Mons. Mahmoud Aoun  
Ingénieur Principal - Sousse

Mons. Robert Steegmans  
Collaborateur Scientifique - Sousse

### Ministere de la Santé Publique

Mons. Sadok Atallah  
Directeur de l'Hygiene du Milieu et de la Protection  
de l'Environnement

### Ministere du Plan

Mons. M. Bouhaouela  
Directeur de la Cooperation

### Ministere de l'Interieur

Mons. Mohammed Saad  
Directeur des Collectivités Locales

District de Tunis

Mons. Abdelkader Bouendi  
Ingénieur Principal

Société Nationale d'Exploitation et Distribution des Eaux (SONEDE)

Mons. Mohamed Benaicha  
Ingénieur Directeur, Etudes et Programmation

Agence Foncière d'Habitation (A.F.H.)

Mons. Ahmed Ayachi  
Directeur, Sousse

Ministere de l'Habitat

Mons. Moncef Bel Habj Amor  
Ministre

Société Nationale Immobilière de Tunisie (SNIT)

Mons. Hedi Ennaifar  
President, Directeur General

Mons. Mustapha Marakchi  
Directeur General, Sousse

Agence pour la Réhabilitation et la Rénovation Urbaine (ARRU)

Mons. Ali Chaouch  
President, Directeur General

United States Agency for International Development (USAID)

James Phippard, Mission Director  
Dorothy Young, Director, Office of Rural Development  
David Leibson, Assistant Director, Regional Housing  
and Urban Development Office (RHUDO),  
Near East Bureau  
Sonia Hamman, Program Officer (RHUDO)

World Bank

Miss Nadia Sand, Loan Officer  
Mr. Michel Pommier, Project Officer (Sewerage)  
Mr. Ian T. Christie, Deputy Director, Urban Development EMENA

LOTISSEMENT

Décret N° 81-1817 du 22 décembre 1981, déterminant les pièces constitutives du dossier de lotissement et définissant les travaux de viabilité et d'assainissement strictement nécessaires à l'exploitation du lotissement.

Nous, Habib Bourguiba, Président de la République Tunisienne;

Vu la loi n° 79-43 du 15 août 1979, portant approbation du Code de l'Urbanisme et notamment son article 47;

Vu l'avis des Ministres de l'Intérieur, du Plan et des Finances, de l'Économie Nationale, de l'Équipement et de l'Habitat;

Vu l'avis du Tribunal Administratif;

Décrétons :

Article Premier. — Le dossier du projet de lotissement doit comporter les pièces suivantes :

1°) Une demande sur formulaire spécial délivrée par l'administration avec signature légalisée du ou des propriétaires ou de leurs mandataires.

2°) Un titre de propriété (titre foncier, acte d'acquisition, jugement etc...)

3°) Un plan de situation du terrain à lotir

4°) Le plan du titre foncier si le terrain est immatriculé ou, si le terrain n'est pas immatriculé, un levé de plan au 1/1000 minimum rattaché aux coordonnées géographiques et dressé par un géomètre agréé ou titulaire d'un diplôme reconnu.

5°) Un plan côté du terrain au 1/1000 minimum dressé par un géomètre agréé ou titulaire d'un diplôme reconnu dans le cas de terrains accidentés ou présentant une pente générale supérieure à 2 %.

6°) Un plan de lotissement au 1/1000 minimum portant indication de la numérotation, de la superficie et de la vocation des lots, du tracé et de l'emprise des voies et aires de partage et leurs raccordements avec les voies existantes.

7°) Une attestation des services spécialisés précisant que le terrain à lotir est assainissable et alimentable en eau potable et en énergie électrique.

8°) Le cahier des charges du lotissement fixant les droits et obligations du lotisseur, des acquéreurs ou locataires des lots ainsi que le programme d'aménagement et d'assainissement.

Ce cahier des charges détermine notamment la vocation des lots et fixe les règles et servitudes d'urbanisme et d'architecture imposées aux constructions selon leur nature et leur caractère, ainsi que celles imposées aux emplacements réservés aux installations d'intérêt collectif, aux espaces libres et aux espaces verts.

Les pièces 2 et 4 seront fournies en double exemplaire.

Les autres pièces seront fournies en 7 exemplaires.

Art. 2. — Les travaux de viabilité et d'assainissement strictement nécessaires à l'exploitation du lotissement et mis à la charge du lotisseur sont :

— Ouverture des plate-formes de toutes les voies

— Exécution des voies et leurs raccordements avec les voies carrossables existantes. Les voies seront traitées en tuff compacté dans le cas de terrains argileux ou en terre battue dans le cas de terrains sablonneux.

— Exécution des réseaux d'eau potable, d'assainissement et d'électricité et leurs raccordements avec les réseaux généraux correspondants lorsque ces réseaux existent.

Art. 3. — Les plans d'exécution du réseau d'eau potable et du système d'assainissement doivent, avant leur réalisation, être approuvés par les services spécialisés.

Art. 4. — Les Ministres de l'Intérieur et de l'Équipement sont chargés, chacun en ce qui le concerne, de l'exécution du présent décret qui sera publié au Journal Officiel de la République Tunisienne.

Fait à Tunis, le 22 décembre 1981

P. le Président de la République Tunisienne  
et par délégation  
Le Premier Ministre

Mohamed MZALI

## APPENDIX D

Arrête des Ministres du Plan et des Finances et de l'Equipement du 2 octobre 1982, portant modification des montants des redevants d'assainissement;

Les Ministres du Plan et des Finances et de l'Equipement:

Vu la loi no. 74-73 du 3 août 1974, portant création de l'Office National de l'Assainissement (ONAS);

Vu la loi no. 72-85 du 27 décembre 1972, portant ratification des accords de prêts de la Banque Mondiale, pour le financement du projet "Infrastructures Touristiques";

Vu la loi no. 72-49 du 13 juin 1975, ratifiant l'accord de prêt conclu à Washington le 18 février 1975 entre la République Tunisienne et la BIRD, relatif à l'assainissement urbain;

Vu le décret no. 78-972 du 7 novembre 1978, modifiant et complétant le décret no.75-201 du 29 mars 1975;

Vu le décret no. 75-492 du 26 juillet 1975, chargeant la SONEDE de la facturation et de la perception des redevances d'assainissement pour le compte de l'ONAS;

Vu le décret no. 79-768 du 8 septembre 1979, réglementant les conditions de branchement et de déversement des effluents dans le réseau public d'assainissement;

Vu le décret no. 82-474 du 28 février 1982, modifiant et complétant le décret no. 75-201 du 29 mars 1975 portant institution des redevances d'assainissement tel que modifié et complété par le décret no. 78-972 du 7 novembre 1978;

Arrêtent:

ARTICLE PREMIER -- Les montants des redevances d'assainissement institués par le décret no. 75-201 du 29 mars 1975, tel que modifié et complété par le décret no. 78-972 du 7 novembre 1978 et le décret no. 82-474 du 26 février 1982, sont modifiés comme suit:

### 1/ USAGE DOMESTIQUE

1.1 Usager branche au réseau public d'alimentation en eau potable et au réseau public d'assainissement

a). usager consommant un volume inférieur ou égal à 20 m<sup>3</sup> d'eau par trimestre.

0,750 D par trimestre et par logement

b). usager consommant un volume d'eau supérieur à 20 m<sup>3</sup> et inférieur ou égal à 40 m<sup>3</sup> par trimestre:

0,750 D par trimestre et par logement plus 20 millimes pour chaque m<sup>3</sup> d'eau potable consommé dans la tranche supérieure à 20 m<sup>3</sup>.

c). usager consommant un volume supérieur à 40 m<sup>3</sup> et inférieur ou égal à 70 m<sup>3</sup> par trimestre

1,000 D par trimestre et par logement plus 45 millimes pour chaque m<sup>3</sup> d'eau potable consommé.

d). usager consommant un volume supérieur à 70 m<sup>3</sup> par trimestre

2,000 D par trimestre et par logement plus 45 millimes par m<sup>3</sup> pour la première tranche de 70 m<sup>3</sup> et 65 millimes pour chaque m<sup>3</sup> d'eau potable supplémentaire consommé.

1.2 Usager branché au réseau public d'alimentation en eau potable et non branché au réseau public d'assainissement.

Les dispositions sont les mêmes que dans le cas 1.1, sauf s'il fournit la preuve qu'il lui est impossible de se raccorder par un branchement particulier au réseau public d'assainissement.

Dans ce cas, la redevance est nulle.

1.3 Usager s'alimentant en eau potable au moyen de citernes, puits non équipés ou à des bornes fontaines et rejetant ou non dans un réseau public d'assainissement, ses effluents.

La redevance est nulle.

## 2/ USAGE TOURISTIQUE

Le taux de redevance est fixé à 2,000 D par trimestre et 150 millimes par m<sup>3</sup>.

L'assiette de cette redevance est le volume consommé.

## 3/ USAGE INDUSTRIEL

Le taux de redevance est fixé à 2,000 D par branchement et par trimestre et 80 millimes par m<sup>3</sup>.

3.1 Dans le cas où l'industriel s'étant équipé d'installations de pré-traitement ou d'autres épurations, les rejets industriels présentent les caractéristiques suivants:

- absence de substance toxiques
- demande biologique en oxygène après 5 jours (DBO) inférieur à 25 mg par litre
- matière solide en suspension (MES) inférieur à 30 mg par litre.

Le taux de redevance pour usage industriel est ramené à 2,000 D par trimestre et par branchement et 65 millimes par m<sup>3</sup>, s'il est branché au réseau public d'assainissement, mul s'il n'est pas raccordable.

3.3 Lorsque l'effluent est très polluant et présente l'une ou l'autre des caractéristiques suivantes:

- matières solides en suspension (MES) supérieures à 400 mg par litre
- demande biologique en oxygène après 5 jours (DBO) supérieure à 400 mg par litre
- demande chimique en oxygène (DCO) supérieure à 1000 mg par litre

Le taux de redevance pour usage industriel est de 2,000 D par trimestre et par branchement et 105 millimes par m<sup>3</sup>.

3.3 Dans le cas où l'industriel justifie de l'impossibilité qu'il a de rejeter ses effluents dans un réseau public d'assainissement ou si l'autorisation d'effectuer le branchement au réseau lui est refusée en raison de degré de pollution de ses effluents, le taux de redevance est de 6<sup>r</sup> millimes par m<sup>3</sup>.

L'assiette de cette redevance est le volume d'eau réellement consommé ou prélevé quel que soit, son origine (réseau public ou puits équipés de pompe ou artésien, ou sources etc...)

ARTICLE 2 -- Le présent arrêté sera publié au Journal Officiel de la République Tunisienne.

Tunis, le 2 octobre 1982

Le Ministre du Plan et des Finances

Mansour MOALLA

Le Ministre de l'Equipement

Mohamed SAYAH

Vu

Le Premier Ministre

Mohamed MZALI

/ LISTE DES STAGES EFFECTUES A L'ETRANGER

de 1975 à 1982

SUJET DU STAGE	LIEU	DATE	PRISE EN CHARGE	PARTICIPANTS
<ul style="list-style-type: none"> <li>- Analyse des eaux usées</li> <li>- Problèmes d'épuration et études des rejets d'eau industriel</li> <li>- Supervision et contrôle des station d'épuration</li> <li>- Organisation du travail et fonctionnement du laboratoire.</li> </ul>	ALLEMAGNE	1/12/75 - 30/11/76	Coopération Tuniso-Allemande	1 ingénieur
<ul style="list-style-type: none"> <li>- Problème de génie-civil relatif à l'hydraulique</li> <li>- Préparation cahier de charges et supervision chantier</li> <li>- Pose et réalisation des réseaux</li> </ul>	ALLEMAGNE	1/12/75 - 30/11/76	Coopération Tuniso-Allemande	1 ingénieur
<ul style="list-style-type: none"> <li>- Assainissement Urbain (réseaux et stations de relèvement)</li> <li>- Problème de maintenance et d'entretien engins spéciaux.</li> </ul>	ALLEMAGNE	3/5/76 - 27/4/77	Coopération Tuniso- Allemande	1 technicien supérieur
<ul style="list-style-type: none"> <li>- Questions spécifiques de gestion et de législation</li> </ul>	FRANCE	15/4 au 30/7/76	O.N.A.S.	1 administrateur
<ul style="list-style-type: none"> <li>- Traitement des eaux usées et protection de l'environnement</li> </ul>	ALLEMAGNE	23 au 30/1/77	Coopération Tuniso-Allemande	6 ingénieurs

-49-

APPENDIX E

**Best Available Document**

**Best Available Document**

SUJET DU STAGE	LIEU	DATE	PRISE EN CHARGE	PARTICIPANTS
- "Epuración des eaux" (organisé par l'ACTIM).	FRANCE	11 Au 29/1/78	Coopération Tuniso-Française	2 ingénieurs
- Amélioration en place des propriétés des sols naturels organisé par l'Ecole Nationale des Ponts et chaussées.	FRANCE	14 au 18/5/79	O.N.A.S.	2 ingénieurs
- Problème de la conduite et de l'entretien des stations d'épuration. (Centre d'Etude et de documentation de l'environnement de Liège).	BELGIQUE	13 Au 18/5/79	O.N.A.S.	2 ingénieurs
- Perfectionnement professionnel dans le domaine du traitement des eaux usées.	ALLEMAGNE	5/5/80 au 31/3/82	Coopération Tuniso-Allemande	2 ingénieurs
- Perfectionnement professionnel dans le domaine du traitement des eaux usées.	ALLEMAGNE	1/1/80 au 30/7/81	Coopération Tuniso-Allemande	2 techniciens supérieurs
- Analyse des Conditions d'exploitation des stations d'épuration et des systèmes d'entretien et de curage des réseaux d'égout. (SAUR)	FRANCE	4/2 au 5/3/80	Projet de formation CEE	1 ingénieur

-50-

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SUJET DU STAGE	LIEU	DATE	PRISE EN CHARGE	PARTICIPANTS
- Perfectionnement des cadres en exploitation des services de distribution d'eau et d'assainissement. (CEFIGRE)	FRANCE	2/6 au 11/7/80	O.N.A.S.	1 ingénieur
- Processus d'exploitation des stations d'épuration	SUEDE	21 au 29/2/81	Coopération Tuniso - Suédoise	2 ingénieurs
- Traitement des eaux usées et visite d'installations de prétraitement	ALLEMAGNE	12 au 25/10/80	Coopération Tuniso - Allemande	2 ingénieurs
- Congrès sur la protection de l'environnement	ALLEMAGNE	15 au 21/6/80	Coopération Tuniso - Allemande	3 ingénieurs
- Gestion Administration et Financière des services de Distribution d'eau potable et d'assainissement (CEFIGRE)	FRANCE	3/6 au 9/7/81 12/5 au 18/6/82	O.N.A.S.	2 administrateurs
- Conception et réalisation d'infrastructures d'assainissement (Fondation de l'eau)	FRANCE	2/11 au 12/12/81	Projet de formation CEE.	1 ingénieur

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SUJET DU STAGE	LIEU	DATE	PRISE EN CHARGE	PARTICIPANTS
- Exploitation d'infrastructures d'assainissement (S.A.U.R.)	FRANCE	5/11 au 15/12/81	projet formation CEE	1 ingénieur
- Maintenance et entratien des équipements des stations de pompage de l'épuration (C.I.B.E.)	BELGIQUE	10/11 au 26/12/81	Projet formation CEE	1 ingénieurs
- Problèmes posés par la gestion des abonnés. (S.L.E.E.)	FRANCE	13/4 au 7/5/82	Projet de formation CEE	1 administrateur
- Méthodes utilisées en matière de conception des projets d'assainissement et réalisation d'ouvrage (S.L.E.E.)	FRANCE	3/5 au 11/6/82	Projet de formation CEE	1 ingénieur
Exploitation des réseaux d'assainissement (Ecole Nationale des Ponts et chaussées.)	FRANCE	6/6 au 11/6/82	O.N.A.S.	2 ingénieurs

LISTE DES SEMINAIRES ENTREPRIS  
DEPUIS 1976

SUJET DU SEMINAIRE	ORGANISATEUR	AUDITOIRE	LIEU	DATE	REMARQUES
Problèmes posés par l'exploitation des stations	O.N.A.S - G.T.Z	Agents de Station	Tunis	2-05/07/76	
Exploitation et Entretien des Stations d'Épuration	G.T.Z	Ingénieurs	Tunis	11-16/07/77 17-20/07/77	Stage théorique Stage pratique
Techniques d'assainissement	GTE.(Univ.de STUTGART)	Ingénieurs	Tunis	19/9-1/10/77	
Surveillance des chantiers (clauses des marchés et organisation)	O.N.A.S - G.T.Z	Surveillants		29-31/5/78	
Procédés d'étanchéisation	O.N.A.S	Agents Techniques	Grand Tunis	2 d Trim 78	
Hydraulique générale et urbaine	O.N.A.S - E.N.I.T	Ingénieurs	Tunis	03-06/6/78	
Techniques d'exploitation d'une station d'épuration	ONAS - ENIT	Chefs de Centre	Tunis	29-1/9/78 01-12/10/78	Stage théorique Stage pratique
Fonctionnement des pompes pour eaux résiduaires	GTE (Univ. de BERLIN)	Ingénieurs	Tunis	01-21/10/78	Mégalo - Séminaire
Formation des magasiniers, gestion des stocks	O.N.A.S	Chefs magasiniers	Tunis	21-24/11/78	
Assurance Incendie	O.N.A.S	Agents Administratifs	Tunis	27-28/02/79	
Techniques de commandements	O.N.A.S	Chefs de centre	Grand Tunis	26-27/03/79	
Entretien des Réseaux	O.N.A.S	Chefs de Travaux	Sousse Tunis	01-04/04/79 10-12/04/79	
Journée d'Information sur l'Étanchéité	SIKA	Ingénieurs	Tunis	12/04/1979	
Comptabilité générale (classification des comptes et méthodes de travail)	ONAS	Agents comptables	Tunis	17-18/04/79	
Journée d'information sur les pompes	POMPEX	Ingénieurs	Tunis	23/04/1979	
Journée d'information sur les tuyaux Aniante - Ciment	SICOAC	Ingénieurs	Tunis	24/04/1979	
Hydraulique générale	ONAS - ENIT	Ingénieurs	Tunis	1-5/04/79	

LISTE DES SEMINAIRES ENTREPRIS

DEPUIS 1976

SUJET DU SEMINAIRE	ORGANISATEUR	AUDITOIRE	LIEU	DATE	REMARQUES
Techniques de commandement	O.N.A.S	Chefs de Centre	Sousse	07/06/1979	
Techniques de pose	O.N.A.S - G.T.Z	Surveillants	Tunis	14-15/6/79	
Hydrologie urbaine	O.N.A.S - E.N.I.T	Ingénieurs	Tunis	19-22/6/79	
Hydraulique urbaine	O.N.A.S - G.T.Z	Chefs de centre	Grand Tunis	25-26/6/79	
Calcul automatique des canalisations E.U et E.P	SOTINFOR	Ingénieurs	Tunis	26-27/6/79	
Audit interne et contrôle de gestion	O.N.A.S	Cadres Administratifs	Tunis	12-16/7/79	
Secourisme	Croissant rouge	Chefs de travaux	Tunis Sousse	24-29/9/79	
Théorie et Pratique des Engins-Spéciaux	O.N.A.S	Conducteurs machinistes	Tunis	18-19-22, 12 1979	
Exécution et Contrôle- Construction des canalisations	G.T.Z ( Univ. Aachen )	Ingénieurs	Tunis	17/5/1980	Égale - séminaire
Traitement des eaux usées industrielles	G.T.Z ( Univ. Aachen)	Ingénieurs	Tunis	27/10 1981	Égale - séminaire
Exploitation des stations d'épuration	S.I.D.A	Agents de Stations	Kairouan	24/3-10/11 1980	
Méthodologie des mesures dans les écoulements urbains	O.N.A.S - C.E.E G.T.Z	Ingenieurs	Tunis	16, 17, 29 du 81	
Elément de géotechnique	O.N.A.S- C.E.E	Surveillant de travaux	Tunis	24/4 et 8/5/81	
Sécurité médicale et Hygiène.	Croissant Rouge	Chef de travaux et opérateurs stations	Tunis	Juillet 81	

Effectif et répartition du personnel

SITUATION AU 31 MARS 1983

Unités	Personnel cadre		Personnel de	Personnel d'exécution	Total agents
	Technique	de gestion	maitrise		
Direction exploitation	26	4	254	947	1231
Direction des Etudes et de la programmation	7	1	14	5	27
Direction des projets dans Tunis	9	--	55	13	77
Direction ingénierie et travaux	13	--	56	15	84
Direction GRe + Sce informatique	2	--	8	1	11
Division administrative	--	7	29	31	67
Division financière et Comptable	--	4	17	1	22
Division des marchés Achats et Stocks	1	2	21	23	47
<b>Total</b>	<b>58</b>	<b>18</b>	<b>454</b>	<b>1036</b>	<b>1566</b>

## APPENDIX H

### Income Distribution as it Relates to Sanitation Investments in Tunisia

The table below shows the distribution of household expenditures in municipalities in Tunisia. The data are divided into three categories according to the size of the town. Analysis of these data has enabled the WASH team to estimate median per capita expenditures and the proportion of population falling below the median in each of the three groups.

These data, confirmed by observations in the field, reveal a pattern of remarkably even income distribution between the larger and smaller towns. Median per capita expenditure in the smallest towns amounts to an estimated 203 TD per year as compared to 244 TD for the country at large. The proportion of the population falling below the median is slightly under 60% in the smallest towns and 55 percent for the medium-sized towns.

The WASH team noted a marked heterogeneity of social classes within the majority of neighborhoods in towns outside of Tunis. Substantial homes stand beside more spartan structures. This practice makes it difficult to target social infrastructure investments to reach lower income groups. In the case of sewerage in the small towns, the entire area must be considered. Though gradations between neighborhoods do exist, these gradations are quite subtle and difficult to identify. Therefore, identification of the principal beneficiaries of the Thirty Cities Project is based on the size of the towns for which sewerage services are intended. As a group, therefore, the smaller towns clearly qualify for HG financing.

Within the larger towns, overall averages are less useful measure of the economic level of beneficiaries affected by the project. In general, as town size increases, neighborhoods become more homogeneous and more differentiated along social and economic lines. Indeed, one of the reasons that per capita expenditures in the largest towns and especially Tunis, are so close to overall averages in spite of obvious concentration of more highly paid technical and management personnel, is the presence of concentrations of acute poverty.

In the larger towns, therefore, it is somewhat easier, at least theoretically, to target investments in sanitation. Unfortunately, technical considerations force a certain progression from lower to higher parts of drainage basins. As a result, a specific investment may benefit high income areas initially, but may be a necessary first step to reaching low income areas. More often, investments will benefit lower and upper income areas simultaneously because both are located within the same drainage basin.

A precise determination of the proportion of investments that benefit one group or another requires much more time in the field than was available to the WASH team. Rough estimates have been made but USAID should recognize that imprecise conclusions may have been drawn by the team with respect to beneficiaries.

Distribution of Total Expenditures in Tunisia by Size of Commune  
(Tunisian Dinars/year)

Percent of Population by size of Commune

<u>Per Capita Expenditures</u>	<u>Over 70,000</u>	<u>15,000-70,000</u>	<u>Under 15,000</u>	<u>All Communes</u>
0-50	.3	.9	1.5	.8
50.1-60	.1	.7	1.1	.5
60.1-70	.8	1.5	1.0	1.1
70.1-80	.6	1.8	1.2	1.1
80.1-100	2.4	3.5	4.4	3.2
100.1-120	3.9	5.8	6.2	5.1
120.1-130	1.9	3.0	4.2	2.8
130.1-160	7.5	9.8	11.8	9.3
160.1-200	11.3	12.7	17.9	13.4
200.1-240	11.6	14.4	9.5	11.9
240.1-300	12.1	15.4	12.2	13.1
300.1-500	25.7	20.7	19.0	22.5
over 500	21.7	9.8	10.1	15.2
	<hr/>	<hr/>	<hr/>	<hr/>
Totals	99.9	100.0	100.1	100.0
Mean Expenditure	391	288	279	332
Estimated Median <sup>a/</sup>	287	229	203	244
Avg. Household Size	5.55	5.77	5.68	5.65
Avg. Household Expenditure	2170	1662	1584	1876
Percent of Population Below Median (Estimated)	41.3	55.0	59.5	50.0

678 = 20th percentile

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<sup>a/</sup> Interpolated