

19. List of Present Equipment in the Central Laboratory

List of present equipment in the Central Laboratory

The following is the list of present equipment in the Central Laboratory

The Equipment of the Central Laboratory at July 25th, 1995

No.	Equipment Name	Q'ty	Remarks
1	Autoclave	4	1 unit out of order
2	Incubator 37°C	2	
3	Incubator 45°C	2	
4	BOD Incubator 25°C	1	
5	Spectronic 20	1	
6	Atomic Absorption Spectrophotometer	1	
7	Flame Photometer	1	
8	Gas Chromatograph	1	
9	Muffle Furnace	2	2 units out of order
10	pH meter	2	1 unit out of order
11	HACH Calorimeter	1	
12	Analytical Balance	2	1 unit out of order
13	Top Loading Balance	2	
14	Water Bath	1	
15	Multi Heater for Reflex COD Analysis	1	
16	Hot Air Sterilizer	2	1 unit out of order
17	Dry Oven	2	1 unit out of order
18	Microscope	2	
19	Refrigerator	2	
20	Freezer	1	
21	Vacuum Pressure Pump	1	
22	Fume Hood	2	2 units out of order
23	Hot Plate	1	
24	Magnetic Stirrer	3	
25	Stirrer Hot Plate	1	
26	Quebec Colony Counter	1	
27	Bacteriometer	1	
28	Distilling Apparatus	2	1 unit want to upgrade
29	Centrifuge	1	
30	Jar Tester	1	
31	Tecator Aquatec Flow Analysis	1	under repair
32	UV-VIS Spectronic 1001	1	1 unit out of order
33	Conductivity Meter	2	2 units out of order
34	Taylor Water Analyzer	1	obsolete
35	Dessicating Cabinet	1	
36	Water Sampler	2	
37	DPD Chlorine Comparison Kit	3	
38	Thermometer	3	
39	Culture Medicine Bottle		
40	Water Sampling Bottle		

Note) Articles for consumption like glassware and chemical reagents are excluded

The Equipment of the Material Testing laboratory

The following is the list of present equipment at the Material Testing Laboratory.

The Equipment of the Material Testing Laboratory at July 25th, 1995

No.	Equipment Name	Q'ty	Remarks
Sample Preparation			
1	Sample Splitter, 8 chutesx2", Gilson SP2	6	
2	Portable Heavy Duty Drier, Forney, IA 8865-10	1	
3	Single Wall Oven, 0-230°C, Controls D1390	3	
4	Desiccator Cabinet, 13"x13"x14", Solitest G135	1	
5	Laboratory Sample Cutter, Riken, SN0256	1	
6	Drill Press, Bench Type	1	
7	Coring Machine with Frill Bits	1	
Weights			
8	Triple Balance, 2610gx1g	1	
9	Cent-O-gram 311gx0.01g, Ohaus	2	
10	Solution Balance, 20kgx1kg, Ohaus	4	
11	Portable Platform Balance, Gilson, 52kg	3	
12	Analytical balance, Ohaus, 200g	1	
Soil Testing			
13	Standard Sieve, round 8"x2"	242	
14	Motorized Liquid Limit Device with ASTM	1	
15	Rotap Sieve Shaker, Gilson SS30s	2	
16	Modified Compaction Mold	3	
17	Standard Compaction Mold	3	
18	Modified Compaction Hammer	6	
19	Pocket Geotester Dial Penetrometer HM502	2	
Cement/Concrete			
20	Motorized Flow Table, 10" dia., 1/2" drop, Gilson HM273F	1	
21	Vicat Apparatus, Gilson HM310	2	
22	Dial Thermometer, Gilson	12	
23	Concrete Cylinder Molds, 4" dia x 12"	100	
24	Slump Test Set	6	
25	K-slump Tester, 12"x3/4", Gilson, HM-65	3	
26	Concrete Micrometer, Solitest CT-29	3	
27	Blaine Fineness Apparatus, Gilson MA10	1	
28	Field Bucket	3	
29	Air Meter, 1/4 cu. ft., Controls	2	
30	Mortar Mixer, 5qts	2	
31	Capping Compound Warmer, 4qts	4	
Paints and Other Coatings			
32	Elcometer, 256FN-79C, metric for ferrous and non-ferrous materials	1	
33	Dial Caliper Gage (internal), Mitutoyo, 209-	2	

	103/105	
34	Vernier Caliper, 0-150mm, Mitutoyo, 536-151/152	3
35	Micrometer	1
36	Vernier Caliper, Taylor	1
	Hydrotesting	
37	Pressure Test Hand Pumps locally fabricated	2
38	Machinist Bench Viswe, 8" Jaw Combination	1
39	Rigit Pipe Wrench, 8"	1
40	Pull-out Assembly (Fabricated)	1
	Other Tests	
41	Universal Testing Machine, Controls, Model C901	1
42	CORE 1500xt Microcomputer	1
43	Compressive Machine, Solitest	1
44	Los Angeles Abrasion Machine with 12 steel balls	1
45	Durometer "A" Scale	1
46	Hydrometer with Jar, 0-1, 1-2	3
47	Softening Point Apparatus	1

Note) Articles for consumption like and glassware are excluded

20. Required Skills and Facilities in R&D

Required Skills and Facilities in R & D

(1) Waterworks

Research Areas	Necessary Skills	Necessary Facilities	Related Institutes
1) Water Purification - Coagulation - Flocculation - Sedimentation - Filtration - Chlorinating	- Academic background in CE, CHE, SE, ME, EE, Chemistry - Experience in treatment plants and water purification	- Rapid mixers - Rotodip for alum measurements - Alum system - Polymer system - Chlorine system - Day tanks - Flourination system - Flocculation - Flowmeters - Jar testers - Process control laboratory	MWSS LWUA Water Districts NWRB NIA NPC LLDA
2) Water Quality Control - Water quality analysis - Monitoring - Assessment	Academic background in chemistry, biology, microbiology, med. tech., sanitary engineering	- Process control laboratory - Microscope - Jar tester - Incubator - Refrigerator - Drying oven - Sterilizer - Heat & steam - Culture media - Chem. reagent - Glassware - Colony counter - BOD incubator	DOH BFAD FDA DOST EMB/DENR MHD MWSS LWUA PIPAC (Altenco) UP NSRI
3) Water Distribution - Network analysis - Distribution optimization - Piping materials - Reservoir	Academic background in CE, SE, ME	- Pipe network - Primary mains - Secondary mains - Tertiary mains - Pumping station - Reservoir	MWSS LWUA NWRB NPC

<p>4) Mechanical Engineering</p> <ul style="list-style-type: none"> - Facilities/treatment equipment 	<p>Electrical engineers Mechanical engineers Electricians Mechanics Pipe fitters Welders</p>	<p>Rapid mixing</p> <ul style="list-style-type: none"> - Rapid mixers <p>Flocculation basin</p> <ul style="list-style-type: none"> - Flocculators - Sluice gates - Drain valves <p>Accelerator</p> <ul style="list-style-type: none"> - Accelerator - Drain valves - Air compressors - Gate valves - Sluice gates <p>Filter beds</p> <ul style="list-style-type: none"> - Sluice gates - Gate valves - Piping system - Flow meters <p>Washwater pump house</p> <ul style="list-style-type: none"> - Pumps - Gate valves - Check valves - Piping system <p>Washwater recovery</p> <ul style="list-style-type: none"> - Pumps - Gate valves - Check valves - Piping system <p>Chemical treatment</p> <ul style="list-style-type: none"> - Chemical feeders - Chemical mixers - Chlorinators - Evaporators - Pumps - Weighing scales - Hoists - Booster pumps/motors - Valves 	<p>University of the Philippines Institute for Scale Industries National Engineering Center MERALCO Foundation National Manpower Youth Center Supplier/manufacturer</p>
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<p>- Distribution Equipment</p> <p>- Intake Facilities/ Equipment</p>	<p>For the maintenance of the facilities</p>	<p>Pumping system</p> <ul style="list-style-type: none"> - Booster pumps/motors - Gate valves - Butterfly valves - Check valves - Piping system - Metering devices <p>Electric power supply</p> <ul style="list-style-type: none"> - Sub-station switchgears <p>Stand by power</p> <ul style="list-style-type: none"> - Stand by gen-sets (engine side) - Air compressors <p>Intake tower structure</p> <ul style="list-style-type: none"> - Sluice gates <p>Electric power supply</p> <ul style="list-style-type: none"> - Substation switch gears 	
<p>5) Electrical Engineering</p> <p>- Facilities/treatment equipment</p> <p>- Distribution Equipment</p> <p>- Intake Facilities/ Equipment</p>	<p>Electrical engineers</p> <p>Mechanical engineers</p> <p>Electricians</p> <p>Mechanics</p> <p>Pipe fitters</p> <p>Welders</p> <p>For the maintenance of the facilities</p>	<p>Rapid mixing</p> <ul style="list-style-type: none"> - Motor starters/controls <p>Flocculation Basin</p> <ul style="list-style-type: none"> - Motor starters/controls <p>Accelerator</p> <ul style="list-style-type: none"> - Motor starters/controls <p>Washwater pump house</p> <ul style="list-style-type: none"> - Motor starters/controls <p>Washwater recovery</p> <ul style="list-style-type: none"> - Motor starters/controls <p>Chemical treatment</p> <ul style="list-style-type: none"> - Motor starters/controls - Metering equipment - Power supply system for filter plant <p>Pumping system</p> <ul style="list-style-type: none"> - MCC for pumps/motors <p>Electric power supply</p> <ul style="list-style-type: none"> - Sub-station switchgears <p>Stand by power</p> <ul style="list-style-type: none"> - Stand by gen-sets controllers <p>Electric power supply</p> <ul style="list-style-type: none"> - Sub-station switch gears 	<p>University of the Philippines Institute for Scale Industries National Engineering Center MERALCO Foundation National Manpower Youth Center Supplier/manufacturer</p>

6) Instrumentation			
- Flow meters	<p>Trainings Seminars Experience Academic background ECE, asst. elec. engrs Instrumentation tech.</p>	<p>Water reservoir Treatment plants Booster pumping stations Aqueduct</p>	<p>University of the Philippines Institute for Scale Industries National Engineering Center MERALCO Foundation National Manpower Youth Center Supplier/Manufacturer</p>
- Level meters	<p>Trainings Seminars Experience Academic background ECE, asst. elec. engrs Instrumentation tech.</p>	<p>Water reservoir Treatment plants</p>	<p>University of the Philippines Institute for Scale Industries National Engineering Center MERALCO Foundation National Manpower Youth Center Supplier/manufacturer</p>
- Pressure Gages	<p>Trainings Seminars Experience Academic Background ECI, Asst. Elec. Engrs. Instrumentation Tech.</p>	<p>Booster pumping stations Deepwell pumping stations Treatment plants</p>	<p>University of the Philippines Institute for Scale Industries National Engineering Center MERALCO Foundation National Manpower Youth Center Supplier/manufacturer</p>

(2) Sewerage and Sanitation

Research Areas	Necessary Skills	Necessary Facilities	Related Institutes
<p>1) Wastewater Treatment</p> <ul style="list-style-type: none"> - Sedimentation - Screening - Grit removal - Biological treatment (secondary treatment) - Water recycling of treated water - Sludge utilization/treatment - Waste stabilization pond 	<p>Operation & maintenance</p> <p>Operation of sludge pumps</p> <p>Operation of Bar screen</p> <p>Operation of oxygen transfer/ F/M ratio of return activated sludge</p> <p>Laboratory analysis</p> <p>Sludge digestion, agriculture, aquaculture, pathogas, o/m, oxygen transfer</p>	<p>Working STP with back-up equipment parts, supplies and materials pumps, Bar screen, Blowers, generators, RASP DO meter</p> <p>Laboratory analysis</p> <p>Primary/secondary digestion filter press, drying beds garden</p>	<p>MWSS</p> <p>LWUA</p> <p>Water Districts</p> <p>NWRB</p> <p>NIA</p> <p>NPC</p> <p>LLDA</p>
<p>2) Monitoring and Assessment of waste water</p>	<p>Sewage analysis and interpretation</p>	<p>Sewage laboratory directly attached to WIP</p>	<p>EMB/DENR</p> <p>DOH</p> <p>MHD</p> <p>MWSS</p>
<p>3) Collection System</p> <ul style="list-style-type: none"> - Combined System - Separate system - Transportation system - Piping Materials 	<p>Operation and maintenance of the collection network for stormwater/sewer or both.</p> <p>Operation of appropriate cleaning equipment</p> <p>Catchment & Transport Systems</p> <p>Knowledge in strength of materials as to the Hydraulics of the collected sewage/stormwater</p>	<p>Stormwater/Sewer, network lateral, mains, trunklines, interceptors, siphons, outfalls, lift/pump stations sewer cleaning equipment</p> <p>Catchment lagoons, tankers transport equipment</p> <p>Pipe manufacturers of Cast Iron, Concrete, Vitrified Clay and other pipes.</p>	<p>University of the Philippines Institute</p> <p>National Engineering Center</p> <p>Supplier/manufacturer</p>
<p>4) Mechanical Engineering</p> <ul style="list-style-type: none"> - Facilities/Treatment Equipment - Distribution Equipment - Intake Facilities/Equip. (Lift Station) 	<p>Operation and maintenance of mechanical equipment commonly found in treatment/ pumping plants such as pumps, compressors mechanized screens, grit removal equipment and others.</p> <p>Familiarity with the basic trouble-shooting techniques related to said equipment.</p>	<p>Pumping plants complete w/ mechanized screens, grit removing equipment back-up equipment, odor removal equipment, gas detector and other appurtenances</p>	<p>University of the Philippines Institute for Scale Industries</p> <p>National Engineering Center</p> <p>MERALCO Foundation</p> <p>National Manpower Youth Center</p> <p>Supplier/manufacturer</p>

<p>5) Electrical Eng'g.</p> <ul style="list-style-type: none"> - Facilities/Treatment Equipment - Distribution equipment - Intake Facilities/Equipt. 	<p>O/M of motors, control system, switch gear, substitution & instrumentation system.</p> <p>Familiarity with the o/m of PLC & telemetering system.</p>	<p>Motors complete with control and protection system.</p> <p>PLC oriented control system, telemetering system, flowmeter and other instruments necessary for effective and efficient operation.</p>	<p>University of the Philippines Institute for Scale Industries National Engineering Center MERALCO Foundation National Manpower Youth Center Supplier/manufacturer</p>
<p>6) Sanitation Upgrading</p> <ul style="list-style-type: none"> - Septic Tank Materials 	<p>Knowledge in the characteristic of materials that can be used in S. T. and also how to build them</p>	<p>Fabrication of these materials.</p>	<p>DOH EMB/DENR</p>
<p>7) Desludging System</p>	<p>Knowledge in O & M of desludging equipment</p>	<p>Desludging trucks, pumps and apputenances</p>	<p>DOH EMB/DENR</p>
<p>8) Septage Collection and Treatment</p>	<p>Knowledge in sludge conditioning and treatment and O & M of digesters and processes necessary for this work</p>	<p>Screens, digestion pumps, sedimentation basins.</p>	<p>DOH EMB/DENR</p>

21. Water Related Industries and Associations

Water Related Industries and Associations

Industry	Major Companies	Related Associations	Related Gov't Organization
A) Water Supply			
1. Engineering	<ol style="list-style-type: none"> 1. DCCD Engineering Corporation 2. Total Consultancy Group, Inc. (TCGI) 3. Engineering & Development Corporation of the Phil. (EDCOP) 4. NIA Consult 5. TRANS-ASIA Corporation 6. F. F. Cruz, Inc. 7. Schema-Consult 	<ol style="list-style-type: none"> 1. PWWA 2. AWWA 3. ISO 4. PICE 5. PSSE 6. BPS 7. CECOPHIL 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA 3. NWRB
2. Construction	<ol style="list-style-type: none"> 1. J. V. Angeles Construction 2. F. F. Cruz, Inc. 3. Titah Construction 4. Anden Construction 5. A. M. Oreta Construction 6. C. M. Pancho Construction 7. MMRR Construction 8. Italit Construction and Development Corporation 	<ol style="list-style-type: none"> 1. PCA 2. PPA 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA
3. Material			
- Iron Pipe	<ol style="list-style-type: none"> 1. FPF Corporation (Cast Iron) 2. Mayers Steel Pipe 3. Goodyear Steel Pipe 4. Italit Construction and Development Corporation 5. National Steel Corp. 6. International Pipe, Inc. 	<ol style="list-style-type: none"> 1. AWWA 2. ISO 3. BPS 4. ASTM 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA
- PVC Pipe	<ol style="list-style-type: none"> 1. Italit Construction and Development Corporation 2. MOLDEX Corporation 3. Atlanta Corporation 4. NELTEX Corporation 5. WELTEX Corporation 6. EMERALD Corporation 	<ol style="list-style-type: none"> 1. AWWA 2. ISO 3. BPS 4. ASTM 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA
- Fiberglass Reinforced Pipe	<ol style="list-style-type: none"> 1. Hobas, Phils. 2. Sarplast, Phils. 3. Kurimoto, Ltd. 	<ol style="list-style-type: none"> 1. AWWA 2. ISO 3. BPS 4. ASTM 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA
- Other Pipe (Ductile Iron Pipe)	<ol style="list-style-type: none"> 1. Kurimoto, Ltd. 2. Kubota, Ltd. 	<ol style="list-style-type: none"> 1. AWWA 2. ISO 3. BPS 4. ASTM 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA
- Other Material (Fittings and Appurtenances)	<ol style="list-style-type: none"> 1. Makati Foundry 2. Phil. Valve Mtg. Corp. 3. LASELO Foundry 4. MACWater 	<ol style="list-style-type: none"> 1. AWWA 2. ISO 3. BPS 4. ASTM 	<ol style="list-style-type: none"> 1. MWSS 2. LWUA

Water Related Industries and Associations

Industry	Major Companies	Related Associations	Related Gov't Organization
4. Machinery Manufacturing - Water Meter	1. Liberty Corp. 2. Ever Gotesco Marketing Corp. 3. Unifield Enterprises	1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
- Other Meter	1. Liberty corp. 2. Ever Gotesco Marketing Corp. 3. Unifield Enterprises	1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
- Motor	1. Kubota, Phils. 2. Worthington Phils. 3. Ever Gotesco Marketing 4. Southern- Phils.	1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
- Generator		1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
- Facilities/Equipment		1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
5. Chemical/Biological	1. Amidale Corp. - copper sulfate 2. Transworld + alum. sulfate 3. Resins, Inc. 4. Chem. Corp. of the Phil. 5. Mabuhay Vinyl Corp. 6. Environmental Chem. 7. NALCO 8. Cardinal Industrial Co. 9. Atom Che. 10. International Chem. Corp. 11. Glee Chem	1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
6. Others			

Water Related Industries and Associations

Industry	Major Companies	Related Associations	Related Gov't Organization
B) Sewerage			
1. Engineering	1. DCCD Engineering Corporation 2. Total Consultancy Group, Inc. (TCGI) 3. Engineering & Development Corporation of the Phil. (EDCOP) 4. NIA Consult 5. TRANS-ASIA Corporation 6. F. F. Cruz, Inc. 7. Schema-Consult	1. PSSE 2. PICE 3. ISO 4. BPS	1. MWSS 2. LWUA
2. Construction	1. J. V. Angeles Construction 2. F. F. Cruz, Inc. 3. Titah Construction 4. Anden Construction 5. A. M. Oreta Construction 6. C. M. Pancho Construction 7. MMRR Construction 8. Italit Construction and Development Corporation	1. PCA 2. PPA	1. MWSS 2. LWUA
3. Material - Iron Pipe - PVC Pipe - Fiberglass Reinforced Pipe - Other Pipe (Ductile Iron Pipe) - Other Material (Fittings & Appurtenances)	1. FPF Corporation (Cast Iron) 2. Mayers Steel Pipe 3. Goodyear Steel Pipe 4. Italit Construction and Development Corporation 5. National Steel Corp. 6. International Pipe, Inc. 1. Italit Construction and Development Corporation 2. MOLDEX Corporation 3. Atlanta Corporation 4. NELTEX Corporation 5. WELTEX Corporation 6. EMERALD Corporation 1. Hobas, Phils. 2. Sarplast, Phils. 3. Kurimoto, Ltd. 1. Kurimoto, Ltd. 2. Kubota, Ltd. 1. Makati Foundry 2. Phil. Valve Mtg. Corp. 3. LASILO Foundry 4. MACWater	1. ISO 2. BPS 3. ASTM 1. AWWA 2. ISO 3. BPS 4. ASTM 1. AWWA 2. ISO 3. BPS 4. ASTM 1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA 1. MWSS 2. LWUA 1. MWSS 2. LWUA 1. MWSS 2. LWUA

Water Related Industries and Associations

Industry	Major Companies	Related Associations	Related Gov't Organization
4. Machinery Manufacturing - Flow Meter	1. Liberty Corp. 2. Ever Gotesco Marketing Corp. 3. Unifield Enterprises	1. ISO 2. BPS 3. ASTM	1. MWSS 2. LWUA
- Motor	1. Kubota, Phils. 2. Worhtington Phils. 3. Ever Gotesco Marketing 4. Southern- Phils.	1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
- Generator		1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
- Facilities/Equipment		1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
5. Chemical/Biological		1. AWWA 2. ISO 3. BPS 4. ASTM	1. MWSS 2. LWUA
6. Others			

- PWWA - Philippine Waterworks Association
- AWWA - American Waterworks Association
- ISO - International Standard Organization
- PICE - Philippine Institute of Civil Engineers
- PSSE - Philippine Society of Sanitary Engineers
- BPS - Bureau of Production Standard
- PCA - Philippine Contractors Association
- PPA - Philippine Plumbers Association
- ASTM - American Standard for Testing and Materials
- NWRB - National Water Resources Board
- BFAD - Bureau of Food and Drug
- FDA - Food and Drug Authority
- UP/NSRI - University of Philippines/National Science Research Institute
- MHD - Manila City Health Department
- CECOPHIL - The Council of Engineering Consultants of The Philippines

22. MWSS Internal Survey

MWSS Internal Survey

1. Corporate Goals and Strategies

(1) In your own words, briefly describe the organizational mission of MWSS.

The question tests the respondents' recall of the key words contained in the mission statement.

The MWSS mission statement goes:

To ensure continuous and adequate supply of potable water and sanitary sewerage services to the system's service area at fair and affordable rates in a manner that ensures the conservation of the environment and the viability of the system as a model water supply and sewerage utility.

Table 1

Key Words in Mission Statement	# of Ans.
Continuous and adequate supply	23
Potable water	56
Sanitary sewerage services	40
System's service area	41
Fair and affordable rates	15
Conservation of the environment	2
Viability of the system	6
Model water supply and sewerage utility	2

As shown in the table, respondents easily identify the services expected from MWSS. However, there appears to be less awareness of the performance and service quality related key words (continuous and adequate, fair and affordable, environmental conservation, model utility).

- (2) What services or functions must MWSS perform to be considered successful in its mission? What are the performance goals set by the agency for each type of service? What are the key programs being undertaken by the agency to improve the delivery of each type of service?

This question probes into the respondents' views on how MWSS mission statement translates into core business processes. Responses were categorized using a life cycle model for water and sewerage services, starting with water sourcing until wastewater recovery and recycling.

Table 2

Service/Function	# of Ans.	Ongoing Programs
Water sourcing and treatment	21	various water supply expansion programs, including groundwater extraction, expansion, rehabilitation of treatment plants
Expansion of service area	14	service contracting for private subdivisions
Construction management	5	
Application processing and service installation	-	(no response)
Water delivery	44	rehabilitation of water treatment plants, installation of telemetering instruments, sectoralization
Leak repair and system maintenance	12	special leak action group, rehabilitation of distribution lines, campaign against illegal connections
Billing and collection	16	computerization, introduction of incentive schemes for collection
Sewer collection services	14	Metro Sewer Projects I and II
Wastewater treatment	1	

Note: Multiple responses allowed.

As shown in the table, most respondents could not identify the core business of MWSS. This contrasts with the high recall rates for the key terms in the organizational mission statement. Most respondents identified one or more of the ongoing expansion projects being undertaken by MWSS. Projects, however, were cited in several service categories. This would be indicative that while the respondents are familiar with the major projects being undertaken by MWSS, they are not very clear on the impact of these projects on MWSS operations. The projects mentioned are mostly infrastructure related. Except for computerization and telemetering, there were no

projects identified that address internal process streamlining concerns.

(3) How did you learn about these corporate goals?

Table 3

Mode of Communications	# of Ans.
Articulated in official forum (e.g., meetings, symposia)	44
Office circulars and other written announcements	26
Informal discussions with peers	16
Training sessions	5
Did own research	9

Note: Multiple responses allowed.

The question probes into the mode of communication used by MWSS management to inform lower level officers and staff members about corporate goals, objectives and strategies. As shown in the table, MWSS management uses formal communication channels (meetings, memoranda) to inform the organization about corporate matters.

(4) In your opinion, what percentage of MWSS managers (division managers and up from all departments) are fully aware of corporate directions, goals, objectives and roles?

Table 4

Percentage	# of Ans.
At least 80%	39
At least 60% but less than 80%	7
At least 40% but less than 60%	9
At least 20% but less than 40%	2
Less than 20%	0

The high ratings on corporate awareness contradict the conclusions drawn from the comparison of responses for Items 1 and 2. During the interviews, respondents were generally hesitant to rate peers from other units due to lack of interaction and restricted their assessment only to peers within the same department.

- (5) For each service or function identified in Item 2, what measure(s) are used for evaluating MWSS performance? List down all measures in use that you are familiar with. Are there other measures that you would want to use, but which are currently not available?

Table 5

Function	Current Measure	Proposed Measure
Water sourcing and treatment	- megaliters per day capacity (2)	
Expansion of service area	- % of population served (4)	- customer satisfaction
Construction management	(no valid response)	- accomplishment rate
Application processing and service installation	- # of connections - cycle time for connections	(no valid response)
Water delivery	- non revenue water (8) - volume delivered vs. required (4) - # of complaints (2) - prosecution of users with illegal connection	- equity of distribution among different areas and users (2) - area-based (by sector) performance measures
Leak repair and system maintenance	- % of complaints attended to (2) - non revenue water	- aging of complaints by response time
Billing and collection	- billing efficiency (2)	
Sewer collection services	- % of HH with septic tanks or sewer connections - % of target area served	- % of target area served - capacity vs. requirements
Wastewater treatment	(no valid response)	(no valid response)

Responses shown in the table are limited to valid indicators. Despite the fact that the non revenue water (NRW) indicator is used as a corporate-wide performance measure, less than 20 percent of the respondents cited it. The low number of valid responses reflects a widespread inability, or lack of information, on how agency performance is evaluated.

- (6) Listed below are various services provided by MWSS to water users. How would you rate the agency's performance in delivering these services? [SCALE: 1 - highly unsatisfactory, 7 - excellent] For services rated 5 or higher, what are the

organizational factors that enable MWSS to perform well? For services rated 3 or lower, what factors impede or prevent good performance?

Table 6-A

MWSS Service	# of Ans.	Ave. Rating
Water sourcing and treatment		
Expansion of service area	52	5.02
Construction management	50	4.26
Application processing and service	54	4.28
Installation	49	4.31
Consumer education		
Water delivery:		
– cost of delivery	51	5.73
– water quality (potability)	54	6.48
– water pressure	50	4.24
– service hours/duration	50	4.16
Leak repair and system maintenance:		
– access to assistance center	54	5.30
– response time of repair crew	52	3.90
– quality of repair work	51	4.51
Billing and collection:		
– accuracy of meter reading	52	4.50
– timeliness of bill preparation	53	5.42
– courtesy of collectors	53	5.25
– processing of payments	47	5.74
Sewer collection services:		
– area coverage	47	4.17
– processing of HH connections	36	4.53
Wastewater treatment:		
– wastewater recovery	20	3.65
– wastewater treatment	32	4.09

Respondents were asked to provide the basis for the ratings given. A summary of the most frequently cited factors is shown in Table 6-B.

Table 6-B

Service Category	Driving Forces	Negating Forces
Service area expansion	<ul style="list-style-type: none"> - many ongoing projects (15) - good coordination/ management/ motivated employees (4) - high priority given (2) 	<ul style="list-style-type: none"> - inadequate/dwindling sources of water (7) - inadequate funding (5) - weak management (3)
Construction management	<ul style="list-style-type: none"> - competent management and technical staff (6) 	<ul style="list-style-type: none"> - red tape (12) - inadequate supervision and/or connivance with contractors (16)
Application processing	<ul style="list-style-type: none"> - streamlining of organization and procedures (sectoralization and one-stop shop) (5) - efficient personnel (2) 	<ul style="list-style-type: none"> - red tape (20) - customers lack awareness of requirements (4) - high volume and lack of personnel (3) - fixers (2)
Meter installation	<ul style="list-style-type: none"> - competent personnel (7) - availability of meters (2) 	<ul style="list-style-type: none"> - meters unavailable (6) - tampering, defective installation, lack of maintenance (7) - long waiting time (5)
Water delivery:		
<ul style="list-style-type: none"> - service fees - potability 	<ul style="list-style-type: none"> - regulated rates (22) - high standards (17) - good treatment facilities (11) - unpolluted sources (2) 	<ul style="list-style-type: none"> - wastage - leaking, sub-standard pipes (4)
<ul style="list-style-type: none"> - water pressure 	(no valid response)	<ul style="list-style-type: none"> - inadequate supply (13) - depends on area (9) - leaking pipes and/or illegal connections (8)
<ul style="list-style-type: none"> - service hours 	(no valid response)	<ul style="list-style-type: none"> - inadequate supply (16) - area dependent (2)
Billing and collection:		
<ul style="list-style-type: none"> - accuracy of meter reading 	<ul style="list-style-type: none"> - computerized reading (6) - honest, industrious readers (2) 	<ul style="list-style-type: none"> - erring meter readers (8) - defective, low-quality meters and/or installation (10) - inaccessible meter (2)
<ul style="list-style-type: none"> - timeliness of bill preparation 	<ul style="list-style-type: none"> - computerized processing (11) 	<ul style="list-style-type: none"> - delays in installation of computerized system (5)

<ul style="list-style-type: none"> - courtesy of collectors - payment processing 	<ul style="list-style-type: none"> - incentive schemes (4) - training and supervision (7) - streamlined systems (10) - accessible branches (4) 	<ul style="list-style-type: none"> - lack of discipline/training (4) - subcontracting schemes (no direct control) (3) - manual cashiering operation in some branches (2)
<p>Leak repair:</p> <ul style="list-style-type: none"> - access to assistance center - response time of repair crew - quality of repair work 	<ul style="list-style-type: none"> - branch network (8) - enough hot lines (7) - trained personnel (2) (no valid response) - trained crew (4) 	<ul style="list-style-type: none"> - lack of supplies (2) - poor logistics support (12) - lack of personnel (4) - defective subcontracting arrangements (2) - work ethics/attitudes (4) - poor scheduling (2) - poor quality materials (4) - poor work standards (4) - lack of supplies (5)
<p>Sewerage services:</p> <ul style="list-style-type: none"> - area coverage - processing of service requests - wastewater recovery - wastewater treatment or pollution control 	<ul style="list-style-type: none"> (no valid response) - adequate manpower (2) (no valid response) - pumping stations with preliminary treatment (4) 	<ul style="list-style-type: none"> - limited area (11) - capital intensive (5) - poor urban planning (2) - low priority given (2) - lack of customer awareness on services available (2) - no facilities (28) - limited facilities (6)

In the absence of clear performance measures, respondents gave high ratings for practically all functions and services of the agency, including those areas wherein they generally acknowledge MWSS services to be inadequate (e.g., sewer services).

- (7) What other agencies does MWSS have to coordinate with to succeed in its mission? For each identified agency, indicate the nature of coordination that is required. How smooth is the coordination between MWSS and each agency in the list? For each agency with whom coordination is less than satisfactory [rating of 3 or below], what

factors hinder smooth coordination?

Table 7

Agency	# of Ans.	Nature of Coordination	Ave Rating	# of Ans.
Bureau of Lands	1	right of way	-	-
Civil Service Commission	1	personnel management	5.00	1
Customs/SGS	1	-	-	-
DBM	5	budget requests	3.50	2
DENR/EMB/NPCC	10	environmental regulations	6.33	6
DOF/Treasury	2	equity allocation	5.00	1
DOH	9	water sampling and testing	6.20	5
DPWH	27	infrastructure coordination	5.36	19
Financial Institutions	3	financing requirements	7.00	1
LGUs	23	excavation and other permits	4.21	14
Malacanang	1	-	5.00	1
Manila Gas Corporation	2	line maps	5.00	3
MERALCO	9	line maps	4.57	7
Metro Manila Authority	6	permits	5.00	4
NAPOCOR	16	water use	6.00	10
NHA	1	-	4.50	2
NWRC	9	water extraction regulations	5.67	3
NEDA	1	-	5.00	1
NIA	10	water use	6.14	7
PAG-ASA	1	weather forecasts	7.00	1
PNR/LRTA	2	-	-	-
PLDT	11	line maps	4.00	8
Police	7	traffic coordination	3.00	2

Most frequently cited as the agencies requiring coordination with are the offices involved with infrastructure and water resources, i.e., supply-side management agencies. Except for NHA, however, there was no mention of coordination with agencies that address demand-related factors, e.g., agricultural and industrial expansion, urban expansion, and land-use planning.

- (8) a) Identify five internal conditions which would be the most likely to change in the next few years and generate favorable (+) or unfavorable (-) impact on MWSS's ability to deliver on its performance targets.
- b) Identify at least five conditions in the external environment which would be most likely to change and generate favorable (+) or unfavorable (-) impact on MWSS performance.

	Favorable	Unfavorable
INTERNAL	<ul style="list-style-type: none"> • Privatization (31) • Sectoralization/decentralization/reorganization (32) • Computerization (25) • Intensified campaign against illegal connections (1) 	<ul style="list-style-type: none"> • Privatization (18) • Sectoralization (9) • Frequent changes in management (10) • Patronage (6) • Computerization (5) • Merger with LWUA (1)
EXTERNAL	<ul style="list-style-type: none"> • Water Crisis Act and other favorable legislation (36) • Increase in capitalization (7) 	<ul style="list-style-type: none"> • Political interference (11) • Population growth and expansion of service area (6) • Limited funding (2) • Change in hydrographic conditions (1)

Note: Figures in parentheses indicate the number of response.

The ambivalence towards privatization indicates the need for wider consultation among MWSS employees to clarify strategies and organizational implications. The attitude towards the ongoing sectoralization and computerization is more positive; however, the fact that these programs are viewed by a minority group as a threat indicates a similar need for consultations to reduce/eliminate resistance to change.

Political interference, or patronage, and its consequence, frequent management changes, are repeatedly cited as negative influences on agency performance.

(9) What laws, presidential decrees, executive orders or other legal issuance provide the directions, define responsibilities and operating limits, determine resource availability or otherwise impinge on MWSS operations? Do you have a copy of such legal documents?

Table 9

Legal Issuance	# of Ans.
Existing Measures:	
MWSS Charter (RA 6234)	37
COA Regulations	13
Civil Service Regulations	2
Attrition Law	1
Water Code	1
Salary Standardization Law	1
AO 129	1
AO 130	1
PD 1870	1
PD 1594	1
PD 1445	1
EO 93	1
Public Works Act	1
PD 401	1
PD 1931	1
RA 7656	1
Urban Land Reform (squatting laws)	1
Proposed Measures:	
Anti Water Theft/Pilferage Bill	11

None of the respondents could readily produce a copy upon request of the legal documents they identified.

(10) What aspects of MWSS do you consider as requiring the most urgent improvement?
Explain in detail.

Table 10

Areas for Improvement	# of Ans.
Reduce non revenue water	15
Leak repair/line rehabilitation	11
Enforcement powers	11
Staff values and attitudes	10
Working conditions and facilities	8
Performance evaluation and promotion policies	8
Organizational structure	7
Procurement	7
Collections	5
Metering operations	4
Communications and coordination	2
Construction management	2
Preventive maintenance program	1

2. Departmental Roles and Responsibilities

(11) Who are clients served by your specific organization unit (department or division)? What services does your unit provide for each client category?

Table 11.A EXTERNAL CLIENTS

Department	Water User	Contractor	Other Government Agencies
CORPORATE PLANNING			coordination of plans
MIS			
• PMED			
• Computer Service Center			
ENGINEERING			
• PPD			
• Design			
• ARQC	- water sampling and testing	- materials testing	
CONSTRUCTION			
• Special Projects		- contract supervision	
• Locally Funded Projects			
OPERATIONS			
• WSTD	- supply of potable water		
• WDMD	- distribute water from deep wells		
	- maintain distribution network		
• SSD	- extension of service area		

<ul style="list-style-type: none"> • Central Maintenance 	<ul style="list-style-type: none"> - service connections - complaints servicing (e.g., clogs) - septic tank excavation - sewer collection and treatment - water rationing 		
<p>CUSTOMER SERVICE</p>	<ul style="list-style-type: none"> - service connections/disconnections - billing and collection - customer complaints - leak repairs and line maintenance - meter readings - investigation of illegal connections 		<ul style="list-style-type: none"> - water and sewerage services
<p>FINANCE</p> <ul style="list-style-type: none"> • FCBD • Accounting • Treasury 	<ul style="list-style-type: none"> - account reconciliation and adjustments 	<ul style="list-style-type: none"> - claims processing 	
<p>ADMINISTRATION</p> <ul style="list-style-type: none"> • Personnel Management • HRD • Health and Safety • Legal • Procurement • General Services 	<ul style="list-style-type: none"> - information on employee whereabouts - collection cases 		<ul style="list-style-type: none"> - human resources statistics

Table 11-B INTERNAL CLIENTS

Department		A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T
A	CORPORATE PLANNING	x																		
B	MIS • PMED • Computer Service Center	x																		
C	ENGINEERING • PPD	x		x																
D	• Design						x	x	x	x										
E	• ARQC							x												
F	CONSTRUCTION • Special Projects • Locally Funded Projects																			
G	OPERATIONS • WSTD			x											x					
H	• WDMD																			
I	• SSD																			
J	• Central Maintenance								x	x	x	x								
K	CUSTOMER SERVICE	x	x	x																
L	FINANCE • FCBD	x																		
M	• Accounting	x	x																	
N	• Treasury																			
O	ADMINISTRATION • Personnel Management																			
P	• HRD																			
Q	• Health and Safety																			
R	• Legal																			
S	• Procurement																			
T	• General Services																			

@ - Top Management

The responses in Table 11-A indicate the degree of external client orientation among the respondents. As expected, the Operations and Customer Service units identified the water user/consumer as their client. It is worth noting that most respondents from the Engineering and Construction units do not view contractors as clients, much less the water users.

Table 11-B, on the other hand, indicates awareness of inter-dependencies and linkages among

MWSS units. Responses here have to be cross-checked / validated against responses from Tables 18 and 19.

(12) What is the specific contribution of your unit towards the attainment of MWSS goals?

Table 12

Department	Goal Contributions
CORPORATE PLANNING	<ul style="list-style-type: none"> - plan preparation - preparation of financial and economic projections
MIS <ul style="list-style-type: none"> • PMED • Computer Service Center 	<ul style="list-style-type: none"> - performance evaluation and monitoring - statistical reports for management decisions - reduction in erroneous billings
ENGINEERING <ul style="list-style-type: none"> • PPD • Design • ARQC 	<ul style="list-style-type: none"> - development of projects for supply expansion - monitoring and investigation of project implementation - engineering design - ensure quality of services
CONSTRUCTION <ul style="list-style-type: none"> • Special Projects • Locally Funded Projects 	<ul style="list-style-type: none"> - ensure contractor compliance with project TOR - takeover of projects abandoned by contractors
OPERATIONS <ul style="list-style-type: none"> • WSTD • WDMD • SSD • Central Maintenance 	<ul style="list-style-type: none"> - operation of water treatment plants - drilling of deep wells - water distribution schedules - sewer maintenance - excavation of HH septic tanks - maintenance of plants, vehicles and equipment - delivery of water rations
CUSTOMER SERVICE	<ul style="list-style-type: none"> - billing and collection (revenue generation) - enforcement of campaign against illegal connections

	- resolution of customer complaints
FINANCE	
• FCBD	- sourcing of funds - loan servicing
• Accounting	- analysis of financial and operational data - preparation of financial statements - audit and collection of accountabilities and receivables
• Treasury	
ADMINISTRATION	
• Personnel Management	- feedback on turnover, tardiness and absenteeism
• HRD	- skills training and management development
• Health and Safety	- safety awareness and accident prevention - medical care
• Legal	- legal proceedings vs. delinquent accounts
• Procurement	- timely procurement of requirements
• General Services	- dissemination of internal communications

Responses reflect perceptions on the Key Result Areas for each organizational unit.

- (13) a) What are the key functions (duties and responsibilities) of your organizational unit?
 b) What are the operational goals and targets for your unit? (c) What performance measures are used to evaluate your unit's performance?

Table 13

Department	Function	Goal/Target	Performance Measure
CORPORATE PLANNING	- preparation of long term plans - special studies - provide data/stats for other units	- annual corporate plans	
MIS			
• PMED	- internal control	- enhanced performance	- # of units audited
• Computer Service Center	- HW/SW development and	- uninterrupted operations	- reduced downtime

	<ul style="list-style-type: none"> - maintenance - report generation - in-house training for users 		
ENGINEERING <ul style="list-style-type: none"> • PPD • Design • ARQC 	<ul style="list-style-type: none"> - project preparation - technical studies - engineering design - laboratory testing for H2O - review/testing of material - specifications - technology evaluation 	<ul style="list-style-type: none"> - 12 samples per sampling point per year 	<ul style="list-style-type: none"> - # of projects prepared - decrease NRW - # of samples collected and tested
CONSTRUCTION <ul style="list-style-type: none"> • Special Projects • Locally Funded Projects 	<ul style="list-style-type: none"> - contract administration - contract supervision/ takeover - project administration 		<ul style="list-style-type: none"> - project accomplishment rates - do-
OPERATIONS <ul style="list-style-type: none"> • WSTD • WDMD • SSD • Central Maintenance 	<ul style="list-style-type: none"> - water treatment and quality monitoring - water allocation and distribution - collection, treatment and disposal of waste water - installation of sewer connections - installation, replacement, repair and calibration of meters 	<ul style="list-style-type: none"> - water potability - increase in area coverage - equitable distribution - quantity of meters repaired per year 	<ul style="list-style-type: none"> - water quality, volume - volume delivered vs. required - # of meters repaired - completion time - quality of repairs

	<ul style="list-style-type: none"> - maintenance of facilities and equipment 		
CUSTOMER SERVICE	<ul style="list-style-type: none"> - service connections - meter reading - billing and collection - leak repairs - application processing - investigation and evaluation of complaints/illegal connections - census surveys 	<ul style="list-style-type: none"> - reduction in A/R - faster collection - improved accuracy of meter readings - reduction in illegal connections - zero complaints 	<ul style="list-style-type: none"> - level of A/R - billing efficiency - % of bills with adjustments - # of processed applications - reduction of billings based on average consumption - # of complaints
FINANCE			
<ul style="list-style-type: none"> • FCBD 	<ul style="list-style-type: none"> - financial projections - loan servicing - project financing 	<ul style="list-style-type: none"> - timely reporting - up-to-date payments - expenses within budget 	<ul style="list-style-type: none"> - 20 days after cut-off date - % of reports on time - value of surcharge payments - budget variances
<ul style="list-style-type: none"> • Accounting 	<ul style="list-style-type: none"> - records management - accounts monitoring and reconciliation 	<ul style="list-style-type: none"> - timely reporting 	
<ul style="list-style-type: none"> • Treasury 	<ul style="list-style-type: none"> - financial reporting 		
ADMINISTRATION			
<ul style="list-style-type: none"> • Personnel Management 	<ul style="list-style-type: none"> - employee relations - staff transfers and promotions 	<ul style="list-style-type: none"> - ensure vacancies are filled up within reasonable time 	
<ul style="list-style-type: none"> • HRD 	<ul style="list-style-type: none"> - training and education 	<ul style="list-style-type: none"> - prompt action on personnel recommendations 	<ul style="list-style-type: none"> - training and scholarships available
<ul style="list-style-type: none"> • Health and Safety 	<ul style="list-style-type: none"> - medical services - health and safety policies 	<ul style="list-style-type: none"> - zero accidents 	<ul style="list-style-type: none"> - accident occurrences
<ul style="list-style-type: none"> • Legal 		<ul style="list-style-type: none"> - adjudication of pending litigation - prosecution of illegal connection 	<ul style="list-style-type: none"> - case load

• Procurement	– procurement of material requirements	cases – timely delivery	– target vs. actual delivery dates
• General Services			

Responses on organizational functions indicate ACTUAL duties carried out. Responses to goals and targets may refer to performance indicators CURRENTLY in use.

(14) On what basis have these functions been assigned/identified for your unit?

Table 14

Basis for Assignment	# of Ans.
Official Charter	38
Other legal issuance	6
Internal policy decisions (e.g. reorganization)	25
Ad hoc assignments	11

Note: Multiple responses allowed.

High frequency of responses to *internal policy decisions* and *ad hoc assignments* as basis for functions and duties raises the possibility that actual work being undertaken by various organizational units may no longer be fully consistent with the designated functions under the MWSS charter.

(15) How and by whom were performance objectives established for your unit?

Table 15

Origin	# of Ans.
Policy making agencies of government	2
MWSS Board of Directors	4
Unilateral decisions by MWSS top management	4
MWSS top management in consultation with key managers	14
Unilateral decisions by immediate superiors	10
Immediate superiors in consultation with unit managers	22
Own decisions in consultation with superiors and subordinate staff	21

Note: Multiple responses allowed.

Top answers indicate a consultative approach to management.

(16) How are these departmental functions, roles and responsibilities and performance targets communicated to other managers and staff members within your organizational unit?

Table 16

Mode of Communications	# of Ans.
Official briefing upon joining the department	11
Written circulars, memoranda, or policy manual	22
Announcements during regular staff meetings	43
Informal discussions/verbal instructions	17
Others	-

Note: Multiple responses allowed.

The use of meetings as a primary means of communications support earlier statements regarding consultative/participatory management styles.

- (17) a) How frequently is your unit evaluated? By whom?
 b) How frequently do you evaluate your subordinate units?
 c) What are the current practices for providing feedback to subordinates?

Table 17.A

Group Evaluation Frequency	# of Ans.
Annually	3
Semi-annually	8
Quarterly	3
Monthly	17
Weekly	1
Daily	1
Not evaluated	10
No response	11

Table 17.B

Evaluating Official	# of Ans.
Deputy Administrator	10
Corplan/PMED	6
Immediate superior/department manager	17
None	12
No response	10

Note: Question 17b duplicates Question 23. Responses on frequency of evaluation for subordinate units are summarized in Table 23.

More than one-third of respondents indicated *no evaluation/evaluator* or did not respond to both questions (Q17.A and Q17.B). This raises the question of whether formal performance monitoring and evaluation procedures are in place.

Table 17.C

Subordinate Feedback Modes	# of Ans.
One-on-One	26
Staff meeting	12
Memorandum/in writing	12
None	3

(18) With what other groups does your organizational unit need to coordinate in order to carry out your own role effectively? Describe nature of coordination. What are existing mechanisms for coordination?

Department	Top Management	CORPLAN	PMED	Computer Services	Planning
CORPORATE PLANNING	planning direction				projections
MIS					data requirements
• PMED					
• Computer Services					
ENGINEERING				coordinate design	
• PPD					
• Design					
• ARQC					
CONSTRUCTION					plans
• Special Projects					
• Locally-funded					
OPERATIONS					
• WSTD					
• WDMD					
• SSD					
• Central Maintenance					
CUSTOMER SERVICE				billings	
FINANCE				billing summary	
• FCBD					
• Accounting					
• Treasury					
ADMINISTRATION				tardiness reports	
• Personnel					
• HRD					
• Health and Safety					
• Legal					
• Procurement					
• General Services					

Department	Design	ARQC	Special Projects	Locally-funded	WSTD
CORPORATE PLANNING					
MIS					
• PMED					
• Computer Services					
ENGINEERING					
• PPD					
• Design	project specifications		materials testing	materials testing	chemical analysis
• ARQC	material specifications				
CONSTRUCTION					
• Special Projects	revision of plans	schedule of tests		claims for payment	plans and specifications
• Locally-funded	specifications				
OPERATIONS					
• WSTD	pipe laying plans			work schedule	job requests
• WDMD					
• SSD					
• Central Maintenance					
CUSTOMER SERVICE	leak repairs			line repairs	
FINANCE					
• FCBD					production reports
• Accounting					
• Treasury					
ADMINISTRATION					
• Personnel					
• HRD					
• Health and Safety					
• Legal					
• Procurement	PABC activities				
• General Services					

Department	WDM	Sewerage	Central Maintenance	Customer Service	FCBD
CORPORATE PLANNING					
MIS					projections
• PMED	data requirements		data requirements	data requirements	cash advances
• Computer Services					
ENGINEERING					
• PPD					
• Design					
• AROC					
CONSTRUCTION					
• Special Projects					
• Locally-funded	line energization			turnover of projects	payments
OPERATIONS					
• WSTD			maintenance requirements facilities repair		budget requirements
• WDM					
• SSD				meter repairs	
• Central Maintenance	job requests				
CUSTOMER SERVICE	distribution schedules metering of big accts		meter replacement		budget requirements
FINANCE					
• FCBD				leak repair data collection reports	budget
• Accounting					
• Treasury					
ADMINISTRATION					
• Personnel					
• HRD					
• Health and Safety					
• Legal					
• Procurement					
• General Services					budget requirements

Department	Accounting	Treasury	Personnel	HRD	Health and Safety
CORPORATE PLANNING					
MIS					
• PMED					
• Computer Services		requisitions			
ENGINEERING					
• PPD					
• Design					
• AROC					
CONSTRUCTION					
• Special Projects					
• Locally-funded					
OPERATIONS					
• WSTD	inventory certification	property management			
• WDMMD	salaries	supply requirements			
• SSD		supply requirements			
• Central Maintenance	payments	supply requirements	administrative concerns	training requirements	
CUSTOMER SERVICE					
FINANCE					
• FCBD		fixed asset accounts			
• Accounting		collection remittances			
• Treasury					
ADMINISTRATION					
• Personnel				skills inventory	medical certification
• HRD				policy implementation	
• Health and Safety					
• Legal					
• Procurement		stock levels			
• General Services					

Department	Legal	Procurement	General Services
CORPORATE PLANNING			
MIS			
• PMED			
• Computer Services		supplies	
ENGINEERING			
• PPD			
• Design			
• AROC			
CONSTRUCTION			
• Special Projects			
• Locally-funded			
OPERATIONS			
• WSTD			
• WDMD			
• SSD			
• Central Maintenance		supplies and materials	transport requirements
CUSTOMER SERVICE		supplies and materials	transport requirements
FINANCE			
• FCBD			
• Accounting			
• Treasury			
ADMINISTRATION			
• Personnel	employee clearances		facilities and services
• HRD			
• Health and Safety			
• Legal			
• Procurement			
• General Services			

(19) What other offices or units within MWSS depend on your unit for inputs?

Department	Top Management	CORPORATE	PMED	Computer Services	Planning
CORPORATE PLANNING	plans				demand projections
MIS • PMED • Computer Services					
ENGINEERING • PPD • Design • AROC					
CONSTRUCTION • Special Projects • Locally-funded	monthly reports	monthly reports			progress reports
OPERATIONS • WSTD • WDMD • SSD • Central Maintenance			accomplishment reports		
CUSTOMER SERVICE	revenue reports			meter readings	
FINANCE • FCBD • Accounting • Treasury		actual budgets assets utilization		batch runs	operational data
ADMINISTRATION • Personnel • HRD • Health and Safety • Legal • Procurement • General Services					

Department	Design	ARQC	Special Projects	Locally-funded	WSTD
CORPORATE PLANNING					
MIS					
• PMED					
• Computer Services					
ENGINEERING					
• PPD					
• Design					
• ARQC			materials testing	design consultations materials testing	surveys and census materials testing
CONSTRUCTION					
• Special Projects					
• Locally-funded					
OPERATIONS					
• WSTD					
• WDMD					
• SSD					
• Central Maintenance					facilities repair
CUSTOMER SERVICE					
FINANCE					
• FCBD					
• Accounting					
• Treasury				material requirements	
ADMINISTRATION					
• Personnel					
• HRD					
• Health and Safety					
• Legal					
• Procurement					
• General Services					

Department	WDM	Sewerage	Central Maintenance	Customer Service	FCBD
CORPORATE PLANNING					projections
MIS					
• PMED					
• Computer Services					
ENGINEERING					
• PPD					
• Design	surveys and census	surveys and census		review subdivision plans	
• ARQC	materials testing	materials testing	materials testing		
CONSTRUCTION					
• Special Projects				systems installed	accounts payable statements
• Locally-funded	project status			project turnover	
OPERATIONS					
• WSTD	water supply				
• WDM	leak reports			distribution schedules	
• SSD	pressure buildup			service connections	
• Central Maintenance					
CUSTOMER SERVICE			spot check of meters		revenue collections
FINANCE					
• FCED				budget approvals	financial reports
• Accounting				feedback reports	
• Treasury					
ADMINISTRATION					
• Personnel					
• HRD					
• Health and Safety				legal opinions	budget realignments
• Legal					
• Procurement					
• General Services					

DEPARTMENT	Accounting	Treasury	Personnel	HRD	Health and Safety
CORPORATE PLANNING					
MIS					
• PMED	payroll		payroll		
• Computer Services					
ENGINEERING					
• PPD					
• Design		inspection of deliveries			
• AROC					
CONSTRUCTION					
• Special Projects					
• Locally-funded					
OPERATIONS					
• WSTD					
• WDMD	payroll				
• SSD					
• Central Maintenance		meter requirements			
CUSTOMER SERVICE	revenue reports claims			benefits claims	
FINANCE					
• FCBD					
• Accounting					
• Treasury					
ADMINISTRATION					
• Personnel					
• HRD					
• Health and Safety					safety training
• Legal					
• Procurement		delivery inspection			
• General Services					

Department	Legal	Procurement	General Services
CORPORATE PLANNING			
MIS			
• PMED			
• Computer Services			
ENGINEERING			
• PPD			
• Design			
• ARQC		materials testing	
CONSTRUCTION			
• Special Projects			
• Locally-funded			
OPERATIONS			
• WSTD			
• WDMMD			
• SSD			
• Central Maintenance			
CUSTOMER SERVICE			
FINANCE			
• FCBD			
• Accounting			
• Treasury			
ADMINISTRATION			
• Personnel			
• HRD			
• Health and Safety			
• Legal			
• Procurement			
• General Services			

(20) What factors prevent smooth coordination with other MWSS units?

Table 20

Obstacles	# of Ans.
Lack of communication, delayed reports	15
Lack of integrated planning	1
Lack of resources, work load	6
Bureaucratic procedures	2
Limited authority of representatives in meetings	1
Personal differences, lack of cooperation	9
Unreasonable demands	1
Lack awareness of functional roles and responsibilities	2
None	19

Note: Multiple responses allowed.

(21) If given the chance, what changes in organizational structure or coordination mechanisms within MWSS would you implement to enhance the performance of your own unit?

Table 21

Proposed Changes	# of Ans.
Improve systems and procedures, including computerization	15
Reorganization, including sectoralization and decentralization	24
Recruitment, selection and training	11
Procurement system	9

3. Operating Systems

(22) What specific outputs/services is your department/division responsible for? For each output/service, how long (on the average) does it take to complete a single transaction, i.e., from the moment a request is initiated to the time the output/service is completed and delivered to the client? Would you rate this cycle time as satisfactory?

Table 22

Department	Output/Service	Cycle Time
CORPORATE PLANNING	<ul style="list-style-type: none"> - Long term plans - Special studies - Projections - Water rate studies 	3 mos variable 2 weeks 2 weeks
MIS <ul style="list-style-type: none"> • PMED • Computer Service Center 	<ul style="list-style-type: none"> - Special studies - Transaction documentation 	variable
ENGINEERING <ul style="list-style-type: none"> • PPD • Design • ARQC 	<ul style="list-style-type: none"> - project financial estimates - hydrogeologic studies - project specifications - project monitoring - engineering design (large projects) - design review (small projects) - technical support services (surveys, drafting work) - laboratory testing - technology evaluation 	variable 6 months 3-4 weeks variable 5 days
CONSTRUCTION <ul style="list-style-type: none"> • Special Projects • Locally-funded Projects 	<ul style="list-style-type: none"> - Project supervision - Project supervision 	
OPERATIONS <ul style="list-style-type: none"> • WSTD • WDMD • SSD 	<ul style="list-style-type: none"> - Installation and maintenance of pumping and distribution facilities - sewer service connections - collection and disposal of waste 	variable variable

<ul style="list-style-type: none"> • Central Maintenance 	<ul style="list-style-type: none"> water - septic tank dislodging and pumping - repair of mechanical and electrical equipment at filtration plants, booster pumping stations, deep wells - meter calibration and repair - machine shop services (welding, tooling) - maintenance of vehicles 	variable
<p>CUSTOMER SERVICE</p>	<ul style="list-style-type: none"> - water service application processing - meter reading - billing and collection - A/R collection - leak repair - meter repair/replacement - disconnection/connection - customer complaints 	<ul style="list-style-type: none"> 7-15 days 5 days 1 month 3-4 months 2-7 days 10-20 per day within a day (no remarks)
<p>FINANCE</p> <ul style="list-style-type: none"> • FCBD • Accounting • Treasury 	<ul style="list-style-type: none"> - financial reporting - project financing - loan servicing - records maintenance - summary reports - RIV processing 	<ul style="list-style-type: none"> 3 weeks as needed 2 weeks 30 minutes
<p>ADMINISTRATION</p> <ul style="list-style-type: none"> • Personnel • HRD • Health and Safety • Legal • Procurement • General Services 	<ul style="list-style-type: none"> - monthly reports - employee grievance handling - hiring, promotion processing - training program - medical services - safety regulations - bid preparation and awards - inspection of deliveries - computer repair - inter-office communications - equipment and facilities maintenance 	<ul style="list-style-type: none"> 3 days 1 week variable variable fast as prescribed by law variable

(23) What kind of feedback is given to employees regarding their performance? How often is this given?

All respondents cited the Performance Appraisal Report (PAR) and the Management by Objectives for Results (MORE) as the formal feedback mechanism. These are administered semi-annually. In addition, informal feedback may be provided in the course of work supervision. Frequency of feedback is shown in Table 23 below.

Table 23

Frequency	# of Ans.
As needed	20
Daily	7
Weekly	1
Monthly	5
Semi-annually	34
Annually	-

(24) a) What factors motivate employees to perform well?

b) What factors affect employee morale and motivation negatively?

Table 24

Factors	# of Ans.
Motivators:	
Salary, wages, benefits, incentives	45
Performance recognition	21
Management and supervisory style	15
Promotion opportunities	15
Management as role model	11
Working environment	11
Training opportunities	11
Values (e.g., concern for service, sense of accomplishment)	9
Interpersonal relations	7
Security of tenure	7

Demotivators:	
Favoritism/patronage	27
Negative example set by superiors	12
Low salaries/delayed payments	12
Lack of recognition for performance	8
Lack of promotion opportunities	6
Poor working conditions	4
Lack of equipment	3
Lack of tenure (casuals)	3
Job mismatch	2
Shortage of supplies and materials	2
Unclear goals, directions	2
Office intrigues	2
Civil service regulations	1

Next to monetary considerations, performance-related rewards and incentives (e.g., recognition, promotion) are identified as major motivators. Closely related thereto are the management style factors (role model, supervisory style, patronage/favoritism).

(25) Have there been any systems streamlining program undertaken in the last three years for any of the functions or processes undertaken in your department? If yes, describe changes and how these have affected your work performance.

Table 25

Streamlining Program	Affected Departments
Reorganization (sectoralization, decentralization, restructuring)	Engineering Design SSD Customer Services FCBD Accounting Treasury
Computerization	Central Maintenance Customer Services Accounting Personnel

Table 25 indicates the organizational units which felt the effects of recent systems streamlining programs. It is to be noted that reorganization and computerization efforts appear not to be coordinated. In the case of engineering and sewerage services, reorganization appears to have been pursued without provisions for computer support.

(26) Are operating procedures in your unit documented in a manual of procedures? If yes, when was this manual last updated? Do you have a copy of this manual? If a copy is not available, how and where can you get a copy?

Table 26

Department	Procedures Manual	Last Update	Copy Available	Source of Copy
CORPORATE PLANNING	N			
MIS				
• PMED	Y	1989	Y	
• Computer Service Center	Y			
ENGINEERING				
• PPD				
• Design	flowchart		N	
• ARQC	Y	various	Y	
CONSTRUCTION				
• Special Projects	Y	1988		
• Locally-funded projects	N			
OPERATIONS				
• WSTD	Y	1984/1980	Y	
• WDMD	Y (own ver.)	1985	Y	
• SSD	Y	1985	Y	
• Central Maintenance	Y	various	Y	
CUSTOMER SERVICE	Y	various	Y	Library
FINANCE				
• FCBD	N			
• Accounting	Y	various	Y	
• Treasury	N	various		
ADMINISTRATION				
• Personnel	Y	1980s	N	

• HRD	N		
• Health and Safety	Y	1988	Y
• Legal	N		
• Procurement	Y	1993	Y
• General Services	N		

Respondents who indicated that some manual of procedures is available failed to produce a copy thereof upon request.

(27) What staff development programs or training courses sponsored or organized by MWSS have any of your staff attended in the last 3 years? If given the opportunity, what kinds of training programs would you send your staff to?

Training programs attended by staff are mostly in-house or external training programs organized through the HRD office. Of greater interest would be the list of desired training programs. These are indicated below.

Table 27

Department	Desired Training Programs
CORPORATE PLANNING	- project economics
MIS	
• PMED	- values training
• Computer Services	
ENGINEERING	
• PPD	(no response)
• Design	(no response)
• ARQC	- advanced lab analysis
	- degree programs
	- specific technical courses
CONSTRUCTION	
OPERATIONS	
• WSTD	- technical writing
• WDMD	- interpersonal relationships
• SSD	- customer relations
• Central Maintenance	- technology updates

	<ul style="list-style-type: none"> - values reorientation
CUSTOMER SERVICE	<ul style="list-style-type: none"> - computer data base management - customer relations values reorientation
FINANCE <ul style="list-style-type: none"> • FCBD • Accounting • Treasury 	<ul style="list-style-type: none"> - leadership skills - Exchange Risk Tooling (?) c/o ADB - orientation on work of other units - orientation on work of other units - values reorientation - IT updates - planning
ADMINISTRATION <ul style="list-style-type: none"> • Personnel • HRD • Health and Safety • Legal • Procurement • General Services 	<ul style="list-style-type: none"> - advanced computer courses - business communications - records management - values/work attitudes (no response) (no response) (no response) - administrative skills - records, inventory management

Customer relations and values reorientation are mentioned by respondents from several organizational units.

(28) If given the chance, what aspects of departmental operations would you change and how?

Table 28

Department	Proposed Changes
CORPORATE PLANNING	- integrate financial, technical and economic planning
MIS • PMED • Computer Services	- spin off unit as internal control unit - clarify organizational roles and functions
ENGINEERING • PPD • Design • ARQC	- spin off/create project implementation division - streamline contract awarding procedures - establish modern research laboratory - offer fee-for-service packages to public
CONSTRUCTION	- strengthen project support services (accounting) - review/revise position classification scheme
OPERATIONS • WSTD • WDMD • SSD • Central Maintenance	- improve resource management procedures - staff reduction - equipment upgrading - facilitate procurement for operating supplies - equipment upgrading - job rotation - job matching (skills vs. position) - facilities rehabilitation - centralize vehicle dispatching/maintenance
CUSTOMER SERVICE	- decentralize support services - set up more water sampling and metering points - office renovation and equipment modernization - computerization - revise guidelines on overdue accounts - review position classification and plantilla - set up "book" management system for sectors/branches
FINANCE • FCBD	- decentralize branch operations - computerization

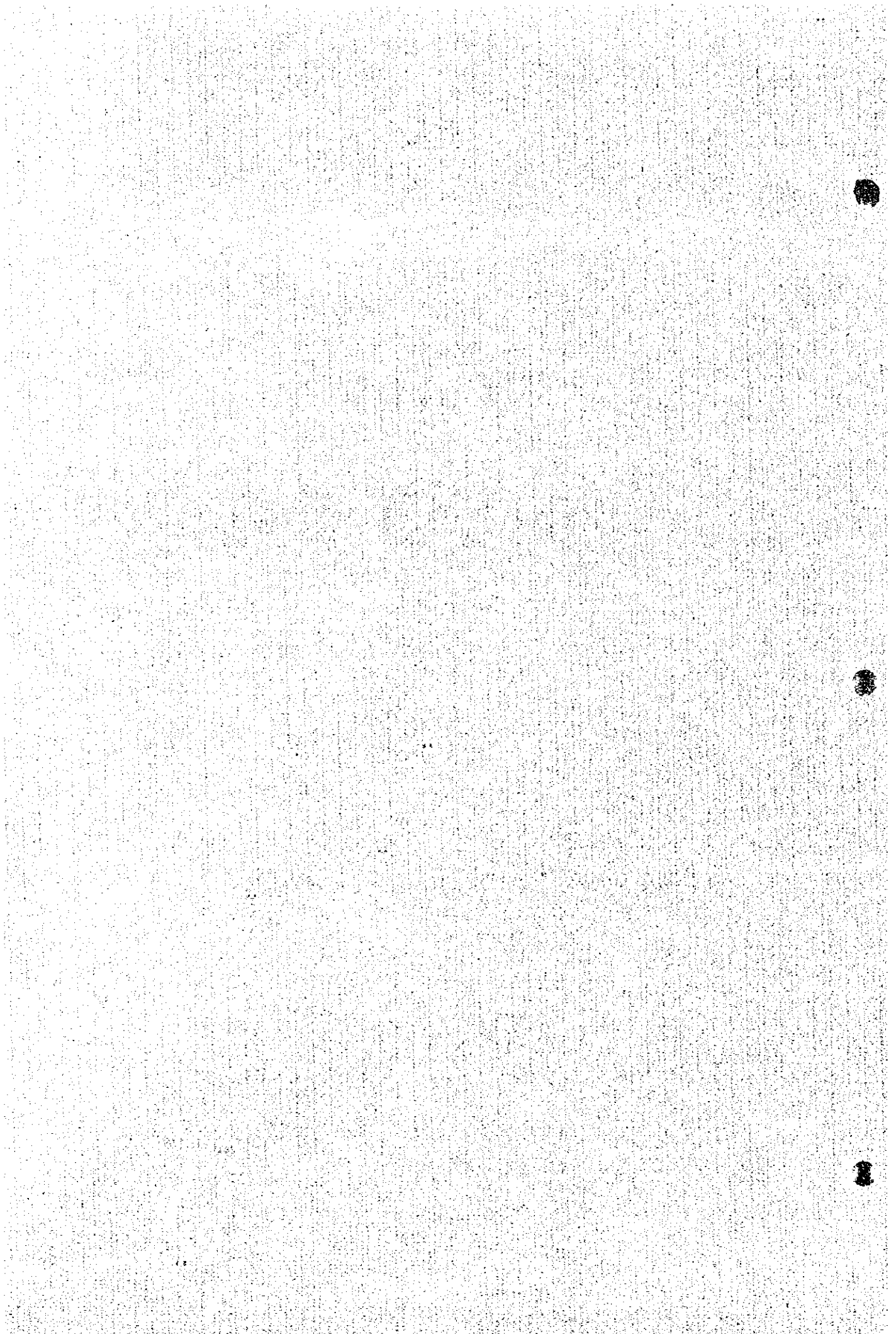
• Accounting	- computerization - job matching
• Treasury	(no response)
ADMINISTRATION	
• Personnel	(no response)
• IIRD	- career planning and development per position - job matching
• Health and Safety	- elevate (restore) unit to department level
• Legal	(no response)
• Procurement	- computerization of procedures - revise legal prescriptions on bidding timetable
• General Services	(no response)

Part V

Financial Study

Part V

Financial Study



1. Financial Ratios

Financial Ratio	1990	1991	1992	1993	1994
Profitability:					
Profit ratio	16.0%	23.0%	26.3%	23.9%	8.9%
Operating exp. ratio	35.7%	32.8%	32.0%	33.2%	37.4%
Total assets turnover	10.4%	10.9%	11.9%	10.8%	11.9%
Return on total assets	4.4%	4.8%	5.1%	4.0%	3.2%
Return on equity	5.4%	5.9%	6.9%	5.0%	3.0%
ROR (MWSS charter)	8.8%	10.3%	11.9%	8.9%	8.3%
ROR (ADB covenant)	9.3%	11.3%	11.1%	10.8%	8.0%
Liquidity and financial capacity:					
Current ratio	428.7%	433.5%	465.8%	475.4%	483.2%
Debt ratio	36.7%	34.1%	36.1%	32.4%	29.7%
Debt equity ratio	58.0%	51.7%	56.5%	48.0%	42.3%
L/T assets to L/T funds ratio	84.2%	84.9%	82.3%	84.6%	83.8%
Debt service ratio	144.1%	138.0%	139.6%	135.0%	122.6%
Growth:					
Total assets	16.5%	18.4%	-0.5%	21.6%	-3.8%
Fixed assets	16.0%	19.7%	-3.7%	25.9%	-4.8%
L/T loans	40.1%	9.9%	5.6%	10.0%	-12.9%
Operating revenues	10.5%	23.9%	9.4%	10.0%	5.8%
Operating expenses	13.9%	12.3%	22.3%	8.8%	24.9%
Net income	59.8%	35.1%	11.7%	-6.0%	-40.6%

Note: of Financial Ratios Formula

$$1) \text{ Profit ratio} = \frac{\text{Net income excluding interest income}}{\text{Operating revenue}}$$

$$2) \text{ Operating exp. ratio} = \frac{\text{Operating expenses}}{\text{Operating revenue}}$$

$$3) \text{ Total assets turnover} = \frac{\text{Total assets}}{\text{Operating revenue}}$$

$$4) \text{ Return on total assets} = \frac{\text{Net income before interest expenses}}{\text{Total assets}}$$

$$5) \text{ Return on equity} = \frac{\text{Net income}}{\text{Equity}}$$

$$6) \text{ ROR (MWSS charter)} = \frac{\text{Operating revenue} - \text{Operating expenses} - \text{Non - cash exp.}}{\text{Net fixed assets in operation} + 2 \text{ months average expenses}}$$

$$7) \text{ ROR (ADB covenant)} = \frac{\text{Operating revenue} - \text{Operating expenses} - \text{Non - cash exp.}}{\text{Average net fixed assets in operation for the year}}$$

$$8) \text{ Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$9) \text{ Debt ratio} = \frac{\text{Total liabilities}}{\text{Total liabilities} + \text{Equity}}$$

$$10) \text{ Debt equity ratio} = \frac{\text{Total liabilities}}{\text{Equity}}$$

$$11) \text{ Debt service ratio} = \frac{\text{Operating revenue} + \text{Interest income} - \text{Direct operating expenses}}{\text{Payments for principal and interest} + \text{Sinking fund provision}}$$

$$12) \text{ L/T assets to L/T funds ratio} = \frac{\text{Net fixed assets} + \text{Construction in progress}}{\text{Long - term liabilities} + \text{Equity}}$$

2. Operational Data for Water Utilities Surveyed

City	Bangkok	Beijing	Bombay	Hong Kong	Jakarta	Kuala Lumpur	Metro Manila	Seoul	Singapore	Taipei
Population	5,609,352	5,769,600	9,800,000	5,700,000	8,350,000	1,145,075	7,928,867	10,940,000	2,762,700	3,720,275
Daily production (m ³)	2,870,000	1,743,000	2,450,000	2,400,000	880,000	360,000	2,490,202	4,929,000	1,189,223	1,849,969
# of connections	1,027,623	1,153,920	141,086	1,917,000	280,386	675,151	669,151	1,583,575	799,049	1,189,095
# of staff	5,608	19,651	8,607	5,191	2,851	1,668	8,554	3,681	1,952	1,459
People served	4,454,313	5,498,429	N/A	5,845,200	2,072,688	1,145,075	5,654,156	10,970,509	3,056,878	3,720,645
Ave. persons/HC	5.8	N/A	N/A	3.4	6.0	5.0	8.1	7.9	4.2	5.3
Annual revenue (\$ mil.)	240,956	17,003	37,054	427,229	44,709	98,404	84,884	336,543	176,904	109,981
Annual op. cost (\$ mil.)	74,424	20,268	30,946	276,286	21,163	3,611	33,267	236,127	75,364	47,852
Unit production cost	0.071	0.032	0.035	0.315	0.066	0.027	0.037	0.131	0.174	0.071
Cost indicator	100	201	246	54	251	25	116	48	29	19
Operating ratio (%)	31	119	84	65	47	4	39	70	43	44
Composition of op. exp.										
Power	22	29	33	13	20	23	14	18	13	17
Personnel	45	5	32	32	31	31	57	19	49	67
Other	33	66	35	54	49	46	29	65	38	16
Total	100	100	100	100	100	100	100	100	100	100
Staff/1,000 connections	5.5	17.0	61.0	2.7	10.2	1.8	12.8	2.3	2.4	1.2
A/R bal. (mos.)	3.1	N/A	2.5	2.7	1.5	1.0	4.0	0.3	1.1	0.3
NRW (%)	31	28	24	26	57	37	58	42	8	24

Note: N/A: Data not available

Cost indicator is obtained by applying per capita GNP against unit production cost. The figure for Bangkok is indexed as 100.

3. Water Tariff for Residential Customers

Monthly Consumption	Residential A	Residential B
First 10 m ³	P28.00 per connection	P33.50 per connection
Next 10 m ³	P3.40 per m ³	P4.10 per m ³
Next 10 m ³	P4.15 per m ³	P4.65 per m ³
Next 10 m ³	P5.20 per m ³	P5.40 per m ³
Next 10 m ³	P6.00 per m ³	P6.10 per m ³
Next 10 m ³	P6.55 per m ³	P6.65 per m ³
Next 20 m ³	P7.25 per m ³	P7.45 per m ³
Next 20 m ³	P7.90 per m ³	P8.00 per m ³
Over 100 m ³	P8.45 per m ³	P8.55 per m ³

4. Water Tariff for Commercial and Industrial Customers

Monthly Consumption	Commercial	Industrial
First 25 m ³	P226.25 per connection	P246.25 per connection
Next 975 m ³	P9.05 per m ³	P9.85 per m ³
Over 1,000 m ³	P9.50 per m ³	P11.55 per m ³

5. Calculation of Average Water Tariff

Customer group	Usage	Tariff	Group Comp.	Effect	Overall Comp.	Effect
Residential A	0-10	2.80	28.88%	0.81	17.58%	0.49
	11-20	3.40	22.24%	0.76	13.54%	0.46
	21-30	4.15	13.93%	0.58	8.48%	0.35
	31-40	5.20	8.64%	0.45	5.26%	0.27
	41-50	6.00	5.51%	0.33	3.35%	0.20
	51-60	6.55	3.64%	0.24	2.22%	0.15
	61-80	7.25	4.29%	0.31	2.61%	0.19
	81-100	7.90	2.35%	0.19	1.43%	0.11
101 & up	8.45	10.52%	0.89	6.40%	0.54	
			100.00%	4.55	60.86%	2.77
Residential B	0-10	3.35	29.45%	0.99	0.43%	0.01
	11-20	4.10	23.33%	0.96	0.34%	0.01
	21-30	4.65	15.27%	0.71	0.22%	0.01
	31-40	5.40	9.67%	0.52	0.14%	0.01
	41-50	6.10	6.13%	0.37	0.09%	0.01
	51-60	6.65	3.94%	0.26	0.06%	0.00
	61-80	7.45	4.18%	0.31	0.06%	0.00
	81-100	8.00	1.96%	0.16	0.03%	0.00
101 & up	8.55	6.07%	0.52	0.09%	0.01	
			100.00%	4.80	1.46%	0.07
Commercial	0-25	9.05	9.22%	0.83	2.84%	0.26
	26-1000	9.05	45.32%	4.10	13.94%	1.26
	1001 & up	9.50	45.46%	4.32	13.99%	1.33
			100.00%	9.25	30.77%	2.85
Industrial	0-25	9.85	6.52%	0.64	0.45%	0.04
	26-1000	9.85	34.28%	3.38	2.37%	0.23
	1001 & up	11.55	59.20%	6.84	4.09%	0.47
			100.00%	10.86	6.91%	0.75
Total					100.00%	6.43

Source: Corplan

Note: Effect denotes impacts on tariff average either for customer group or overall.

6. Tariff for Water Utilities in Asia

a) Water Tariff Profile

City	No. of Grades	Demand Mgmt.	Cross Subsidy Ratio	Cost of Domestic Water	Overall Average Tariff	GNP per capita	Indicator of Relative Cost to GNP
Bangkok	12		1.48	\$ 0.157	\$ 0.242	\$ 1,650	100
Beijing	1		2.09	0.022	0.030	370	56
Bombay	1		28.00	0.010	0.069	330	144
Hong Kong	4	YES	2.00	0.438	0.371	13,580	19
Jakarta	4	YES	2.52	0.209	0.363	610	410
Kuala Lumpur	3	YES	2.24	0.189	0.327	2,520	89
Seoul	4		3.93	0.103	0.230	6,350	25
Singapore	3	YES	1.82	0.326	0.442	14,140	22
Taipei	9		12.57	0.159	0.244	8,790	19
Manila	9		2.86	0.116	0.232	740	216

Source: Water Utilities Data Book - Asian and Pacific Region (ADB, 1993)

Note: All utilities charge based upon consumption.

Existence of demand management is determined by the author of the ADB Data Book.

Cross subsidy index is the ratio of the cost of industry water vs. domestic water at 30 m³ per month

Cost of domestic water is the average per cubic meter at 20 m³ per month

Overall cost of water is the average tariff given by the ADB Data Book.

Relative cost to GNP is the ratio of the average tariff to per capita GNP (Bangkok being 100)

b) Demand Management Indicator

City	Ave. Unit Cost at Monthly Use of			Ratio	
	10 m ³ (A)	20 m ³ (B)	30 m ³ (C)	(B)/(A)	(C)/(A)
Bangkok	\$ 0.157	\$ 0.157	\$ 0.157	100	100
Beijing	0.022	0.022	0.022	100	100
Bombay	0.010	0.010	0.010	100	100
Hong Kong	0	0.106	0.213	∞	∞
Jakarta	0.172	0.209	0.246	122	143
Kuala Lumpur	0.166	0.189	0.212	114	128
Seoul	0.089	0.103	0.108	116	121
Singapore	0.326	0.326	0.371	100	114
Taipei	0.160	0.159	0.185	99	116
Manila	0.105	0.116	0.129	110	123

Note: For Bangkok, the minimum rate is set for the first 30 cubic meters.

For Hong Kong, the first 15 cubic meters is free.

For Singapore, the minimum rate is set for the first 20 cubic meters.

For Taipei, the minimum charge is set for the first 13 cubic meters, and therefore, the average for the first 10 cubic meter consumption is higher.

7. Cash Flow Calculation

FIRR

2.0%

Year	Benefit	Cost		Total	Net Cash flow
	Total	Const.	Op. exp.		
1995		22	0	22	-22
1996	491	481	0	481	9
1997	529	651	0	651	-123
1998	580	868	0	868	-288
1999	649	1,277	96	1,374	-724
2000	822	1,933	96	2,029	-1,207
2001	906	1,553	107	1,660	-754
2002	990	727	139	866	124
2003	1,075	393	203	596	479
2004	1,159	764	389	1,153	6
2005	1,243	1,575	389	1,964	-722
2006	1,335	1,127	449	1,576	-241
2007	1,428	1,459	449	1,909	-481
2008	1,523	621	600	1,221	302
2009	1,619	594	632	1,226	394
2010	1,717	594	632	1,226	491
2011	1,827	960	662	1,622	204
2012	1,939	657	662	1,319	620
2013	2,052	804	662	1,465	587
2014	2,168	439	761	1,200	968
2015	2,284	149	776	925	1,360
Total	26,335	17,648	7,705	25,353	982



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