APPENDIX E

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4.7 Benetits and Risks

The modernization and automation of the customer information and financial management systems will greatly simplify work processes and data collection. The economic benefits to DAWSSA are expected to be significant and will allow more sustainable development of the water supply system. It is expected that the new systems will also result in a number of other significantly important organizational improvements such as:

Improved accountability

(a)

(b)

- by providing separate utility revenue and receivable totals for each utility fund
- by keeping separate utility fund (sewage in the near future) and aging category totals for each customer
- by keeping separate consumption history for each customer

Improved control

- by facilitating audit trails. For example, by providing a detailed breakdown of all previous customer bills, by providing a complete record of all financial transactions affecting a customer's account balance, accessible on line for each customer at any collection center.
- facilitating control of cashier operations by recording the changes in the total customer accounts receivable with the net total of all financial transactions for the day and producing a daily balancing report
- by providing exception reports for each billing run to indicate accounts which exceed defined limits for consumption and dollar values
- by providing reports listing delinquent accounts requiring collection action
- (c) Improved financial planning and management
 - by analyzing the effect of different rate structures on the total charges billed
 - by providing revenue and consumption history profiles
 - by final billing customers as soon as a meter reading is available

- (d) Improved operational planning
 - by providing consumption history and trend analysis
- (e) Improved customer service
 - by quickly opening accounts for new customers
 - by providing instant access to customer accounts and last bill information
 - by providing automatic credit adjustments for overestimated consumption from previous billing period

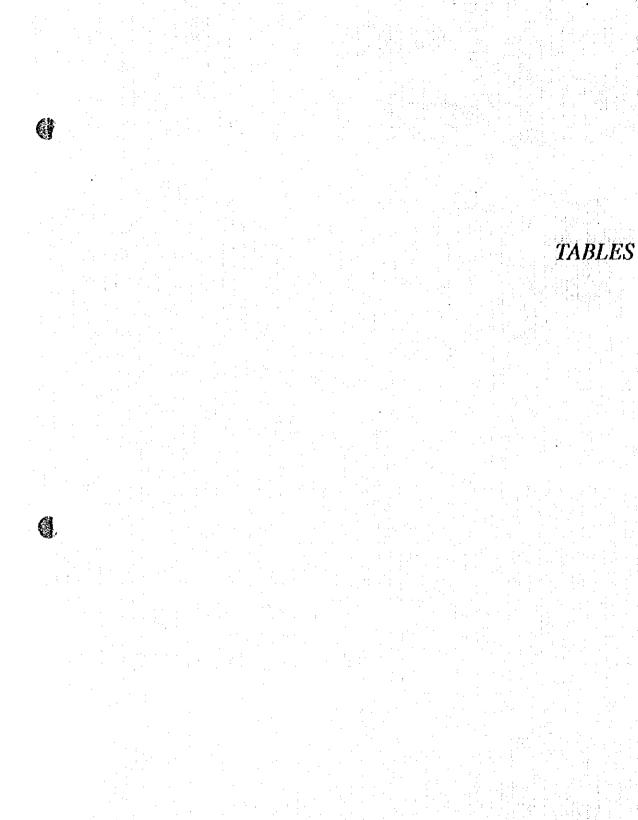
The implementation of the proposed CIS and FMIS must be undertaken in a comprehensive and completely integrated way. There is the risk that some components such as computerization will appear attractive while other components involving hard decisions such as restructuring the organization or streamlining the billing procedures will be set aside. This would unbalance the proposed improvements and risk failing to realize their full benefits. There is also the risk that users will not adapt to the changes brought about by computers. This risk can be minimized by:

a) Setting up inter-Directorate working groups to ensure systems meet user needs

b) Providing extensive user training and support to ensure that users do can make full use of the implemented systems for their day to day work and do not revert to their manual work methods.

c) Providing an adequate number of trained technical staff available to implement and provide on-going support

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 Table E-1.1 - Operating Income & Expenditure Statement (Source DAWSSA accounting directorate)

	1990	1991	2661	1993	1994	1995
Water Produced (000 m3)	151,680	172,900	201.430	212,000	209,000	080.222
Water Sold (000 m3)	53,280	64,515	66.328	20,000	69,582	63,5%
Water Sold (% of total production) th	346	37%	33%	33%	33%	29%
Water delivered to water rights (000 m3) th	020.41	15.750	15151	15,750	15,025	14,859
Total accounted for water (000 m3)	67,300	80,265	81,452	85,750	84,610	78,455
Unnaccounted for Water (% of total production)	560	54%	60%	60%	<i>е</i> о <i>ж</i>	65%
Avenuee Cost (SLm3 produced) ^(h)	0.63	0.66	0.69	0.69	0.86	46.0
Average Tariff (SL/m3 sold) ^(b)	2.17	3.00	2.70	2.67	4.61	4.37
Operating Revenues			1			
Water Sales	115,657,868	193,306,3-14	179.126,281	187,163,513	320.991.221	278,191,915
Cost Recovery Services & Fees	13,352,711	21,422,020	23,233,802	24,690,816	48,426,323	55,229,006
Sale of Connection Materials	2,219,513	2.507 869	3,215,977	4,230,948	3,450,660	3,348,949
Other Revenue	483,825,4	3,390,899	3,446.209	5,377,817	6.654.672	248.142.8
Bank Interest	39,176	414411	160.222	318,931	320,690	315,122
Previous Year's Adjustments	• • •	1,036,641	•	3,356,824		
Total Revenues	135,609,152	221.778.187	209 182,491	225, 138,849	379,843,566	345,326,839
Operating Expenses	375 375 01	13 370 708	\$2,7721,801	57.313.006	74.336.324	83 344 723
Danafites to wages	7 970 999	8,563,920	11.925.133	12,116,067	17:914 417	22.941.860
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Chemicals	1,001,000	100 CTO C		330 LO C	- 000 171 fr	010000
Purchase of service connection materials for re-sa	01410/	167,197,1	1000000	00017001	700 661	044 034 4
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Service fees	171,679,81		886'06:1'CT	076106187	1/5/10/15	000'11C'05
Other Expenses	395,658	16.195	611111		776'067	97/ 16- 1
Previous Year's Expenses	2.710.021	1.313.215	2,603,988	8,093.270	13.830.897	15,352,015
Total Direct Expenses	97,596,690	113,777,982	138,525,938	146,134,034	179,610,050	216,425,636
Depreciation	32,419,648	36,137.223	151,019,431	619'67768	50,234,879	54,100,434
Net Income (deficit)	5,562,814	71.862.982	30,637,122	39,255,196	149,998,637	47,800,769
Profit tax	141,400,4	53,221,000	29.305,275	33.721.759	87.535.873	48,338,215
Net Income (deficit) after taxes	898,675	18,641,982	1,331,847	5,533,437	62,462,764	26,462,554
Financial Indicators		* : • .				
Working ratio (direct expenses/revenue)	0.72	0.51	0.66	0.65	0.47	0.63
Operating ratio (total expenses/revenue) Docfs margin (hofoes 1995)	96 O 06 O	0.68	0.15	0.83	0.61 0.39	0.78
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based on metered billings
 based on metered billings, but no revenue collected
 equal to income from water sales divided by volume of water sold

Table E-1.2 Source & Use of Funds

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	1990	1661	- - -	1993	1661	1995
Source of Funds						
Operating IncomeBefore Taxes	5 562.814	71.862.982	30.637.122	39,255,196	149,998,637	74 800.769
Depreciation	32,449,648	36,137,223	40.019,431	39,749,619	50,234,879	S4 100.434
Loans Received	127,897,417	147,653,462	178,604,884	613,720,042	359,577,715	585,899,631
Grant Aid			1.501,319			
Increase in Capital						750,806,933
Increase in Payables	85.069.595	90:030,062	26,290,126	206,992,610	146,154,451	(93,870,388)
Total Sources	250,979,474	345,683 729	277,052,882	839,717,467	705,965,682	1,371,737,379
		·		• .		
Uses of Funds						
Capital Investments	70,544,102	74,458,203	76,767,380	334,161,986	264,051,482	240,639,313
Foreign Loans Repayment	14,741,655	15,905,054	•	67,944,821	37,855,453	38,900,000
Loans Interest	76,325,174	85,103,348	81, 197, 520	143,4964,641	150,804,247	258,630,013
Increase in receivables	(24,492,565)	121,977,844	62,451,454	298,041,267	(35,745,886)	758,833.713
Increase in inventories	3,903,507)	174 171	22,732,739	60,674,664	19,108,430	(15.754.784)
Income Taxes	1717997	53,221,000	29,305,275	33,721,759	87.535,873	43 562,410
Transfer to Ministry of Finance		2,000,000	• 11 11 10 20 10 10	•	•	
Total Use of Funds	137,879,001	352,839,620	272.454,368	938,040,842	523,609,598	1,324,810,665
Net working capital (SL)	113,100,473	(1,155,891)	4,598,514	(38,323,375)	182,356,084	46,926,714
official exchange rate of 45 SL'USS	2,692,868	(170.378)	109,483	(912,461)	4,341,812	1,042,816
		-				:
Financial indicators						
Income/total sources	3.56	20.8%	11.105	20° 7	- 30 C I C	< 401
Loans/total sources	51.0%	42.7%	64.5%	68.2%	50.9%	42.7%
Capital investmentitotal sources	28.1%	21.5%	27.7%	37.1%	37.4%	17.5%
Capital investment' loans rec'vd	55.2%	50.4%	43.0%	\$4.4%	23.4%	41.1%
Debt service/total sources	36.3%	29.2%	29.3%	23.5%	26.7%	21.7%
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A. Kaferrousse 4.900 24. Oct 56 14. Nov 56 21 66 19. Jan 97 21. Jan 97 1 6 26. Jan 97 21. Jan 97 3. Feb 97 3 7 3 7 <th7< th=""> <th7< th=""> <th7< th=""></th7<></th7<></th7<>	23	Moutharam **	Moukhaiam	18.81		1. Dec. 96	g	ž	19.Feb-97	27-Feb-97	*		11-Mar-97.	12-Mar-97	1	0.	2	12-Mar-97	. 01	6.	72-mil-9	208
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Kulmouse Americe 9.332 21-Oct (% 15 Nor-96 26 7.4 26-160 /1 15-66 / 7 1.Mar 27 4 0 1.Mar 27 16 16 R. Kalemouse 9.332 21-Oct (% 15 Nor-96 26 7.4 26-160 / 15-Nor-96 16 1.Mar 27 15 16 R. Kalemouse 9.399 14.5 points 2 27-Nor-96 26 18 21 18.Nor-96 26 18 26 15.Nor-97 16	1		B-Al Ashmor		\$-505	14-Nov-8	-	-							-		27-180-97	3-Feb-97	<u>ال</u>	88	2-Apr-97	991
R.Kaferroure 21.Oct.06 15.Non-96 3 2 1 2 2 2 2 2 2 2 2 3 3 3 Kastom A.Afrad 9.599 14.5ep.56 2 0 2 0 2 2 2 3 3 3 H.Mohammer Total 25.504 1 3 2 2 0 2 2 2 3 <t< td=""><td>ĥ</td><td>Kalensousse</td><td>A-mezze</td><td>9,332</td><td>_</td><td>15-Nov-26</td><td>2</td><td>74</td><td>76-081-82</td><td>1-Feb-97</td><td>4</td><td></td><td>25.Feb-97</td><td>1-Mar-97</td><td>4</td><td>0 · · ·</td><td>1-Mar-97</td><td>15-Mar-97</td><td>4</td><td>91</td><td>70-001-0</td><td>ខេ</td></t<>	ĥ	Kalensousse	A-mezze	9,332	_	15-Nov-26	2	74	76-081-82	1-Feb-97	4		25.Feb-97	1-Mar-97	4	0 · · ·	1-Mar-97	15-Mar-97	4	91	70-001-0	ខេ
Kasatoun A.Akrad 9.599 14.5gp.96 20.06.91 18 42 13.500-96 14 26 21.0ec.96 51 0 26.0ec.96 30 28.0ec.96 30			R-Katersousse		21-Oct 36			-									16-18W-1	15-Mar-97	14	6	24-Mar-97	2
1044 225,944 14.569,56 2.061,961 13.Now.961 24. 26 23.Dec.961 55 0 28.Dec.961 30.Jan.97 33 Total 225,944 Average 20 6.7 Average 21 201	2 6	Kasstoun	A-Akrad	9,599	L		1X	3		27. Nov. 96	4		23-Dec.96	28-Dec-96		0	DK-Dec 96	70-Jan-97	33	0	30-120-97	138
225,944 Average 20 67 Average 7 28 Average 5 3 Average 21			H-Moharreen		14-Sep-96		H			27 No. 9	- 11		23-Dec-961	24 Dec-96	S.	¢	28. Dec.96.	30-Jan-97	33	38	9-Mar-97	176
			Total			Avense.	ន	Ş	-	Average*	ŕ	Ä		Average	~	ć		Average.	21	4	Average -	5

Note: 1. Days a calendar days, seven calendar days sux working days. 1 days 36 work days 2. Subs have not been delovered to collection centher as of June 9 1997, but meters have been read for next billing cycle. 3. Ture from larger reading until instruct to payment collection centre 4. Averages are for complement one dating. Three to cou :

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46%
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Table E-1.4 Analysis of staffing levels for meter reading

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Table E-1.5 Percentage of Unread Meters

Meter I Name	District Book No.	Total No. of Meters	Unread Meters (1)	Percent Unread
Moukhaiam	55	191	12	6.
viouxitatam	.8	286	40	14.
	44	280 193	32	14.
	28	400		10.
Kanawat	104	238	19	
Xaraway	104	198	20	10.
	54	240	35	14.
	39	240 227	20	8.
	30	295	20	6.
Sarouja	129	162	6	3.
Mooju	95	358	16	4
÷	59	188	10	5.
	90	246	31	12
	120	350	18	.2
Kaboun	5	335	35	10
	41	155	35	22.
х ² .	23	202	37	18
e e la composición de la composición de La composición de la c	14	179	15	8
	8	214	49	22
Mohajreen	43	296	7	2
	11	138	14	10
	80	258	31	12
*	29	268	15	5
	86	306	25	8
Fotal	<u></u>	5,923	620	10

(Source - DAWSSA)

(1) Meters are skipped if no one is home, and usually read at the next cycle

Table E-1.6 Typical Number of Data Entry Errors Found by Consumer Affairs Directorate

Meter District	No. of bills	Average No. of Days	Average Bills per Day	No. of Errors	% errors
Mohaireen	13.813	15	001	67	300F ()
Kaboun	5357			5 11	0.24%
Sarouja	14,134	ิส	102	33	
kanawat.	15,894	36	4	5	
Moukhaiam	18,171	10	1 817	117	0.64%
			· · · · · · · · · · · · · · · · · · ·		

Table E-1.7 Number of Unpaid Bills per Billing Cycle

Cycle No.	Quarter	No of Bills	Value	No of Bills V	Value	% of bills %	% of value
. 258	3/3/94	227,866	59,462,182	5,340	2,101,715		3.5%
259	6/30/94	227.486	70,927,374	6,618	5.153,578	2.9%	7.3%
8	9/30/94	231,022	70,537,444	152.6	3,821,326		5.4%
261	12/31/94	230,726	59.172,318	11,117	4,797,281	. :	8.1%
total 1994		917,100	260.099.318	32.329	15,873,900	3.5%	6.1%
262	3/3/95	233,461	59,315,485	12,416	4,880,159		8.2%
263	6/30/95	232.874	61,238,150	13,811	172,593,971	5.9%	10.8%
75	9/30/95	235,438	60,295,408	16.014	6,292,413		10.4%
265	12/31/95	235.017	52,840,099	23,751	7,855,191		14.9%
total 1995		936,790	233,689,142	65,992	25.621.764	7.0%	11.0%

(1) = unpaid bills as of May 31 1997

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Table E-1.8 Existing Government Unified Accounting System (expenditure account code structure)

			Existing account code structure	
Main	sub-	sub-		
account	account		Description	
12	:		Fixed assetts	
12	121		land	
· ·	121		buildings	÷
	122		equipment	
	123		transport	
	125		teols	
	125	•	office fumiture	2.1
31			wages/salary	
51	· · ·		ages salary	<u>-</u> -
	31.1	21.11	basic	4
			holiday wages	
			overtime	
		- 31.14		
			encouragement bonus	16
	· · ·	31.16	production bonus	`
	312		non-monetary advantages	
1.11	313		special insurance	
<u> </u>	314	·	social insurance	
32			Raw materials used in production of manufactured goods	
	321		basic	
		3211	chlorine	
	322		secondary	
	323		fuel & oil	. 1
5 T	324	а 1 — А	tools & spare parts	
	325		not used by DAWSSA	
÷	326	1	not used by DAWSSA	
	327		stationary, books printed materials	
	328		not used by DAWSSA	:
	329		ethers	· · · · ·
33			Contract Services	
 + +1 	331	•	contracted maintenance	
1.14	332		not used by DAWSSA	1.1
	333	1	not used by DAWSSA	1
1. t	334		public relations, advertising, entertaining	: -
	335		transport	
n de la composición de	336	1	equipment & transportation rentals	÷ .
1	337		Power & water	
	338		mail, cable, telephone, telex, etc	1.
	339	· · ·	miscellaneous service expenses	
34			Purchases for resale	
in an	3.11		service connection materials	
35			Hyed costs	1
1	351		taxes & stamp duties	, · ·
1. A.		 		
	352		depreciation	
· - 4			buildings	÷ 4.
			machine	
			tools	ļ
			office assets	4
	353	ŧ	rents	
36	<u></u>		Special expenses	
	363		damoge claims	
	365	Į	outsanding debts	:
	367	:	retiring allowance	
	367		real estate tax	÷.
	368		income tax from previous years	
	1 505	1	payente avriant presidente store	





Table E-1.9 (1/2) Existing computer equipment inventory

Qty. Users Function		1 Network No. 1 network file server	4 Computer Section, Special Studies Direct. distribution network database	1 Water Measurement Section spring & wells, daily discharge database	1 Environment Directorate chemical & bacteriological tests database	I Telecom. Section telephone switchboard	I Production Directorate production center assets database	1 Main Project Directorate spring discharge database & forecasting	1 Planning Directorate statistics	1 Server console	1 Distribution Directorate	2 Accounting Directorate customer information, metering & billing data	1 Accounting Dept.	1 second network network file server	6 Computer Section, Accounting Directorate Billing		1 Accounting and Materials Inventory program	1 Computer Section, Special Studies Direct. application programs	1 Computer Section, Special Studies Direct. Plot distribution network plans	
Hardware		Bull DPX2000	Monochrome CRT	Monochrome CRT	Monochrome CRT	Monochrome CRT	Monochrome CRT	Monochrome CRT	Monochrome CRT	Monochrome CRT	Monochrome CRT	Alis 4440 line printer	Alis 1020 dot matrix	Bull DPX2000	Monochrome CRT	Monochrome CRT	Monochrome CRT			Calcomn diminar 053 No
Item Location	No.	1 Accounting, 6 floor	12 4 floor	1b 3 floor	1c 3 floor	1d 3 floor	le 1 floor	1f 2 floor	1g ground floor	1h 6 floor	li 1 floor	1j Accounting, 6 floor	1k Accounting, 6 floor	2 Accounting, 6 floor	2a 6 floor	2b 6 floor	2c 5 floor	2d Computer Section, 4 floor Alis 1020 dot matrix	2c Computer Section, 4 floor Calcomp plotter 10255E	21 Commuter Section 4 from Calcomn dimitizer 052060

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Table E-1.9 (2/2) Existing computer equipment inventory

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Item Location			Personal Computers		Software	Penpheral Devices
	Name Brand	Processor	Hard Disk	Drives		
3 laboratory	Gateway	DN2, 66MHZ, 8 MB KAM	730MB	8X CD ROM, FD 3.5	sampie analysis database	unk jet printer
4 telephone operator	Samsung	DX4, 100X242, 12 XB RAM	850 MB	8x CD ROM. FD 5.25 & 3.23	3.23 telephone number records	dot matrix printer
5 Planning Directorate	Namsung	DX2. 66MHZ. 8 MB.XAM	3-40 MB	8X CD ROM HD 5.25 & 3.2	XX CD ROM, HD 5.25 & 3.25 Excel and Winword, work processes	laser printer
6 Planung Directorate	Phillips	Pentum, 133 MF4. 22 MB RAM 1.7 GB	1.7 GB	10x CD ROM. HD 3.5	Excel and Winword, statistical tables, reports	-1-1
7 Main Projects Directorate	Samsung	CYTIX 436, 87 MHz, 8 MB RAM 259 MB	250 MB	6x CD ROM. HD 3.5	Excel, daily discharge from wells & springs	izk jet printer
8 Main Projects Directorate Philips	Philips	Pentium. 133 MHz. 22 MB RAM 1.7 GB	(117 GB	10x CD ROM, FD 3.5	Excel, statistics for wells & spings	scamer. A4 size
9 Water Resources Directorate Phillips	Phillips	Pentum, 133 M4L, 22 MB KAM 1.7 GB	(1.7 GB	10x CD ROM, HD 3.5	program for well & spring measurements	laser printer
10 Telecom Section	DTC (local)	Pentium, 133 MMz, 32 MB XAM 1.6 GB	1.6 GB	12X CD ROM, FD 3.5	SCADA programs	ink jet prater
11 Director General				10x CD ROM, FD 3.5	typing admin. orders and tables. archiving	lak jet prister
ctorate			5	FD 3.5 & 5.25	materials accounting program	dot matrix printer
13/Finance Directorate	Samsung		250 MB	PD 3.5 & 5.25	Excel & Windows, tables, bonus pay	dot matrix printer
14 Finance Directorate	Phillips	Pentium, 133 MHz. 22 MB RAM 1.7 GB	1.7 GB	10x CD ROM, PD 3.5	Excel & Windows, tables, bonus pay	ink jet pointer
15 Studies/works Directorate	Acer	DN2, 66MF42, 16 MB RAM	1 GB & 540 MB	AX CD ROM. FD 3.5 & 5.25 structural analysis program	structural analysis program	dot matrix printer
16 Studies/works Directorate	Samsung	DN2, 66 MHz, 8 MB RAM	340 MB & 250 MB FD 3.5 & 5.25	FD 3.5 & 5.25	AutoCad. Word. Excel	laser printer
17 Studies/works Directorate	Phillips	Pentum. 133 MHz. 40 MB RAM 1.7 GB	(1.7 GB	10x CD ROM, FD 3.5	scan small drawings and use AutoCad	ink jet printer, scamer A4 size
18 Studies/works Directorate	Phillips	Pentium, 135 MHz, 40 MB RAM 1.7 GB	(117 GB	CD Read & Write	scan large drawings and use AutoCad	plotter, scanner A0 size
19 Studies/works Directorate	assembled by DAWSS/Pentium. 200 MHz.	/Pentum. 200 MHz. 32 MB KAM 2 GB	(2 GB	10x CD ROM, FD 3.5	distribution system drawings, AutoCad	ink jet printer & disturer
20 Studies/works Directorate	Skher	DX 33 MHL, 4 MB RAM	850 MB	FD 5.25	Excel and Winword for reports	

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Functional Areas Administrative Services Distribution Network Production Centers Customer Service Human resources Engincering Accounting Finance Applications Ο \bigcirc Ο Ο Ο \bigcirc Ö \bigcirc Office automation Ο O Ô Ο Budgeting Ο \bigcirc Ó Meter Reading Ó, \bigcirc Õ Billing Ó \bigcirc \bigcirc Customer Information 6 General Ledger Ο Cost Accounting О. Q **Expenditure** Control Ō Cash Management Ó **Inventory Management** Ó Ô Purchasing O. \bigcirc \bigcirc Project Management Ο \mathbf{O} Ο O Laboratory Information Ο Ο Production Operations O Ó \bigcirc Ο Õ Maintenance Management Ο 6 \bigcirc Human Resources Management OΟ \bigcirc Ο Geographic Information Ō \bigcirc Ο Ó **Computer Aided Drawing**

Table E-1.10 Computer Application Needs and Status of Development

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Partially Developed

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Table E-2.1 Staffing Requirements for Information Technology Directorate

n Operating and maintaining CIS & Billing production, printing & ex Billing data transfer and managet follow-up exception reports coordination with cashiers coordination with cashiers Managing of CIS and FMIS appl r Network Administration r Data communications support SC an SCADA applications developme cian hardware maintenance, and user	Number of Staff	C 3		2	4				or suppor	++4 		0	technolog 2		
	Rolc	perating and maintaining CIS & FMIS, database, backups		lling production, printing & exception reports	lling data transfer and management	llow-up exception reports	ordination with cashiers	eveloping office applications & providing users with support	anaging of CIS and FMIS applications and development, use	etwork Administration	ata communications support SCADA, LAN & WAN	DADA applications development	CADA support and maintenance, Instrumentation & control	rrdware maintenance, and user support	
	Staff Position	DAWSSA HQ Operator	and a second		Operator	Clerk	Clerk	Technical Services Group DAWSSA HQ System Engineer	System Engineer	а. 1		Systems Engineer S	[

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Table E-2.2 Improved billing schedule (option 3c)

Math Eiger Da. Verty k. Produce Bills Solution Address Allands Produce Bills Solution Address Allands Texture Bills Address Allands				-	Consumer	Communer Affairs Directorate	ſ	L			Accounting Directorals	y Director	âir Bir		ſ	L_		Consumer At	Affairs Directory		
Market Value Market Market </th <th>ľ</th> <th></th> <th></th> <th>Ī</th> <th></th> <th></th> <th>1</th> <th>ł</th> <th></th> <th></th> <th>14-14</th> <th></th> <th></th> <th>-</th> <th>Ŀ</th> <th></th> <th>Contraction of the second s</th> <th>At Commence</th> <th></th> <th>1.</th> <th>1. 1. 1. T</th>	ľ			Ī			1	ł			14-14			-	Ŀ		Contraction of the second s	At Commence		1.	1. 1. 1. T
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Maturelly Lobelly			B- DAWSSA					-													
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All-Burger Columbia	NO.	sherrern -	Moharreen	0.00	18-Aug-96	1		11	1	8 0	Y		1-140-97	2-Jan-97		ñ	4 Jan. 97	19. Jan. 97	15 1 2	26-140-97	161
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Table E-2.3 Improved billing schedule (option 3d)

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CC Tabula	Tabela	2.806	23-Sep-M	1-04-5	3	14		1-Nov-96:	-11			2-Dec-96	13	12	9-Dec-96	9-Dec-96	0	0	9-Dec-94	F
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Note: 1. Deyre = calendar daye, seven calendar daysmax working dayr. I dayr. Kô work days 2. Ruir have not been delivered to collecuon centre se of June 9 1997, but meters have been mad for next billing cycle. 3. Tune from last meter reading to bull ustrad to collecuon centre

Table E-2.4 Improved billing schedule (option 3c)

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bit bit Solution Solut	23-Sep-96 2	30-Sep-96 0 0	30-Sep-96
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Kalveur S.442 17.Oct.56 29.Oct.56 12 31.Oct.56 10.0ct.56 20.Ner.56 11 7 Polati 2.30 2.00 2.30 3.30 2.30 3.30	3-Nov-96 01 7	0	10.Nor-96
Joular 9.001 17.Sep-96 5.Oer-96 14 2 7.Oer-96 14 2 19.Oer-96 14 0 15.Nor-96 2.Oer-96 14 7 7 ann Modersourd 18/13 11.5.Nor-96 17 2 5.Der-96 1 0 17.Nor-96 1 7 A. Modersourd 18/13 15.Nor-96 1 2 16.Nor-96 1 7 B. Al Antimer 9.302 21.Oer-96 1 2 15.Nor-96 1 7 B. Al Antimer 9.302 31.Oer-96 1 2 17.Nor-96 1 7 7 B. Modersourd 9.302 14.Nor-96 1 0 15.	1 1	0	8. vov. 8
Tabla 2x05 2x56p-36 17.0er.96 24 2 19.0er.96 20.0er.96 26.0er.96 26.0er.96 26.0er.96 27 an1 ^m Moudhamm 18/03 13.Nov.96 13.Nov.96 17.Nov.96	· · · · · 4 7	19-Oct-96 0 0	19-061-96
ann ^a Moudhainn 188(3 13, 13, 14, 16, 16) 3, Dee 96 6, Dee 96 6, Dee 96 1 7, Dee 96 7, 0, Dee 96 7,	۔ دو	2-Nov-961 01	3-3X-3
A. Xuferrouse 4.300 DuOor.56 Lá. Nou-56 D. Nou-56	4 (1) starting	14.Dec96 14.Dec96 01 0	14-Dec-96
B-M Admine B-M Admine 9.332 31-004-36 15-Nov-56 23 17-Nov-56 18-Nov-56 11 0 18-Nov-56 20-Nov-56 23 7 4 4 4 4 4 4 5 4 5 5 2 4 4 5 5 2 4 4 5 5 5 4 4 5 5 5 5	12 Developed	0	-25-Nov-84
are ¹ . A member 9332 31.0et.96 15.Nov.96 18.Nov.96 18.Nov.96 11 0 18.Nov.96 20 7 1 20.Nov.96 20 7 1 20.Nov.96 20 Nov.96 20 No			
B-Marenaere 9,099 14-Sep-94 2.0er-96 1K 2 4-0er-96 5.0er-96 7.0er-96 7.0e	20.Nov-96	27.Nov-96 27.Nov-96 0 0	37.Nov-961
A A bard			
		14-04-56 14-04-56 0 0	1400.%
Total 225,944 Average 20 2 Average 1 0 Average 20 2 1	c 4	Averange 0 0	Avenage

Note 1. Days = calmodar days seven calendar daysest working days. 1 days : 86 work days 2. Bits have near days asven on collection centrer as of Jure 9 1997. But meters have been read for sort billing cycle. 3. Thus from hast meter reading to bill reased to collection centre 4. A veragest are for completing one dartnet ł

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Table E-2.5 Cash Flow Comparison (existing vs. 4 month cycle)

		I	Existing (billing r	10. 269)	Pr	oposed 4 month cy	rcle
Month	Week	Bills issued	Value ^{oj}	Cumulative	Bills issued	Value ⁽⁰⁾	Cumulative
1	1				16,127		******
	2		· · · · ·		18,813	7,525,200	7,525,200
	3				15,987	6,394,800	13,920,000
	4	38,149	15,259,400	15,259,400	37,743	15,097,200	29,017,200
2	i				1,001	400,400	29,417,600
	2		44 1				29,417,600
	<u></u> 3	9,094	3,637,600	18,897,000	42,511	17,004,400	46,422,000
	4				14,241	5,696,400	52,118,400
3	1	16,786	6,714,200	25,611,200			52,118,10
	2	21,735	8,693,800	34,305,000	34,541	13,816,400	65,934,80
	3	,					65,934,80
·	4	29,304	11,721,400	46,026,400	2,826	1,130,400	67,065,20
- 4	1	28,575	11,430,100	57,456,500	14,509	5,803,600	72,868,80
	2				3,012	1,204,800	74,073,60
	: 3				26,933	10,773,200	84,846,80
1	4						81,816,80
5	···· ···· ···· ·		·····		16,127	6,450,800	91,297,60
•	2				18,813	7,525,200	98,822,80
	3	18,908	7,563,200	65,019,700	15,987	6,394,800	105,217,60
	. .	10,200			37,743	15,097,200	120,314,80
6		· · · · · · · · · · · · · · · · · · ·	÷		1,001	400,400	120,715,20
÷.	2	52307	20,922,800	85,942,500	.,		120,715,20
	3		20,722,000		42511	17004400	137,719,60
	1				14241	5696400	143,416,00

400 SL

(1) average increed bill =

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Collection Center						ľ														
	Meter		- Month I			C THUNK	*		Menall	а Э.С. 4 С. 4	· · · ·	Aonth 4	7 		N Ke	Monda 5		Monb 6 3 3	1	Totale
No. Name	VV.																			
i Numer				166	-	s .		-	•		-			-	* 4		-	-		1995
2 Bab Massla	7.4			• •						13, X65			-+	•				-		13,465
A paser ALAb		-		K KOV									_	-			- {			2
4 Al Sibley	-					- -	4 0 km					_		-	-		- -	_		ğ
5 Mobulreen	<u>ຄ</u>								i Z						~ +		-			8 <u>3</u>
6 AI Shapour	× 13		_		-			5					-+						-	6.074
Rephded St	×	-						1.01							-	-			-	2
Bab Touma	1 8.9.10			-			-			-	tess.	-			-			-	.	<u>}</u>
9 Aberyo	01'X'			-							1 5.574			:	-			-	~	5.5
10 Bara	51.21							2	3.012		-									10.14
11 Al Amer							-	-+-	-		10.01		_	-		1	-		-	
Merze	16.21	++ > +		* •				•					-					12.730		
B Methe 2	2	<u>.</u>		-			-	-					Ŧ	-				8,064 -		x
14 Doumar	N 11			•	4									-		-	4	12,701	-	1 10.7
Keboun	8			•							-		₹ \$	5,492	-					5
16 Joubar	5				-		-				104.4					-	-			9.8
17 Tebala	1			•	- 24				-	ů A	9	-								ř4
1X Mouldhaim			_														 	18,413		18.81
19 Kaferrouseh	[-	11.11		-	4,605	\$:					 			4 666
Rocken Al Den	1.26		-	0071	-				-	-	-	-	· -	 	 				-	4
			-	(-		-								 		1X 908				18.9
			,	104 12	•	5	- 1006	036-52	25.9501 21.735	256.10	64. 00 LEA		161'5 1	,	•	NOX.	, 	· 22.407	-	207 413
Feer Moath Billing Cycle	Svele					C direction							•						ĺ	
	District	-		4		WORD -	7	- 		~		COLORY C	1. 		1	11 1		Mondu e 1 3	7	Totals
Name	ų.									the second second	÷	•								
Kanawat			35.0			:		-	-		-		_			えらい				15.987
2 Bab Massia						÷	6.294		1.5.1							-	-	6.034		ន
3 Al jeser Al Abid	3.5		•	80X 8					-		-					X	× × 03			17.615
4 AI SIDKey	\$ 		-	10.6		-										16	 3			2
Mohajreen	8 2				145				007 -			-	_						5	
O AL MAPOUT		-			Ŕ		- ţ.										8		5.574	
V Deptroment	0.00	-					24		- -		-							2	121-2 4	
V About	110103					-	12.5				264			-	-					
																				j
5/DC 01						- -					-	210.0	141						-	
		1				-							2							
1 22.00				•				•	. .		•			0.0		-	-	-		2
14 Downse	21 21		-		.							-	102.5					-	- -	
15 Kaboun	0										5.05			-			-			
16 Joutar	a			-					10 6		-		.	-	-		-			
17 Tabula										- 5X5	2									
Mouldheam	ព		18,813		 						.				18.813			-		1
19 Katersousch	24.25					÷	:		1				1911							ĩ
20 Kocken Al Dem	- 1	_	÷	16,547		-	-		8			_	۷.		_		16.547	,		37,893
		_														Ĺ				

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	***	*			 A 100 Automatic 			
Tablé	E-2.7	Impact of 4	month bi	illing cyc	he on pa	ayment (conection	centers

Collection Center	Meter			Required	l staffing		Existing	Recommende
	District	Peak		minutes per	transaction		staff levels	No. of
No. Name	No.	Trans/week	2	5	10	15		Cashiers
1 Kanawat	1	906	1	2	-1	6	1	
2 Bab Masala	2,14	1,571	ł	4	7	11	1	
3 Al jeser Al Abid	3,5	998	1	2	5	7	1	د : د :
4 Al Sibkey	6	1,030	1	2	5	7	1	
5 Mohajreen	7,26	2,121	2	5	10	15	1	
6 Al Shagour	8,13	688	1	2	3	5	2	
7 Baghdad St	8,15	1,438	1	3	7	10	2	
8 Bab Towna	8,9,10	631	1	1	3	4	1	
9 Abasyin	8,9,10	631	1	1	3	4	1	
10 Barza	12,19	1,155	1	3	5	8	2	
11 Al Ashmar	14,24	1,135	1	3	5	8	1	
12 Mezze 1	16,25	1,442	1	3	7	10	1	
13 Mezze 2	16	914	· 1	2	4	6	1	
14 Doumar	17,18	1,439	1	3	7	10	1	
15 Kaboun	20	2,419	2	6	11	17	1	
16 Joubar	21	1,110	1	3	5	8	1	
17 Tabata	22	320	1	1	1	2	1	
18 Moukhaim	23	2,132	2	5	10	15	1	
19 Kafersousch	24,25	806	1	2	4	6	1	
20 Rocken Al Deen	4,26	2,419	2	6	11	17	1	
11.Q.	1,5,13,15	2,142	2	5	10	15	3	
	<u> </u>	27,448	26	64	127	191	26	5

For collection center with only one metering district

Transactions per day during peak week Tpk =0.65% x Nb1 +2 x (0.10 x Nb2/40)

where Nb1 is the number of bills issued during the current period

and Nb2 is the number of bills issued during the previous billing period

- assuming Nb1 = Nb2, and 15% uncollected bills
 - then Tpk = $0.1133 \times Nb1$

For collection center with more than one metering district

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Transactions per day during peak week Tpk =0.65/6 x(Nb1.1+Nb1.2) +2 x (0.10 x (Nb2.1+Nb2.2)/40) where Nb1.1 is the number of bills issued during the current billing period for the first district and Nb1.2 is the number of bills issued during the current billing period for the second district Nb2.1 is the number of bills issued during the previous billing period for the first district Nb2.1 is the number of bills issued during the previous billing period for the first district

and Nb2.2 is the number of bills issued during the previous billing period for the second district assuming Nb1 = Nb2, and 15% uncollected bills

then Tpk = 0.1133 x (Nb1.1 + Nb1.2)

Available working hours = 6 days per week x 6 hours per day = 36 hours per person per week; therefore

144 number of transactions per person per week based on 15 minutes per transaction

216 number of transactions per person per week based on 10 minutes per transaction

432 number of transactions per person per week based on 5 minutes per transaction

1080 number of transactions per person per week based on 2 minutes per transaction

Table E-2.8 (1/2) Cost Accounting Example Using Existing Unified Accounting System

lain cost			Decidition
de	Cost code Sul	b-account structure	
		L	Production centres
	5100		Production directorate
	L	5101	Figeh & side springs
	ſ	5102	Barada
		5103 to 5129	Other springs (open separate accounts for individual springs if needed)
		5130 to 5150	Other wells (open separate accounts for individual wells if needed)
		5150 to 5199	reserved for future use
	5200		Distribution directorate
		5201	Network maintenance
		5210 to 5230	Pumping stations (open separate accounts for individual pumping stations if required)
		5231 to 5299	
	5300	1	Standby wells directorate
			Production Service Centers
	6100		Planning and statistics directorate
	6200		Water resources directorate
	6300		Environment directorate
	6400		Water quality directorate
	6500		Major projects & studies
11	6600		Maintenance directorate
		6610	Maintenance directorate (bldgs. & grounds)
1.1		6620	Maintenance directorate (vehicles)
- 1		6630	Maintenance directorate (electrical)
		6640	Maintenance directorale (mechanical)
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			
			Marketing (le. Consumer Services)
	7100		Consumer section
1			
	7100		Metering section
	7200	_	
			Service connections section
	7300	: <u></u>	Service connections section
· .	7400		Meter repairs/maintenance section
· · ·	_		
			Finance & Administration
وي المحمد ال	8100		Finance Directorate (less stores & salary section)
	8200		Administration Directorate (plus salary section)
		ii	
	8300		Accounting directorate (less materials inventory section)
	8100		Materials Management (finance + accounting)
	 -		Capital Projects
) arata analatar			
	9100		use as required

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Table E-2.8 (2/2) Cost accounting example using existing unified accounting system

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		n an		New cos	t accounting code
Malo					
cost	Sub cost				
code	code	Description			
				je stan se	
5.1		Production			
	5,102	Barada Spri	ngs		and share for a state from the second the black of the state of the st
			y.,		Existing account code structure
		Main			Desidentia
		account	sub-account	sub-account	Descaption
		5.102.12			Fixed assetts
			5.102.12.1		land
			12.2		buildings
			12.3		equipment
			12.4		transport
			12.5		tools
			12.6		office furniture
		5.102.31			wages/salary
	1		5.102.31.1	÷	
				5.102.31.11	basic
				31.12	holiday wages
				÷	overtime
				•	not used by DAWSSA
					encouragement boaus
			1		production bonus
			5.102.31.2	1	non-monetary advantages
				• • • • •	special insurance
			31.3	E the second	
			31.4		social insurance
		5.102 32			Raw materials used in production of manufactured goods
			5.102.32.1	4	basic
				5.102.32.11	chlorine
÷		1997 - B.	5,102.32.2		secondary
		-	32.3		fuel & oil
			32.4		tools & spare parts
			32.5		not used by DAWSSA
	1.1	· .	32.6		not used by DAWSSA
			32.7	1	stationary, books, printed materials
			32.8	<u> </u>	not used by DAWSSA
		1 1 1			others
,	이는 것이?	5.102.33			Contract Services
	1.5	5.102.35	\$ 102.33.1		contracted maintenance
	5		4		not used by DAWSSA
	· · · · ·		33.2		
. :			33.3	1	not used by DAWSSA
z = t		1	33.4		public relations, advertising entertaining
:		a E	33.5		transport
•	1		- 33.6		equipment & transportation rentals
		· ·	33.7		Power & water
			33.8		mail, cable, telephone, telex, etc
			33.9	1	miscellaneous service expenses
	$(k_{1},k_{2})\in K_{1}$	5.102.34	1	[Purchases for resale
		l tra a la	5.102.34.1		service connection materials
		5.102.35			Fixed costs
	1.1.1		\$.102.35.1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	taxes & stanip duties
	1.1	I 1	35.2		depreciation
· .	~ 18년 문		1	2	buildings
					machine
				1 .	tools
		1		•	office assets
				1	
			5.102.35.3	1	rents
		5.102.36			Special expenses
		1	5,102.36.3	i .	damage claims
			36.5		outsanding debis
		1	36.7		retiring allowance
			36.8		real estate tax
		1	36.9	ŧ	income tax from previous years

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Table E-3.1 Number of Workstations Required at Remote Sites

Collec	ction Center	Meter				
		District	Cashiers	Customer Service	Meter	Service Connection
No.	Name	No.		representatives	repairs	Inspection
	1 Kanawat	- 1	2		······································	
	2 Bab Masala	2,14	3			
	3 Al jeser Al Abid	3,5	2			
	4 Al Sibkey	6	2			
	5 Mohajreen	7,26	4			
	6 Al Shagour	8,13	2			
	7 Baghdad St	8,15	3			[
	8 Bab Touma	8,9,10	1		· · ·	· · · · · · · · · · · · · · · · · · ·
	9 Abasyin	8,9,10	1			-
	10 Barza	12,19	2	2	1	
	11 Al Ashmar	14,24	2			
	12 Mezze 1	16,25	3	2	1	
1.1.1	13 Mezze 2	16	1	1	1	
	14 Doumar	17,18	3			
	15 Kaboun	20	5			
	16 Joubar	21	3			
	17 Tabala	22	1	3	1	
·	18 Moukhaim	23	4			
	19 Kafersouseh	24,25	1			ε
	20 Rocken Al Deen	4,26	5			
II.Q.		1,5,13,15	4	5	1	
Fotal	number of cashlers	h v 100000 o ones e sec est a la	54	13	5	
Total	number of customer s	ervice workstat	lons	26		· · · · · · · · · · · · · · · · · · ·

each cashier = 1 workstation

each customer service representative = 1 workstation each service connection inspector = 1 workstation

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Table E-3.2 Equipment and Hardware Requirements

Remote Payment Collection Centers

Equipment		Punction	Quantity
Server (PC)	CPU 64 MB, 200 Mhz	for customer information system	20
	X25 card	for commnications with WAN	
	Ethernet card	for LAN	
	Hard Disk, 4 OB	storing data and processing applications	
Printer	laser	for printing bills	20
	laser	for printing forms and reports	26
Workstations (PC)	CPU 32 MB, 166 Mhz	eashiers	54
·	Hard Drive 2 GB		
Workstations (PC)	CPU 32 MB, 166 Mhz	for customer service representatives	21
	Hard Drive 2 GB		
Workstations (PC)	CPU 32 MB, 166 Mhz	for meter repair crews	5
·	Hard Drive 2 GB		
Bar code seanners	pen laser	for reading bar codes on bills	67
UPS	5 KVA, 15 min battery,	power supply & transient protection	20

Computer Center at Headquarters

Equipment	T	Function	Quantity
Server (PC)	CPU, 128 MB, 200 Mhz	for CIS and FMIS (redundant configuration	4
	Exhernet card	for LAN	
	Hoppy drive	for information transfer	1997 - 19
	Hard Disks 4 GB x 2	storing data and processing applications	
	Гаре Васкир	backing up & restoring files	1
Secondary Storage	Hard Disk, 4 GB x 2	on line data storage for 1-MIS	1
	Optical disk, 16 GB	on line data storage & retrieval for CIS	l
Printer	lascr	for printing forms and reports	2
Printer	line, high speed	for printing bill statements	2
Workstations (PC)	CPU 32 MB, 166 Mhz	system operators	2
	Hard Drive 2 GB		
	Hoppy Drive		
Workstations (PC)	CPU 32 MB, 166 Mhz	network management	1
	Hard Drive 2 GB		
	Floppy Drive		
UPS	5KVA,1/2 hour battery	power supply & transient protection	· 1

DAWSSA Headquarter LAN

Equipment		Function	Quantity
and a second			
Network Server (PC)	CPU 128 MB, 200 Mhz	Novell Netware, newtwork management	1
·	X25 card	for commnications with WAN	
<u>+</u> +,	Ethernet card	for LAN	
······································	Hard Disk, 8 GB		÷
HIDET's	portable data entry terminals	to input meter readings	35
Scanner	high resolution, A4 size	to digitize customer file documents	1
Printer	laser	for printing forms and reports	21
Workstations (PC)	CPU 32 MB, 166 Mhz	miscellancous users	-46
·	Hard Drive, 2 GB		
	Hoppy Drive		
Network	10 MBos, Ethernet co-ax bus	headquarters PCLAN	1

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Table E-3.3 Computer Hardware and Software Needs at Headquarters "

Nection/Department	Location	W T3UN	ork - Printen	Work - Printers Application software	Function
		ie.	Stations		
Contemer Affairs Directorate					
Consumer Affairs Director	Headquarters ground floor	;	-	1 CIS & FNUS	budget preparation and cost control
Meter Reading Section	Headquarters, basement	30		1 CTS	enter consumption data, prepare service requests for failed meters
Service Connections	Headquarters basement		4	1 CIS	obtain requests for service connections and issue notices to customer
Service Disconnections	Headquarters basement	S.	1	1 CTS	obtain requests for service disconnections
Consumer Accounts Department	Headquarters basement		- 3	-1 CIS, Document Management	to manage customer information and files
Figance Directorate					
Finance Director	Headquarters 6 floor		1	1 CIS & FMIS	budget preparation and cost control
Cash Collection Department	headquarters, basement		1	108	follow up late payments, delinquent accounts.
Cashier Audit Section	Headquarters, side building		3	1 CTS	audit cashiers
Ordinary Budget Section	Headquarters, 5 floor		3	1 FMIS	monitor expenditures against budget
Investment Budget Section	Headquarters 5 floor		c 4	1 FMIS	monitor expenditures against budget
Budget Department	Headquarters 5 floor		- 2	1 FMIS	prepare budget. & generate monthly budget reports
Treasury Department	Fleadquarters		1	1 FMCS	cash management and forecast treasury forecast
Payroli Department	Headquarters S floor		3	1 FMCS	prepare monthly payroll
Accounting Directorate					
Accounting Department	Headquarters S floor		9	1 CIS & FMS	general and cost accounting, monthly financial reporting
Accounting Director	Headquarters 5 floor		1	1 CIS & FMIS	budget preparation and cost control
Materials Accounting Section	Headquarters 5 floor		3	1 FMBS	materials accounting
Planning Directorate					
Planning & statistics	Headquarters, old building, ground floor		63	1 CIS & FAUS	prepare investment budget monitor performance and trends
Special Projects and Studies Directorate					
Stores management department	Headquarters. floor		4	1 FMIS	control stores inventory
	-Headquarters, 4 floor		1	CIS & FAIDS	budget preparation and cost control
Others			•	CIS & FMS	
Director General			1	1 CIS & FAILS	
Production Director			1	1 CIS & FMIS	budget preparation and cost control
Distribution Director		· · · · ·	- 1	1 CIS & FMIS	budget preparation and cost control
Total		35	46 2	21	

Daturcluding computer conter requirements
 all workstrations should have word standard office application software

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Table E-4.1 Budget Estimates for Consultancies and Software

1.667.500	1,320,000	:	27,500		120,000				
					E .				
000'076	800,008	3	1	•		L	8.000	FMIS & CIS development	Consultancy No.2 (4)
000.042	2-00,002	2	1	••••••••••••••••••••••••••••••••••••••	2 1 1 1	4	000 11	Short term experts	Consultancy No.1 ^(b)
200.014	000'0/ 7	9		- 140 (* 1	•	•	15,000	Project Management	Consultancy No.1 ⁶⁹
200,010		(¢	•			•	10,000	Kodak	Document management system
41,200		•	005-1	3	40,000	80	85 87	MicroSoft Office	Application software
	•	•		,	40,000		5.08 15	Novell Netware	Network software for LAN
000.1		•	1500	m	000.01	80	8 <u>8</u>	DOS Windows	Operating System for workstation
22.1	1		85		1		200	C†	Compiler
00000	•	-	10,000	•	45,600	8	570	Oracle DBMS	Database ^{co}
8	4	•	14,000	4	70,000	50	3,500	DOS	Operating system
	Price	ġ	Price	Qrv.	Price	Orv.			
Total	Headquarters	Hcad	Computer Center	Compu	Remote Sites	Remo	Unit price ⁽¹⁾		Item

All prices in US S, including taxes; supplied by local vendors
 database costs include fixed cost of \$10,000 + \$570 per workstation
 unit cost is in USS per Man-month of effort
 assumes most of the work is done through a local consultant

166.750 91.713 1,925,963

Physical contingency (10%) = Price contingency (5%) = Total cost =

Equipment		Function	Quantity	Unit price (US\$)	Total cost
Server (PC)	CPU 61 MB, 200 Mhz	for customer information system	20	15,000	300,000
	N25 card	for commulcations with WAN			•
	Ethernet card	for LAN			-
	Hard Disk, 4 GB	storing data and processing applications			
Printer	laser	for printing bills	20	3,000	60,000
	laser	for printing forms and reports	26	2,000	52,000
Workstations (PC)	CPU 32 MB, 166 Mhz	cashiers	51	2,500	135,000
	Hard Drive 2 GB				•
Workstations (PC)	CPU 32 MB, 166 Mhz	for customer service representatives	21	2,500	52,500
· · · · · · · · · · · · · · · · · · ·	Hard Drive 2 GB				
Workstations (PC)	CPU 32 MB, 166 Mbz	for meter repair crews	5	2,500	12,500
	Hard Drive 2 GB			1.1.1.1.1.1.1	•
Bar code scanners	pen faser	for reading bar codes on bills	67	2,500	167,500
UPS	5KVA, 15 min bettery,	power supply & transient protection	20	7,000	140.000

Table E-4.2 Budget Estimates for Computer Equipment and Hardware

Computer Center at Headquarters

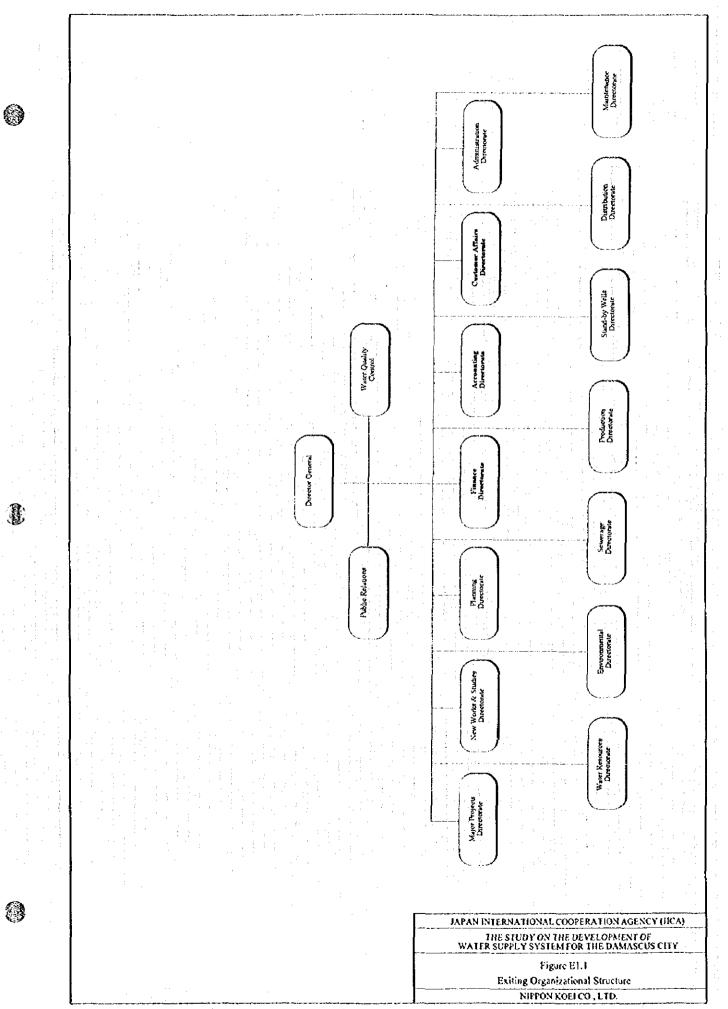
Equipment		Function	Quantity	Unit price (US\$)	Total cost
Server (PC)	CPU, 128 MB, 200 Mhz	for CIS and FMIS (redundant configuration)	4	25,000	100.000
·	Ethernet card	for LAN			
	Hoppy drive	for information transfer			
	Hard Disks 4 GB x 2	storing data and processing applications			
	Tape Báckup	backing up & restoring files	1	2.000	2.000
Secondary Storage	Hard Disk, 4GB x 2	on line data storage for FMIS	1	1,500	1.500
	Optical disk, 16 GB	on line data storage & retrieval for CIS	1	10,000	10,000
Printer	laser	for printing forms and reports	2	2,000	4,000
Printer	line, high speed	for printing bill statements	2	15.000	30,000
Workstations (PC)	CPU 32 MB, 166 Mhz	system operators	2	2,500	5,000
	Hard Drive 2 GB				
	Floppy Drive				
Workstations (PC)	CPU 32 MB, 166 Mhz	network management	1	2.500	2,500
	Hard Drive 2 GB				
	Floppy Drive				
UPS	5 KVA 1/2 hour battery	power supply & transient protection	1	15,000	15,000

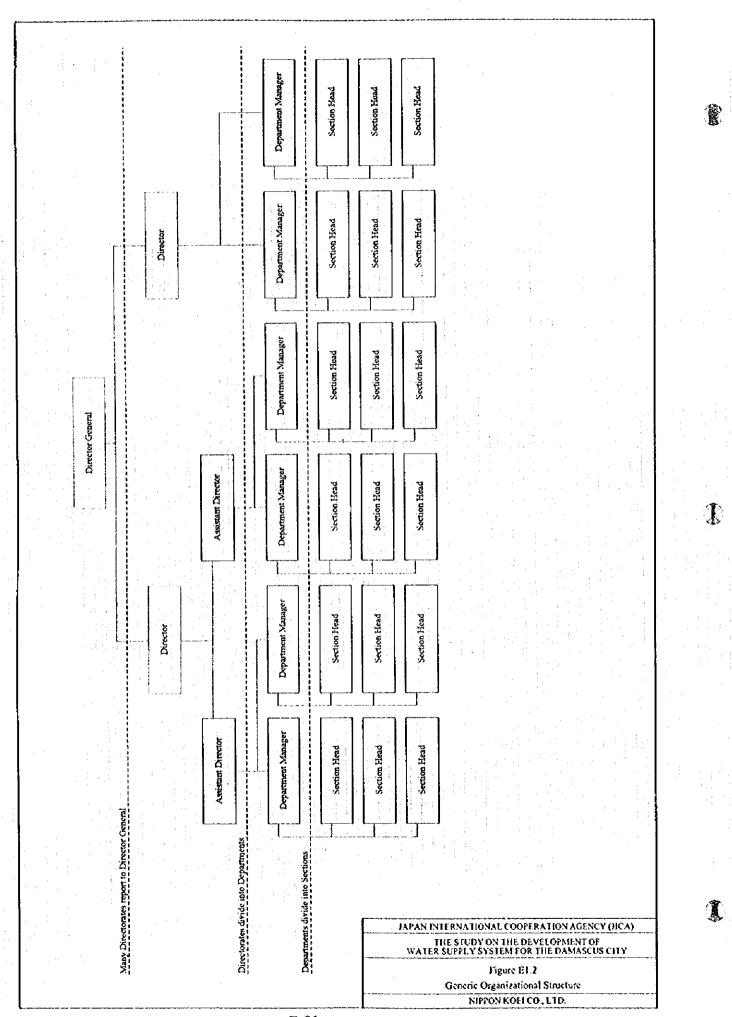
Equipment		Function	Quantity	Unit price (USS)	Total cost
Network Server (PC)	CPU 128 MB, 200 Mhz	Novell Netware, newtwork management	1	25,000	25,000
	N25 card	for commnications with WAN			+
	Ethernet card	for LAN			
	Hard Disk, 8 GB				
HDET's	portable data entry terminals	to input meter readings	35	2,000	70,000
Scanner	high resolution, A4 size	to digitize customer file documents	1	2,000	2,000
Printer	laser	for printing forms and reports	21	2,000	42,000
Workstations (PC)	CPU 32 MB, 166 Mhz	miscellancous users	46	2,500	115,000
	Hard Drive, 2 GB				
	Hoppy Drive				
Network	10 MBps, Ethernet co-ax bus	headquarters PC LAN	i	10,000	10,000

Total hardware cost =	1,353,500	
Physical contingency (10%) =	135,350	
Price contingency (5%) =	74,413	
Total cost =	1,563,293	

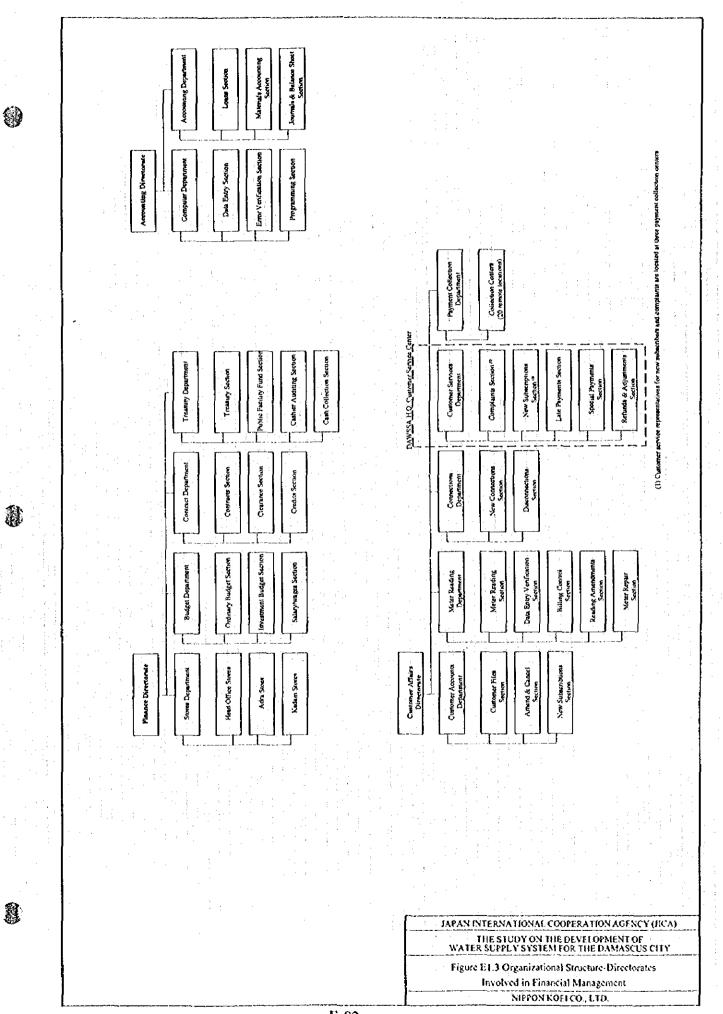
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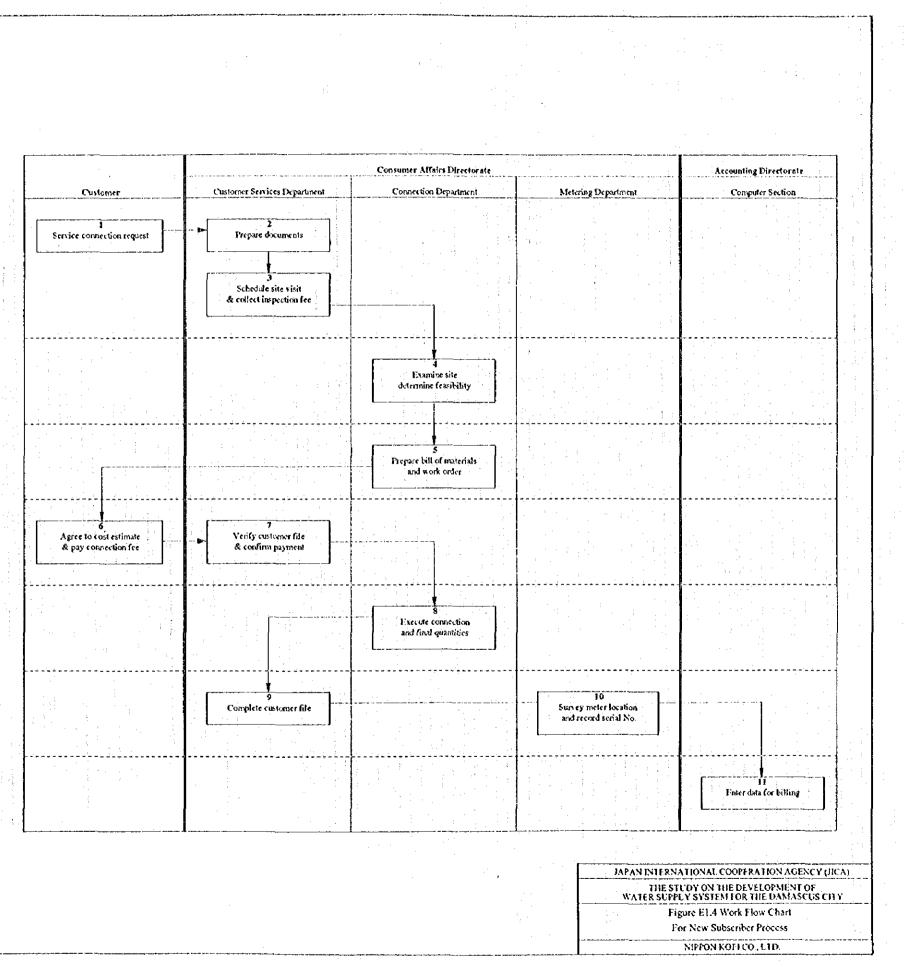




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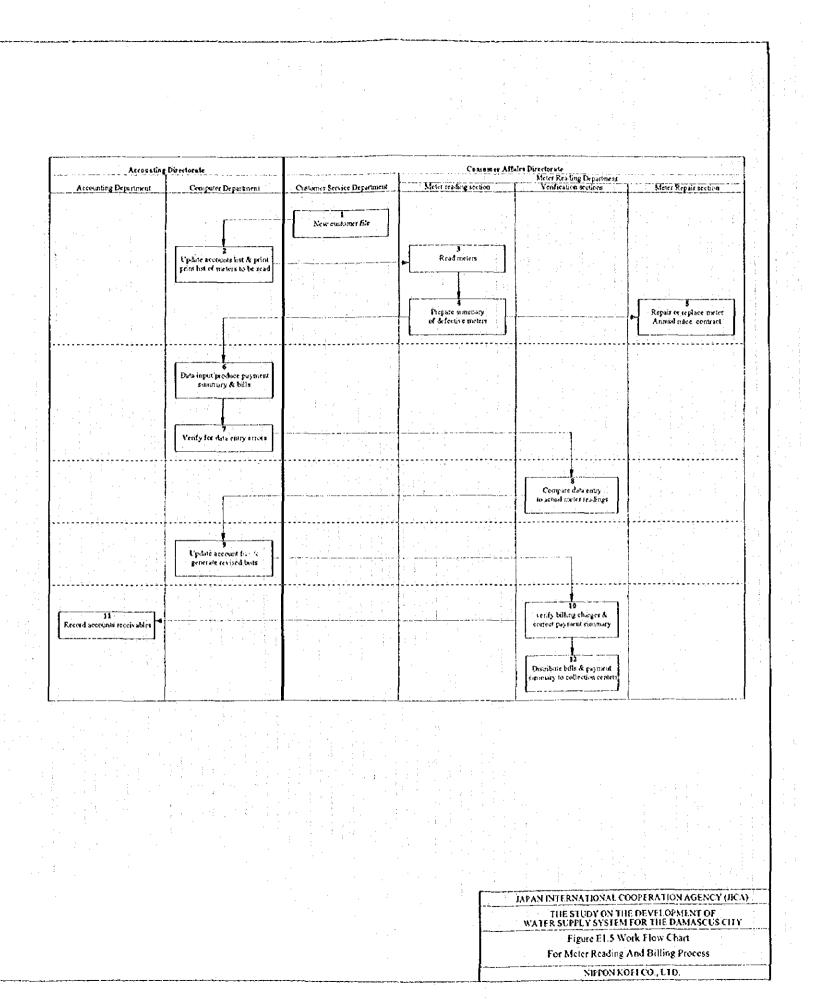


- 1. The customer goes to headquarters customer reference center to request a new connection
- 2. The new customer fills out a request form and is given a receipt with a reference number. The customer service representative prepares a new file booklet for the new connection and fills out the required information.
- 3. The customer pays for the inspection fee and an appointment is scheduled to visit the site. The request form and customer information booklet is then sent to the Customer Service Department to prepare the required documents.
- 4. The file booklet is sent to the Service Connection Department. The new connection section examines the customer's home to verify that a connection can be made to an existing distribution main.
- 5. A work order is prepored showing a bill of materials, labor and a cost estimate including meter installation charges. The cost estimate and bill of materials is sent back to the reference section along with the customer information file.
- 6. The new customer returns to the Customer Reference Center at head office approximately 8-10 days later to pay the connection charges.
- 7. The file booklet is sent to the Customer Service Department who verifies the information on the various documents, and sends the connection work order to the connection section.
- 8. The new connections section verifies the work order, schedules and appointment with the customer and retrieves the materials from stores. The new connection section executes the work and sends the work order (amended with final quantities) back to the Customer Service Department.
- 9. The Customer Service Department classifies the new customer file according to the meter reading sector and transmits the new account information to the computer branch. A copy of the file is sent to the Metering Department.
- 10. The Metering Department, sends a meter reader out to the site to survey the meter route and record notes about the meter location. The serial number of the meter is recorded in the file booklet and the new connection is entered on the meter reading list.
- 11 The Accounting Department's Computer Section enters the new connection along with information on the size, location and class of service for billing.



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- 1. The Customer Service Department takes into account all new service connections, transfers of ownership, and service cancellations which have taken place since the last meter readings in the meter distinct concerned. All these pieces of information are sent to the Computer Department in the Accounting Directorate.
- 2. The Computer Department updates the customer listing and sends to the Meter Reading Department a list of meters to be read, grouped by district.
- 3. The Meter Reading Section classifies the list of meters to be read by work day for each meter reader. When all the sub-districts in one meter district have been visited, a list of readings is sent to the Computer Department along with any amendments required to account files noted by the meter readers for e.g. change of owner.
- 4. The next day after reading the meters, and before starting out on a new route, a summary is prepared listing all defective meters encountered by the meter reader.
- 5. This summary is kept on file for the annual maintenance contract. Some meter repairs are considered urgent and a work order is sent to the meter sub-section.
- 6. The meter readings for the completed district are entered by the Computer Department into the data base. A minimum of 20 m³ per month is entered for every meter that does not have a reading or has a zero consumption.
- 7. The data entry clerk screens the data for obvious errors e.g. unusually large consumption. A list of the readings is printed and all the data is verified against the neter readings recorded in the books. Corrections are made and the bills are printed.
- 8. All meter books are returned to the meter section, along with the bills and a summary for each payment collection office of the billing charges for each customer and the totals to be collected by the easiter. The meter readings entered into the computer are compared against the readings written in the meter books. Any data entry errors are noted and sent back to the computer section for correction.
- 9. The account information is corrected and new bills are printed only for those accounts that were corrected.
- 10. The bills and the payment summary are held by the verification sub-section until the corrected bills are received from the Computer Department. The payment summary is then finally amended (manually) to reflect the corrections made to the bills.
- 11 A copy of the payment summary is sent to the Accounting Department as a record of for accounts receivable issued to the cashiers.
- 12. The bills are issued the remote payment collection offices. The cashier reviews the payment summary list and signs it if the totals agree with the bills he has received A copy of the signed payment summary is kept for auditing purposes. The bills are equivalent to cash and once the cashier has accepted receipt of the bills he/she is responsible for collecting the amounts shown on he payment summary list. Any shortfalls are taken from the cashier's salary.





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	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
	THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY Figure E1.6 (2/2) Meter Reading And Data Entry Schedule

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Customer	Time Lapse	Connection Section	Payment Collection Centers	Cash Collection Section	Collection Audit Section	Accounting Departu	oent in the second s
1 Receives notice	within 45 days after 15 days		2 Customer collects bill				
L	aller is days						
			3 Cashier receives payment	Daily cash collection &	n ithin 3 days	Receive payment reco & cash collection state	
7 Receive first notice for late payment			6 No payment received issue notice to customer				
	nithin 15 days		B Cashier receives payment				
	within 320 days		No payment received				
		10 Execute disconnection & close account			11 Audit cash receipts & balance owing	11 Audit cash receipts balance owing	
have been issued.	r with the correct identification of the second	e customer goes to the pay ation and customer refere y the cashier. The custom	nce number.	When the cashier has collecte Department, The Late Payme totals required to be collected Auditing Section and the Acco	by the cashier are amende ounting Section by the issu	d by the Consumer Affai ue of an administrative or	
er to provide the cashier of customer number and bill stamped with a recei	ipt of payment.	,	10. 1	disconnect the service. Once t closed. If the customer wants	he order is signed, the Di- to have the service re-ins	sconnection Section exec stated, he must make a n	ner Affairs Director to issue an order to utes the work and the customer account is ew application for service and pay all the
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2. The customer has 45 days with a copy of his last bill The bills, are organized in o the bill and is given a copy

- 3. The cashier keeps a daily t
- The cash and the daily tran Directorate). The cash is co at the bank.
- 5. A copy of each cashiers' s Auditing Section of the lin
- 6. If no payment is received y repair worknich stationned
- 7. The customer receives the
- 8. Wether or not payment is r all the non-paid bills from account.

1. The customer goes to headquarters to present the billing complaint.

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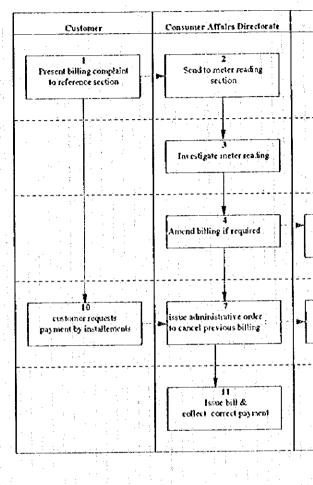
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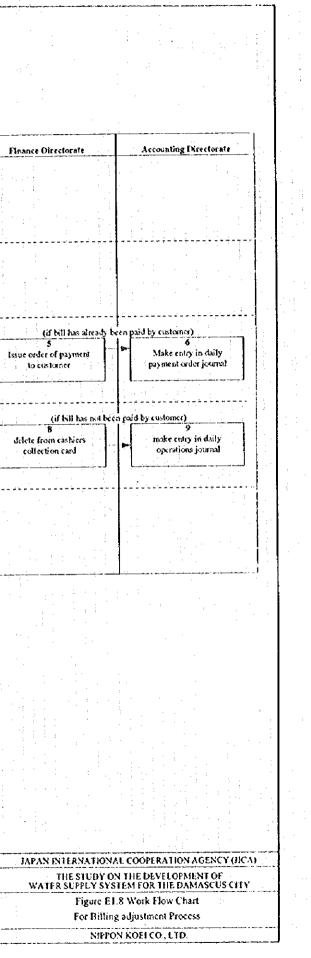
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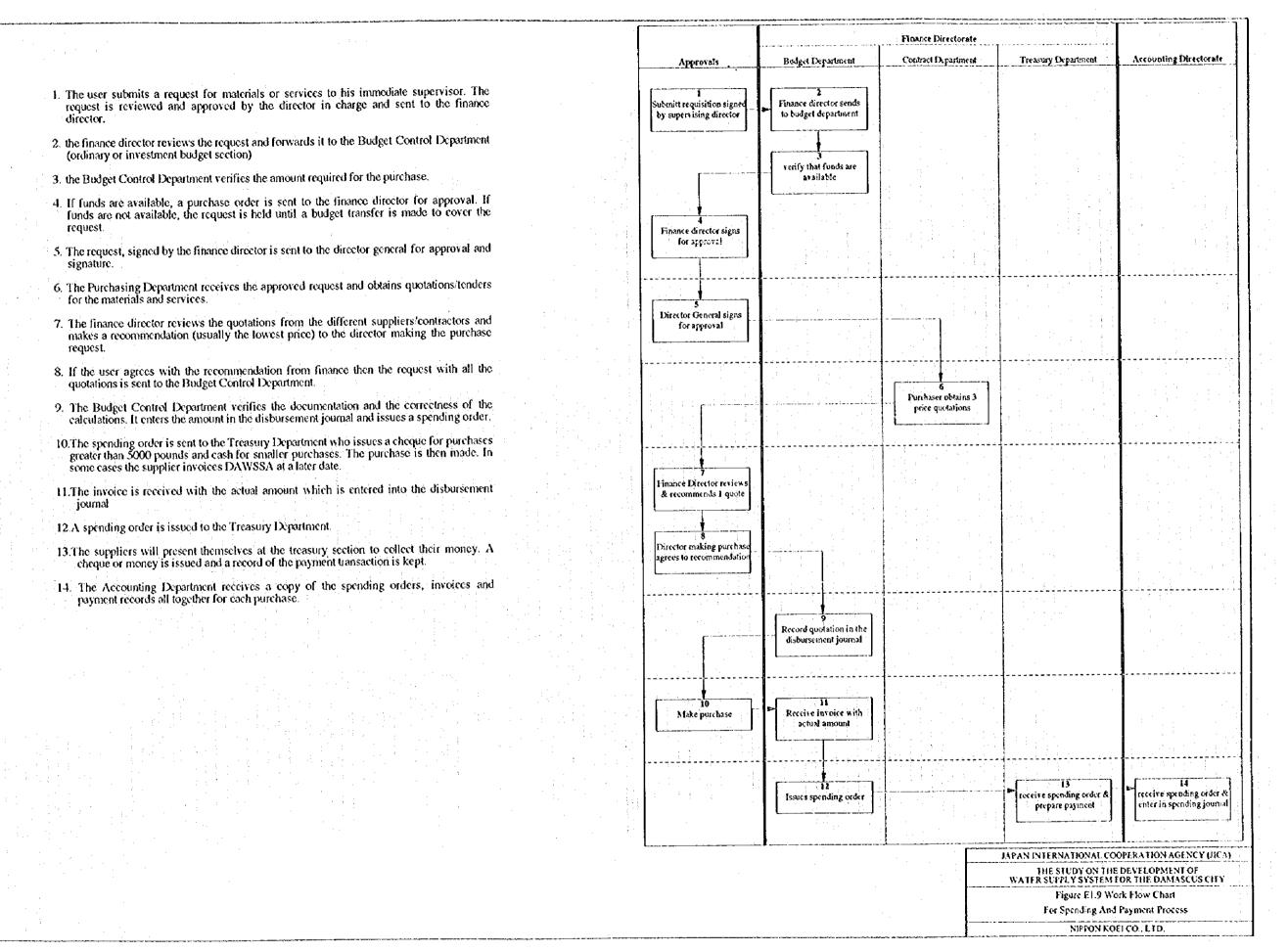
- 2. The Reference Section of the Customer Services Department logs the complaint and forwards to the Meter Reading Department.
- 3. The Meter Reading Section is sent out to investigate the nature of the complaint and take a new reading if required. In some cases the meter was misread or data entered incorrectly.
 - The bill is amended as required and a notice is issued to the Finance Directorate
 - If the bill has already been paid by the customer then the Minance Directorate issues a payment order to refund the customer for the balance between the adjusted amount and the billed amount.
 - The payment order is sent to Accounting Department for entry into the payment journal.
 - If the payment has not yet been made by the customer then the process is slightly more complicated because of the need to adjust the amounts collected by the cashiers for auditing purposes. The process begins by issuing an administrative order from the Consumer Affairs Directorate to the Finance Directorate to carcel the previous billing. The Consumer Affairs Directorate retrieves the bill from the payment collection center. The Billing Venfication and Control Section modifies the amount on the cashier's payment summary list. A copy of the order is sent to the Finance Directorate and the Accounting Directorate for auditing purposes.
 - The Finance Directorate corrects the cashiers payment summary list showing the revised amount that must be collected for auditing purposes.
 - The Accounting Directorate enters the change in billing to the operations journal to remove bill from the revenue account and for purposes of auditing the cashiers.
- 10. In some cases, customers have financial difficulties and request special payment arrangements e.g. payment by smaller installments. The Consumer Affairs Director issues an administrative order and the process follows steps 7 to 9.

11. The bill is amended and the customer pays the correct amount.

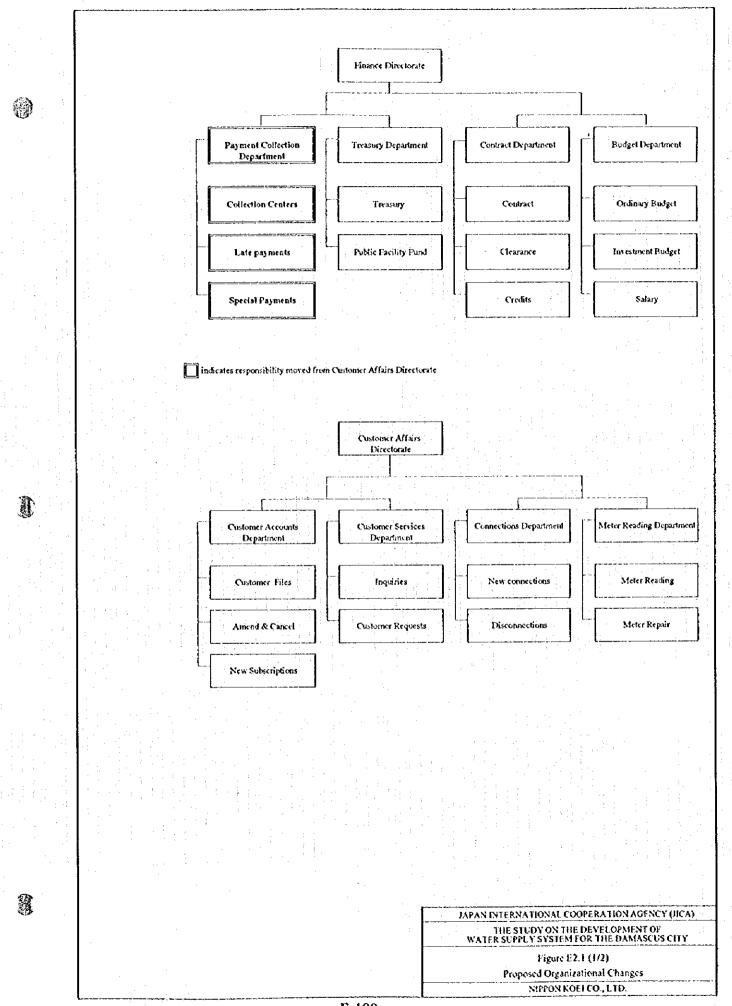




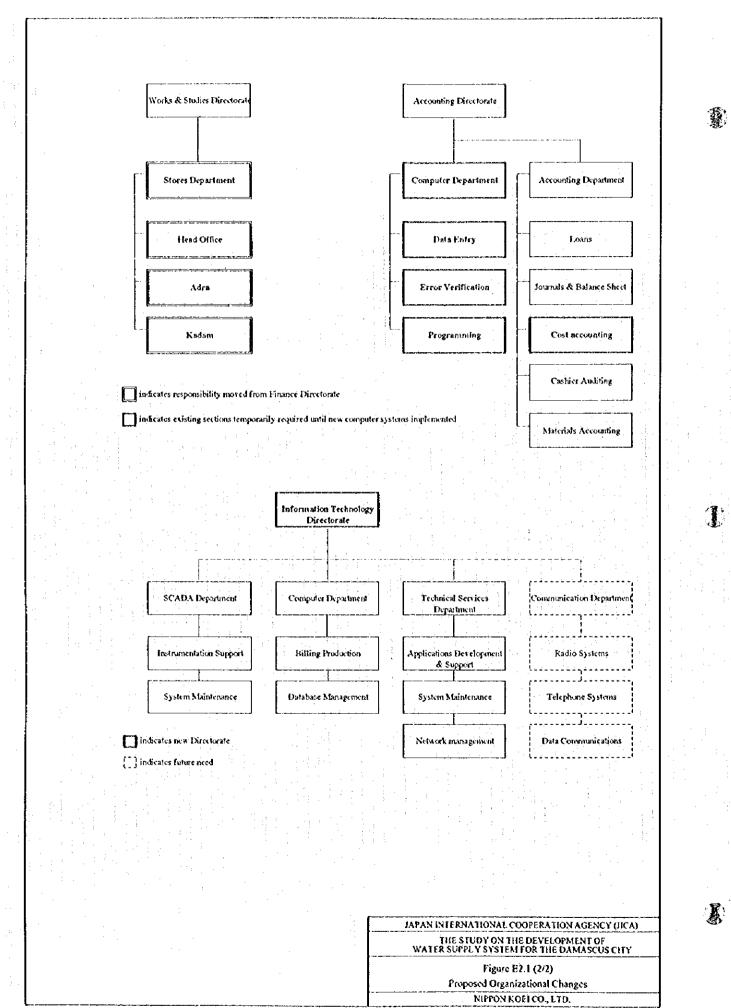


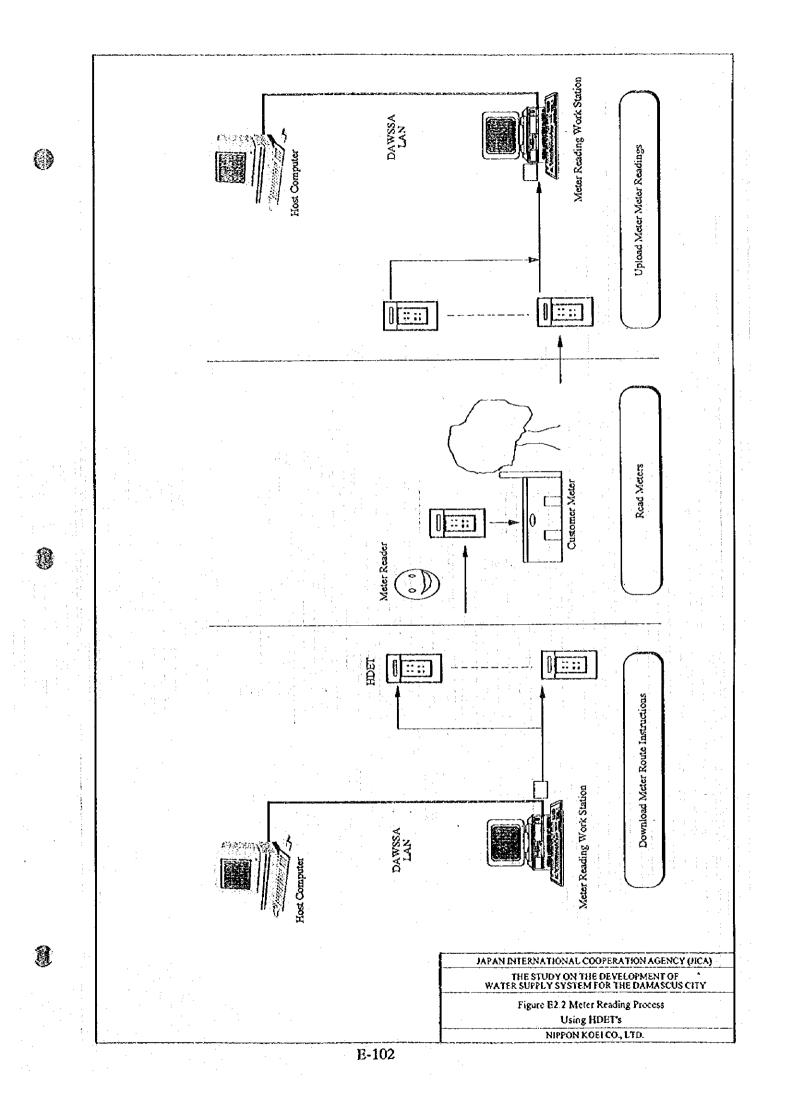




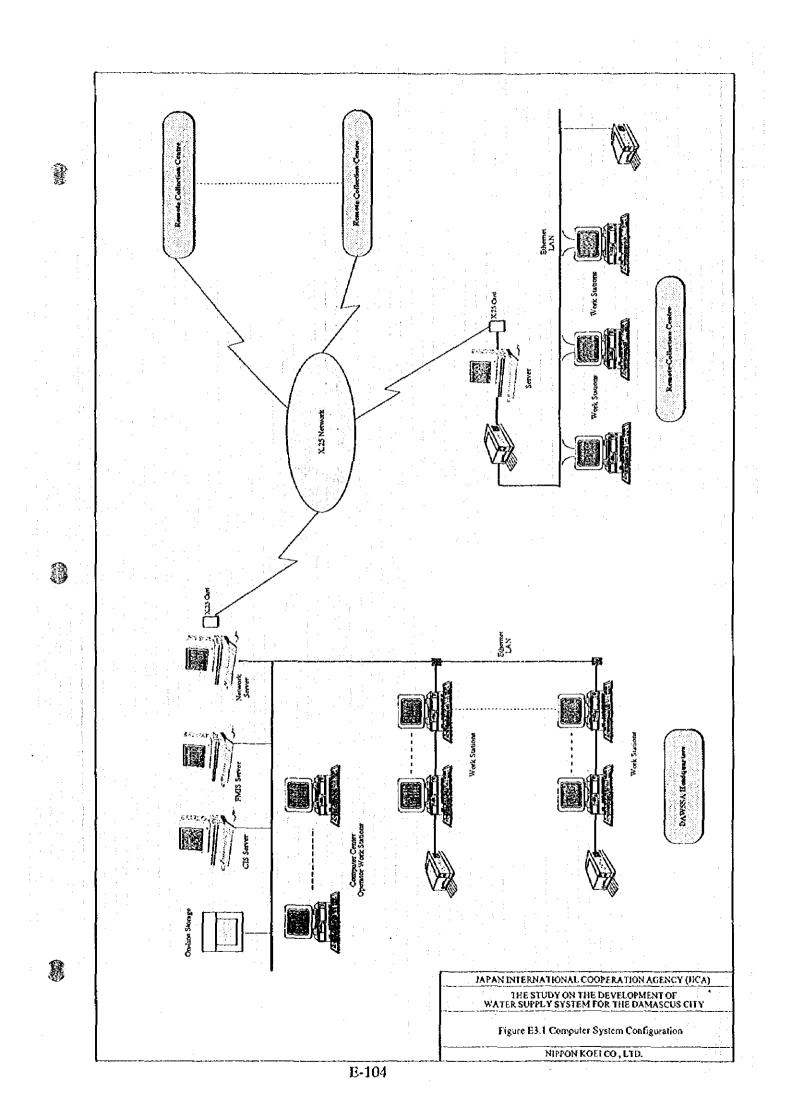


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Figure E4.1 Summary Of Change Strategy

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY Figure E4.2 Implementation Schedule For Computer Systems NiPPON KOELCO, LTD.

TOPOGRAPHIC SURVEY

APPENDIX F TOPOGRAPHIC SURVEY

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1. INTRODUCTION

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This Sectorial Report, Supplementary Survey, compiles the outlines of survey works executed in the Feasibility Studies. Data obtained from the supplementary topographic & leveling surveys was analyzed by data processing. All detailed work outputs, such as drawings and calculation are compiled in Data Book.

The contents of the report are as follows:

- (1) Chapter 2 describes geography of the study area in terms of general understandings of topography in the study area.
- (2) Chapter 3 describes the schedule in Section 3.1, locations, quantities and scales of the executed survey works in Section 3.2, and general features and results obtained from the field works in Section 3.3.

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GENERAL GEOGRAPHY

The City of Damascus is located at the point where the Barada River leaves the Anti-Lebanon Mountain Belt and flows east onto a plain of the El-Arab Trough. The urban area of Damascus, covers the alluvial fan created by the river. To the south east the land forms a plain gently dipping to closed depressions. The mountain belt consists of a series of parallel ridges and valleys running south-west to north-east. The mountain areas have developed karstic features in massive dolomites and limestones that are most strongly developed in areas of tectonic fracturing.

The urban area stays on elevation of 650 m to 750 m above mean sea level and the elevation at TV (K.8) of the Kassioun Mountain is about 1,155 m. Slope inclines in the City is about 0 % to 10 %. The slope is increasing with 10 % to 30 % up to the Kassioun Mountain and slope in mountain area is more than 30 %.

Figure F-2.1 shows the location of the Study Arca.

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3. EXECUTED WORKS

3.1 Work Schedule

Surveys were carried out during the beginning of April 1997 to the end of June 1997 and all the survey results were compiled in report and drawings of designated scale and submitted by the end of June 1997. Schedule is shown in Figure F-3.1.

3.2 Work Quantities

The locations of executed survey works is shown Figure F-2.1. Topographic survey was carried out for the Mezze-Razy and Kafal Sousch-Lawan informal areas and leveling survey was also carried out for a pilot area of DMA and the Wali reservoir area to be used the preliminary design. All the survey was coordinated with the national bench marks in Damaseus.

3.2.1 Supplementary Topographic Survey

The following works were executed during this study stage mainly to elarify the topographic conditions and number of houses at the Mezze-Razy and Kafal Souseh-Lawan informal areas.

(1) Supplementary topographic survey

- Accuracy of scale	: 1/500 for Planimetric surveying	
~ Contour Interval	: 0.5 m (0.25 m in flat arcas)	
- Work Quantity	: about 1,700,000 m ²	
- Survey Method	: Tachymetric method or equivalent	
- Drawings	: prepared by the CAD system with	th the DAWSSA's
	standard scale of 1/2,000	

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Existing house number and location survey

- Accuracy of scale
- : about 1,700,000 m²
- Survey Method

- Work Quantity

- : Tachymetric method or equivalent

standard scale of 1/2,000

: 1/500 for House location measuring

- Drawings
- : prepared by the CAD system with the DAWSSA's
- 3.2.2 Supplementary Leveling Survey

The following works were executed to certify the elevation of the Wali reservoir area and the leveling conditions of the existing water supply network at a pilot DMA area;

(1) Leveling survey for installing datum points of pilot DMA area

The leveling survey was required not only to provide the survey datum at a pilot DMA area of the name of Midam and Yarmouk where is selected by the Team and DAWSSA, but also in order to conform the conditions of the existing main distribution pipeline.

- Accuracy of scale	: 1/1,000 for Route surveying
- Work Quantity	: 15 km for Distribution main with facilitics
- Survey Method	: Tachymetric method or equivalent
- Drawings	: prepared with the DAWSSA's standard scale of
	1/2,000

Leveling Survey for confirming the elevation of the Wali Reservoir Area

- Work Quantity - Survey Points - Survey Method

: about 10 km for Elevation surveying : each 2 points at the reservoir and outflow pipes : Tachymetric method or equivalent

3.3 Survey Results

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3.3.1 Mezze-Razy and Kafar Sousch-Lawan Informal Areas

A topographic survey has been carried out for Mezze-Razy and Kafar Sousch-Lawan informal areas. General features of said areas are as follows;

(1) Mezze-Razy informal area

The Mezze-Razy informal area is located on the south of the Faez Mansour Motorway. Total area is 136.0 ha and population is estimated at 32,786. The elevation varies from 701 m to 715 m above mean sea level as shown in Figure F-3.2. The area slopes down to the south with incline of 1.1 %.

The existing roads in the area are classified by wide of roads and Table F-3.1 shows topographic conditions based on classification of roads. A road map also was prepared as shown in Figure F-3.3.

Results of the survey are summarized as follows:

						A second second	
	Total Area (ha)					136.0	
, .	Length of Road (km)						
: .	 less than 4 m of Wide 	- -			1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	0.509	:
	• 4m to 6 m of Wide		•			5,641	
	 6 m to 8 m of Wide 	•			•	3.035	
	Total					9.185	
	Classification of Elevation (m)						-
	Maximum	1	ъ. н			714.89	
	Minimum	na Na kara	. 1	a		701.21	
•	Average		·			710.21	

(2) Kafar Souseh-Lawan informal area

The Kafar Sousch-Lawan informal area is located in the south of the Hafez Al Assad Motorway. Total area is 55.0 ha and population is estimated at 14,000. The elevation varies from 697 m to 707 m above mean sea level as shown in Figure F-3.4. Average slope

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incline is about 1.5 % in this area. A existing road map also was prepared as shown in Figure F-3.5 and Table F-3.2 shows topographic conditions based on classification of roads.

Results are summarized as follows:

Length of Road (kni)	0.204
 less than 4 m of Wide 	0.394
 4m to 6 m of Wide 5m to 7m of Wide 	1.060
• 6 m to 8 m of Wide	0.668
more than 8 m of Wide	1.017
 Total Length (km) 	3.967
Classification of Elevation (m)	
Maximum	707.10
Minimum	696.64
Average	701.90

(3) House quality and location

Mczzc-Razy and Kafar Sousch-Lawan informal areas is divided into some blocks as illustrated in Figures F-3.2 and F-3.4 respectively, in order to grasp roughly location of houses at each type of buildings. Type and number of buildings and house at each area are summarized in Table F-3.3.

Number of house at each area is estimated as follows:

(Unit : Properties)

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		and the second	· · · · · · · · · · · · · · · · · · ·
Type of Building	Mezze-Razy	Kafar Souseh-Lawan	Total
Resident	2,402	945	3,347
School & Nursery	8	4	12
Mosque	4	3	7
Store & Workshop	77	148	225
Public Bath		3	3
Total	2,491	1,103	3,594

3.3.2 Pilot DMA Area

Midam and Yarmouk, where is located along the Daraa Road in the southern part of the City, are selected for a pilot DMA area with flow rate monitoring system as shown in Figure F-3.6. The route survey was carried out in order to conform the location and elevation of the existing distribution main. The elevation in Midam varies from 688.67 m to 678.87 m and in Yarmouk from 682.00 m to 670.40 m.

Results are summarized as follows:

These Data Manifestian Delute	Elevation above mean sea level (m)				
Flow Rate Monitering Points	Top of Pipe	Surface of Road			
1. Diameter : D 700 mm	687.81	688.67			
2. Diameter : D 250 mm	687.67	688.67			
3. Diameter : D 600 mm	681.69	683.16			
4. Diameter : D 300 mm	681.77	682.34			
5. Diameter : D 300 num	680.40	680.89			
6. Diameter : D 300 mm	677.65	678.87			
7. Diameter : D 400 mm	678.69	680.93			
8. Diameter : D 200 mm	679.99	681.28			

Distribution mains in this area consists of the following pipes:

Diameter of Distributio	n Mains	L	ength (m)	
D 700 mm			438	
D 600 mm			2,989	
D 500 mm			596	
D 400 mm			575	
D 300 mm			276	
D 250 mm			223	:
D 200 mm			2,745	•
D 150 mm			1,904	
D 100 mm			190	
Total			9,936	

3.3.3 Wali Reservoir Area

Wali reservoir, what is located at Al Mouhajrin on the northwest of the City, is the key facility for water supply system in the City. Leveling survey for confirming the elevation of the main facilities in the Wali reservoir area was conducted in coordination with a national bench mark as follows:



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Leveling Point	Distance (m)	Elevation above mean see level (m)
National Bench Mark		807.38
Bench Mark in the Wali reservoir	144.9	801.27
Reservoir Gage 2 m		802.47
Outflow Pipe No.1 D500 mm		801.48
Outflow Pipe No.2 D1000 mm		790.78
Outflow Pipe No.2 D250 mm		790.37

The elevation of the Wali reservoir is summarized as follows:

i) 801.27 m is the elevation of ground in the area.

ii) 804.17 m is the high water level of the reservoir.

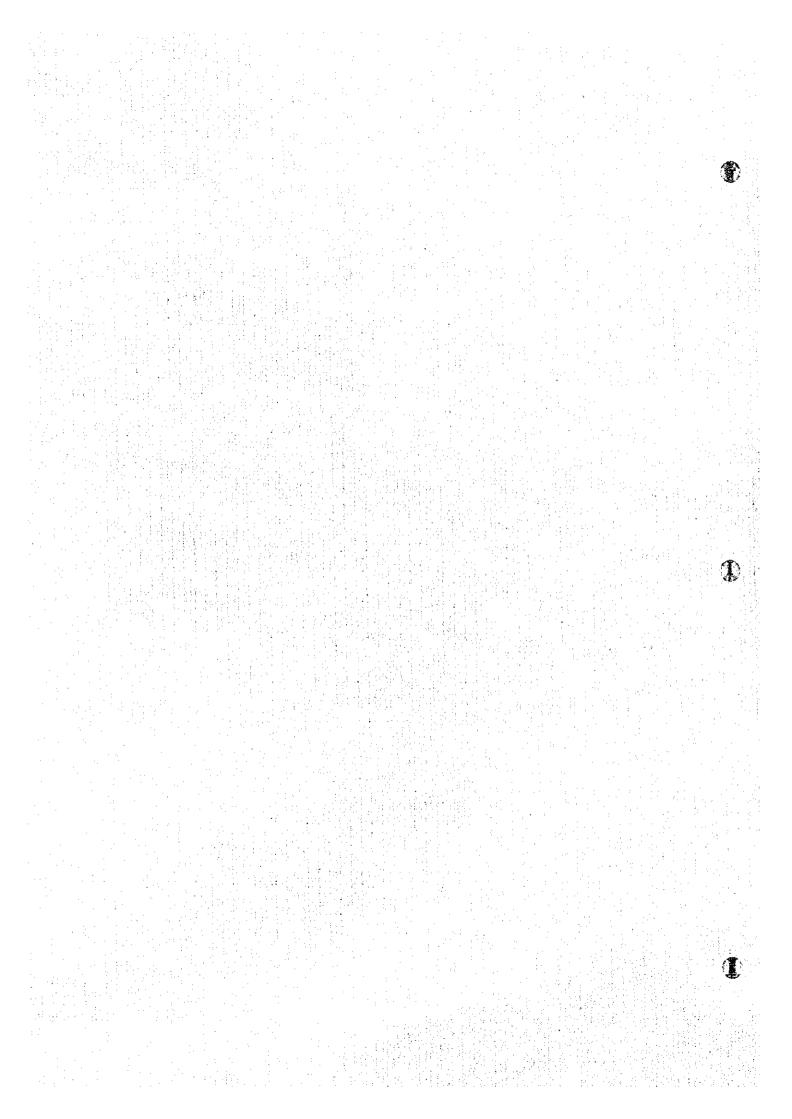
iii) 800.17 m is the bottom level of the reservoir.

Additionally, leveling survey for confirming the elevation of the Mezze High service reservoir (M.2) was carried out since it was identified by the results of the water pressure measurement that the elevation of M.2 obtained from DAWSSA was too low. Newly surveyed elevation of M.2 is 824.81 m.

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TABLES



	1	MEZZE - RAZ	Y INFORMAL AREA			·
	4	TABLE OF RO	DADS SPECIFICATIO	NS	1	
			ļ.			
<u>-</u>	ROAD	LENTH	WIDE		ELEVATIONS	
- -	· · · · · · · · · · · · · · · · · · ·	KM	M	MAXIMUM	MINIMUM	AVERAGE
	A	1.831	6 TO 8	713.93	705.79	710.86
	B	0.717	4 TO 6	711.25	705.59	707.84
	C	1.266	4 TO 6	711.15	701.93	706
	D1	0.23	6 TO 8		1	· · · · · · · · · · · · · · · · · · ·
	, D2	0.426	4 TO 6			
	D (TOTAL.)	0.656	-	711.7	706.83	708.98
	- <u>+</u>	I		1		
 :	E	0.865	4 TO 6	709.08	705.24	706.86
<u>.</u>	F	0.974	6 TO 8	711.27	705.09	708.87
	G	0.382	4 TO 6	712.32	710.95	711.71
-	н	0.662	4 TO 6	710.65	709.07	709.71
	1	0.306	LESS THAN 4	703.61	701.93	703.05
	; J	0.14	4106			
÷	L	0.549	4 TO 6	713.12	710.09	711.11
	M	0.075	4 TO 6	711.5	710.65	711.08
- 	N S	0.24	4 TO 6	711.15	714.89	713.42
	0	0.137	4 TO 6	713.21	714.72	713,95
	R	0.203	LESS THAN 4	710.91	714.7	713.27
	í S	0.185	4 TO 6	711.78	714.19	713.39
	TOTAL	9.185		-		

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Table F-3.1 Classification of Roads in Mezze-Razy

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	KAFAR SOUS	SEH-LAWAN INFORM	IAL AREA		
· · · · · · · · · · · · · · · · · · ·	TABLE OF R	DADS SPECIFICATIO		· · · · · · · · · · · · · · · · · · ·	
ROAD	LENTH	WIDE		ELEVATIONS	
1	KM	<u> M </u>	MAXIMUM	MINSIUM	AVERAGE
L1	0.336	5 TO 7	706.11	705.6	705.87
L.2	0.668	MOER THAN 8	706.8	700.38	703.53
L3	0.093	4 10 6	706.11	705.46	705.74
L4	0.179	4 TO 6	707.01	705.2	706.65
L5	0.248	5 TO 7	704.53	704	704.23
L6-1	0.193	4 TO 6		· · · · · i	
L.6-2	0.349	8 TO 11			
TOTAL	0.542		701.84	700.9	701.13
L7	0.492	5 TO 7	701.13	695,64	698.65
£8	0.174	LESS THAN 4	700.73	700.38	700.62
L9	0.3	6 TO 8	698.52	696.64	697.99
L10	0.152	4 TO 6	698.04	697.06	697.47
L11	0.499	4 TO 6	701.07	695.88	698.31
L12	0.064	4 TO 6	699.7	699.53	699.63
L13	0.22	LESS THAN 4	705.92	704 16	704.92
TOTAL	3.967				· · · · · · · · · · · · · · · · · · ·
····· • ······ • •					
	•			-	
· · · · • • • • • • • • • • • • • • • •	1				······································
		······································			•

Table F-3.2 Classification of Roads in Kafar Souseh-Lawan

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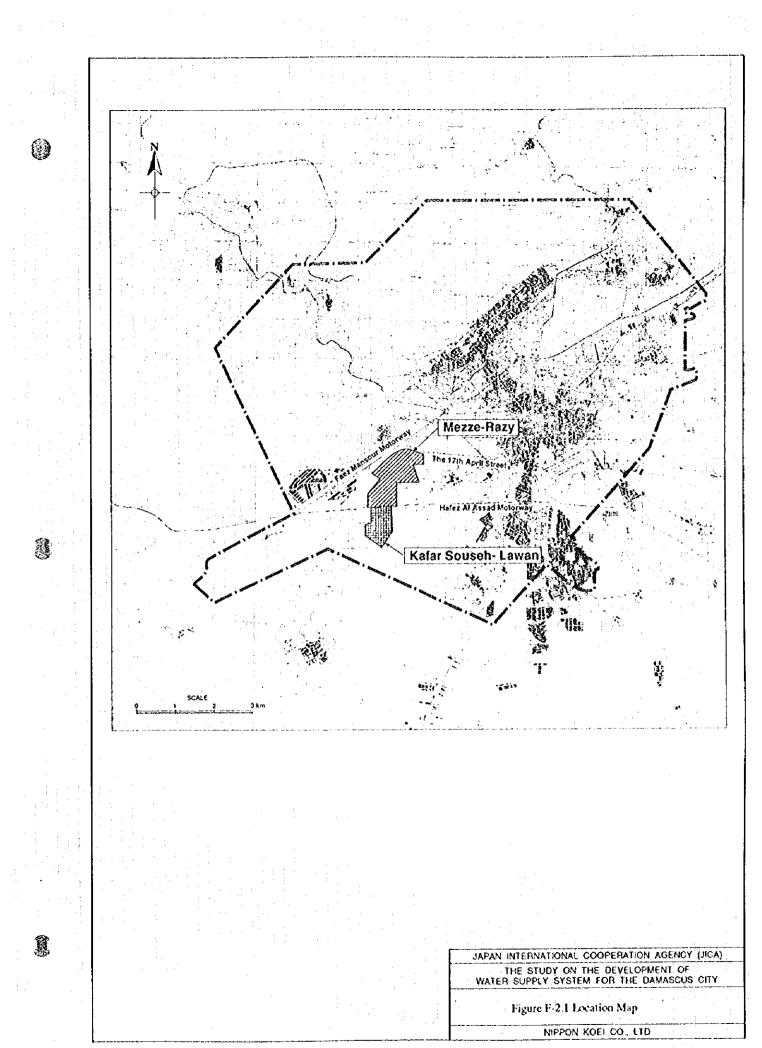
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·····	!			MEZZE- R	AZY INFOR	MAL ARE	Ą	
	TABLE O	F NUMBER	S AND TYPE	IS OF ENU	MERATED	HOUSES	BUILDING	\$
					· •			
· · · · · · · · · · · · · · · · · · ·				(Ur	nit:properi	lies)		
Block numbe	story	2 stories	3 stories	School	Mosque	shop	Workshop	Nursery
1	252	103	6	2		58	5	
2	211	76	7		1	46	4	3
3	15							
4	58	22	1			8	5	
5	56	9			:	10	5	
6	21	4				5	2	
7	210	69	3		1	50	24	1
8	394	85	2	1		55	8	
9	268	37	3			12	14	
10	392	97	1	1	1	66	7	······
Total	1877	502	23	4	4	1 3	74	4

Table F-3.3 Type and Number of Buildings and House

		• • • • • •			LAWAN /		1		€ ≹ :::::::::::::::::::::::::::::::
		TABLE O	F NUMBI	ERS AND	TYPES O	F ENUM	ERATED HO	USES / B	UILDINGS
					(Unit	: prope	rties}		· · · · · · · · · · · · · · · · · · ·
Block	1 story	2 stories	3 stories	School	Mosque	shop	Workshop	Nursery	Swim.Bat
1	22	11				1	2		
2	40	9				1	7		1
3	49	13			1	24	3		
4	85	16	1				3		
5	48	25	2	1		25	1		
6	123	31	1		1	9	1		
. 7	232	58	2			43	7	1	1
8	130	46	1	1	1	18	3	1	2
Total	729	209	7	2	3	121	27	2	3
		ī	······		1				1
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FIGURES



F-12

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Work Item				1997		
		April	May	June	July	Augu
Site Preparation		1735 3				
Supplementary Topograp	hic Survey					
Leveling Survey						
Analysis						
Report Preparation						
	1	• • • • • • • • • • • • • • • • • • •				.
					영화학 영상 (1999) 1999년 - 1999년 - 1999년 1999년 - 1999년 - 1	
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				Figure P-3.1 Wo		AMASCUS
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