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ISA 77398

**SOLID WASTE MANAGEMENT CONSULTANT SERVICES
FOR THE MUNICIPALITY OF
TEGUCIGALPA, HONDURAS**

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September 30, 1990

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SUMMARY

A. Background and Problem

The municipality of Tegucigalpa conferred with RFIJDO/CA regarding the provision of consultant assistance to: Review the municipality's, solid waste collection and treatment services, to identify key issues and problems in these areas, and to recommend strategies and actions which might be implemented to improve solid waste collection and treatment services.

The municipality, at present, only provides collection service to 60% of the City's population. The other 40% do not receive service due to lack of collection equipment and funds to properly maintain the present equipment in operating condition. The proper treatment of the collected waste suffers from the same lack of funds and insufficient equipment.

The municipality does not have all the financial capacity to introduce solutions by itself. However, it does have some capable administrative capacity if reorganizational changes are implemented.

The overall strengthening of the solid waste collection and treatment section can best be achieved by (i) creation of self financing enterprise fund, (ii) by restructuring the collection fee schedules (iii) by privatization of the commercial and industrial solid waste collection services, and (iv) by developing a fee schedule for the disposal of solid waste at the landfill.

B. Project Recommendations and Expected Achievements

The project includes four major recommendations. The primary recommendation is the creation of an auto-financed enterprise fund, with monthly cash flows to allow funds for repair, and replacement of collection and treatment equipment. This type of enterprise fund is allowed under the present municipal code.

The second recommendation is to revise the existing solid waste collection fee structure to charge more equitable fees for services provided. This is more evident in the services being provided to the commercial and industrial sectors. In these areas, fees should be based on volume <cubic meter> and the number of times service is provided each week.

The third recommendation is to regain control of solid waste treatment in the present landfill. Solid waste at this facility has not been covered in over eight months because of lack of sufficient equipment needed to provide compaction and daily cover. This has created a tremendous health problem as well as odor, flies, windblown material and buzzards. Private haulers bring in as much or more garbage to the landfill as does the city's collection fleet. A disposal fee based on weight would help pay for the repair and replacement of landfill equipment. The city needs to install the scale it purchased three years ago to charge fees and create records for future planning and operations.

The fourth recommendation is to privatize commercial and industrial collection. This would free existing collection equipment for residential collection expanding the present coverage by approximately 30-35%. The private collection of commercial and industrial solid waste is allowed under the present municipal code.

Implemented, these recommendations should achieve the following:

1. Increase coverage, operational efficiency and financial self-sufficiency of solid waste collection and treatment services.
2. Provide funds for the expansion and construction of an environmentally designed sanitary landfill. Reduce the existing contamination of soil and water and eliminate present health hazards.
3. Improve Municipal solid waste collection, administration and financial management.
4. Privatization of commercial and industrial solid waste collection services.

The above recommendations were approved by the Mayor of Tegucigalpa and fully supported by solid waste administrative staff.

C. Cost: \$120,000.00

I. REVIEW OF SOLID WASTE COLLECTION SERVICES

A. Administrative and Operations Section

The Administration and operation of the collection, street cleaning and landfill section is under the direction of Jorge Rodriguez, a civil engineer with considerable experience in public works and solid waste management. Mr. Rodriguez has also studied solid waste collection and disposal methods in various cities in the Southeastern United States. He is assisted by another civil engineer, who also holds a Masters Degree in Public Administration for developing countries from Western Michigan University. The superintendent for solid waste collection, street cleaning and landfills is also well qualified in experience and training in solid waste.

1. Solid waste collection equipment appears to meet about 60% of needs. The city has 17-20 cubic yard Fiat garbage collection packers, 9-10 cubic yard Fiat dump trucks and 9-20 cubic yard International garbage collection packers, five of which can be repaired for use.
 - a. Although there is sufficient solid waste collection equipment to collect 60% of the solid waste presently being generated daily in Tegucigalpa, there exists a tremendous problem in keeping this equipment operating due to lack of funds for repair services and replacement parts. In addition, the equipment was purchased in Argentina and replacement parts are hard to find and their delivery takes months to reach Honduras.
 - b. There is a lack of backup collection equipment at times when present equipment breaks down. Collection hours begin at 6:00 AM and crews are in the service yard by 2:00-3:00 PM, another work shift could be sent out until nightfall adding extra routes and increasing collection coverage by at least 10%; however, this cannot be done at present due to lack of backup collection equipment.
 - c. At present, there are some colonias where collection trucks cannot collect due to (1) topography and (2) colonias are not allowed collection by law because property owners have no title to their lands. This is about 20-25% of the solid waste generated daily.

- d. The collection of solid waste from the two major mercados is a major problem. The greater problem of the two is at the Mercado San Isidro in the central part of Tegucigalpa. The open dumping along the river and next to residential areas creates a potential for serious health epidemics as well as a major source of pollution to the river below. Open scavenging by adults and children among the decomposing garbage, littered with flies and buzzards indicates major social and health issues. The volume of daily waste generated by this Mercado is approximately 16-10 cubic yard truckloads. The city is not collecting any fee for this service. The newer mercado appears to be better organized. It has very little scavenging and the odor, fly and buzzard problem is almost non-existent; however, if solutions to the open dumping in what is the waste storage area is not remedied soon, this mercado is going to develop the same major/serious problems as the Mercado San Isidro.

- e. The street cleaning <sweeping> operation seems to be well organized and manned by good working crews; but there are four (4) problem areas that are not allowing good efforts to show results. These problems are (1) the need of about fifty (50) or more additional employees to allow scheduled cleaning of the major areas of the city, (2) the tremendous amount of debris and materials left on the sidewalks and streets by construction projects <both residential and commercial>, (3) materials and debris left on the streets and sidewalks by the city's public works, water, electric, and parks departments when they finish their work, (4) garbage and debris left and thrown on the sidewalks and street by street vendors.

B. Financial system and regulatory policies and procedures

The major problem impacting the solid waste collection and disposal system in Tegucigalpa is the area of finance. There are not sufficient funds to provide a vehicle repair and replacements program, nor are there sufficient funds to hire additional street cleaning employees, purchase additional collection equipment to service those areas not receiving service; nor to provide backup equipment for collection and disposal. The entire fee structure for solid waste collection and disposal needs to be reviewed and revised to charge more equitable for service provided to residential as

well as commercial accounts. Regulatory policies and procedures seem to be well designed and adopted; however, very little enforcement in any area appears to be the practice and one of the major cause for problems.

II. REVIEW OF SOLID WASTE TREATMENT <LANDFILL> SERVICE

A. Adequacy and expected life of existing municipal landfill.

The existing landfill is not being adequately operated. The present operation is wasting landfill space and does not meet minimum health or environmental criteria. The landfill, under its present operation, is an open dump, with a series of smoldering fires, windblown garbage everywhere, stench, flies, buzzards and hundreds of human scavengers. The operations is a potential site for a major health epidemic.

There is no control access into the landfill. No record keeping as to the type, amounts, or sources of waste being brought into the site. The access roads are in need of repair and maintenance. There is no protection for surface water run-off, underground water or landfill gas migration. Fire protection equipment and vector control are not available.

The only piece of landfill equipment, a D-6 bulldozer does not operate. This is the main reason why daily excavation, compaction and cover are not being applied. The location of the site is adequate. The haul distance from Tegucigalpa is only about 9 kilometers. There are good paved roads to the area. The site is well isolated from nearby residences. There appears to be good clay material for bottom and side liner as well as for daily cover. There is ample room for expansion if adjoining property is purchased. The site has been in operation from 15-17 years and some areas have been well operated and maintained as a sanitary landfill.

Landfill personnel is adequate and appears to be well trained, except for the security guards and military who appear to be "operating" the scavenging business.

III. POTENTIAL AREAS FOR IMPROVEMENT AND RECOMMENDATIONS

A. Administrative and Operations Section

This area is staffed by professionals who know the business of solid waste collection and treatment, and street cleaning. However, this area should be allowed to operate separately from public works or other departments. The physical plant already exists and is separate.

Recommendation: Develop solid waste collection and treatment, and street cleaning as an auto financed enterprise fund with its own administration, budget, repair shop, inspectors and fee collection structure for collection services, landfill disposal and street cleaning.

Cost: Some technical assistance to help organize unit, develop operational plan and assist in reviewing and revising fee structure. Two months technical assistance \$30,000.00

B. Equipment Maintenance

One of the major problems for Tegucigalpa is the lack of equipment maintenance. There exists a great need to set up an equipment repair and replacement fund for both collection and landfill. Work cannot be performed if the equipment does not operate. Collection seems to have good mechanics but does not have funds to buy parts. Landfill equipment needs to be repaired or replaced.

Recommendations: (1) Collection Equipment. Develop replacement and repair funds and repair five (5) International Garbage Packers. This will give collection backup equipment when other equipment is broken. It will also allow backup equipment if other equipment is used for additional work shifts. Additional work shifts would allow for about 10% more collection coverage. (2) Present collection equipment can be expanded to provide collection in those colonias where garbage is not collected due to topography or because property owners have no titles to land, if the present voluntary system is expanded on Saturdays. People in these areas are bringing garbage to collection points and city provides collection vehicles. Costs are paid by Colonias.

Cost: Funds for part inventory and repair services \$50,000.00

C. Mercados

The solid waste generated by the mercados are a major problem not only as to volumes generated but also as to the health hazard they create with their waste.

Mercado San Isidro: This mercado generates about 160 cubic yards of uncompacted waste daily. If this waste was compacted 4 to 1, it would only require 4 trucks per day. This amount of uncompacted waste is attracting hundreds of people daily to scavenge and eat from this open dump. The dump is also contaminating the river below.

Recommendation: Build a good concrete platform and place two of the Heil Compaction units from the broken International's on this platform. The garbage can then be put directly into the units and compacted. This would eliminate open dumping, scavenging, buzzards, and odor. The garbage can next be loaded directly from these packing units into trucks for the landfill.

Cost: Repair of units and purchase of small gas motors to run hydraulic packing units about \$1,000.00 each. Concrete platform \$2,000.00. Cost \$5,000.00.

The same should be done at the new Mercado. The total cost for both mercados \$10,000.00.

Recommendation: The City of Tegucigalpa is not charging the mercados for water, electricity nor solid waste disposal. A service fee for these services is recommended to recover all or part of these costs.

Cost: Included in A above.

D. Street Cleaning

This area is one of the most visible and a lot of effort is being put into it. The major problem is not cost or lack of funds, but of coordination and enforcement.

Recommendation: Transfer of 50 additional employees as recommended by the Mayor and hold a meeting(s) of all the city's departments impacting on streets such as public works, building and construction, electricity, parks, and solid waste. Coordination and cooperation among these departments needs to be established and all city employees made responsible for helping keep streets clean by cleaning up after they finish their projects. City inspectors need to enforce clean-up by construction firms of their construction and building sites before occupancy permits are issued. City inspectors also need to prohibit street vendors from dumping their garbage on streets or enforce the clean-up of their sites by fines or revocation of vendors' permits or licenses.

Costs: None

E. Financial system and regulatory policies and procedures.

This is the major problem. Lack of funds to repair and maintain collection and disposal equipment, lack of funds to remedy mercado problems and lack of funds to properly design and operate landfill.

Recommendation: Same as A above. The establishment of an auto-financed enterprise fund with revenues solely dedicated to the administration and operation of this department's units.

Enforcement of regulating policies and procedures need to be practiced otherwise financial system is not going to improve.

Fee structure needs to be reviewed and revised to make it equitable for all users and to collect for all services provided.

Commercial and Industrial solid waste could and should be privatized. If done by franchise, this could bring in revenues to city for collection and free city vehicles to provide better and more collection service to residential area. <My understanding is that privatization is allowed under the present municipal codes>. Privatization would also bring in revenues to the disposal facility as fees for disposal would also be collected from private sector to dispose garbage at landfill.

Cost: Included in A above.

F. Solid Waste Treatment <Landfill>

The present condition at landfill must be remedied as soon as possible due to the potential for health epidemics.

Recommendations:

(1) Present: Barrow from other departments such as public works or lease 3-4 bulldozers, 2-3 frontend loaders and 10-20 trucks, and begin compacting and covering the open dump as soon as possible. Estimated work is 6-8 weeks. Fix the landfill bulldozer or lease one or two dozers so that once all the garbage is covered, daily compaction and daily cover can be applied to landfill garbage. This will bring landfill under control of operators.

(2) As soon as possible: Purchase adjoining property to landfill. There appears to be enough property and space next to the landfill to construct and operate an environmentally designed landfill that would last 10-15 years. The design plan should include recycling and composting as part of the landfill operation and should provide a monitoring system for landfill gas, surface and ground water from the present landfill site.

Cost: Technical assistance to develop environmental design, operation plan, recycling, composting and monitoring systems. Current administration has two civil engineers on staff that could design landfill with technical assistance in two months. \$30,000.00

IV. EXPECTED ACHIEVEMENTS

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