## 4.7 Benefits 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:

(a) Improved accountability

- 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

(b) 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

# *TABLES*

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

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|
| Water Produced (000 m3) | 154,680 | 172,900 | 201,490 | 212,000 | 209,000 | 222,080 |
| Water Sold (000 m3) | 53,280 | 64,515 | 66,328 | 70,000 | 69,582 | 63,596 |
| Water Sold (% of total production)[1] | 34% | 37% | 33% | 33% | 33% | 29% |
| Water delivered to water rights (000 m3)[2] | 14,020 | 15,750 | 15,154 | 15,750 | 15,028 | 14,859 |
| Total accounted for water (000 m3) | 67,300 | 80,265 | 81,482 | 85,750 | 84,610 | 78,455 |
| Unnaccounted for Water (% of total production) | 56% | 54% | 60% | 60% | 60% | 65% |
| Average Cost (SL/m3 produced)[3] | 0.63 | 0.66 | 0.69 | 0.69 | 0.86 | 0.97 |
| Average Tariff (SL/m3 sold)[3] | 2.17 | 3.00 | 2.70 | 2.67 | 4.61 | 4.37 |
| **Operating Revenues** | | | | | | |
| Water Sales | 115,657,868 | 193,306,344 | 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 | 4,339,884 | 3,390,899 | 3,446,209 | 5,377,817 | 6,654,672 | 8,241,847 |
| Bank Interest | 39,176 | 114,414 | 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** | | | | | | |
| Salaries & Wages | 40,365,378 | 43,370,708 | 52,721,801 | 57,313,006 | 74,336,324 | 83,344,723 |
| Benefits | 7,970,999 | 8,563,920 | 11,925,133 | 12,116,067 | 17,914,417 | 22,941,860 |
| Sub-total | 48,336,377 | 51,934,628 | 64,646,934 | 69,429,073 | 92,250,741 | 106,286,583 |
| Energy & Utilities | 22,077,927 | 29,130,575 | 36,898,942 | 27,356,795 | 32,018,654 | 45,841,074 |
| Chemicals | 1,861,063 | 3,619,879 | 3,579,510 | 4,075,856 | 3,727,908 | 5,442,000 |
| Purchase of service connection materials for re-sa | 781,410 | 1,227,297 | 1,632,034 | 2,821,856 | 3,068,393 | 2,939,940 |
| Materials | 2,455,063 | 1,931,080 | 3,432,293 | 5,470,420 | 2,798,561 | 2,758,720 |
| Service fees | 18,979,171 | 24,059,394 | 25,290,988 | 28,501,920 | 31,624,374 | 36,511,580 |
| Other Expenses | 395,658 | 561,914 | 441,249 | 384,844 | 290,522 | 1,293,726 |
| Previous Year's Expenses | 2,710,021 | 1,313,215 | 2,603,988 | 8,093,270 | 13,830,897 | 15,352,013 |
| Total Direct Expenses | 97,596,690 | 113,777,982 | 138,525,938 | 146,134,034 | 179,610,050 | 216,425,636 |
| Depreciation | 32,449,648 | 36,137,223 | 40,019,431 | 39,749,619 | 50,234,879 | 54,100,434 |
| Net Income (deficit) | 5,562,814 | 71,862,982 | 30,637,122 | 39,255,196 | 149,998,637 | 74,800,769 |
| Profit tax | 4,664,141 | 53,221,000 | 29,305,275 | 33,721,759 | 87,535,873 | 48,338,215 |
| **Net Income (deficit) after taxes** | 898,673 | 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) | 0.96 | 0.68 | 0.85 | 0.83 | 0.61 | 0.78 |
| Profit margin (before taxes) | 0.04 | 0.32 | 0.15 | 0.17 | 0.39 | 0.22 |

(1) based on metered billings
(2) based on metered billings, but no revenue collected
(3) equal to income from water sales divided by volume of water sold

Table E-1.2 Source & Use of Funds

| | 1990 | 1991 | 1992 | 1993 | 1994 | 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 | 54,100,434 |
| 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 | 899,717,467 | 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 | 143,496,345 | 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 | 4,664,141 | 53,221,000 | 29,305,275 | 33,721,759 | 87,535,873 | 43,562,410 |
| Transfer to Ministry of Finance | - | 2,000,000 | - | - | - | |
| 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 | (7,155,891) | 4,598,514 | (38,323,375) | 182,356,084 | 46,926,714 |
| official exchange rate of 45 SL/US$ | 2,692,868 | (170,378) | 109,488 | (912,461) | 4,341,812 | 1,042,816 |
| **Financial indicators** | | | | | | |
| Income/total sources | 2.2% | 20.8% | 11.1% | 4.4% | 21.2% | 5.5% |
| Loans/total sources | 51.0% | 42.7% | 64.5% | 68.2% | 50.9% | 42.7% |
| Capital investment/total sources | 28.1% | 21.5% | 27.7% | 37.1% | 37.4% | 17.5% |
| Capital investment/ loans rec'vd | 55.2% | 50.4% | 43.0% | 54.4% | 73.4% | 41.1% |
| Debt service/total sources | 36.3% | 29.2% | 29.3% | 23.5% | 26.7% | 21.7% |

**Table E-1.3 Existing Billing Schedule** (Cycle No. 269 - final quarter 1996)
(Source DAWSSA - Cycle No. 269 - final quarter 1996)

| | | | | Consumer Affairs Directorate | | | | | Accounting Directorate | | | | | | | | Consumer Affairs Directorate | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Read Meters | | | | | Enter Data | | | Verify & | Produce Bills | | | | Correct Statements | | | | Issue Statement | Total Time |
| No. | District name | Collection centre | No. of Bills | start | end | duration | delay | | start | end | duration | Correct | print | issue | duration | delay | Receive bills | Back to Actg | duration | delay | To cashier | lapse [3] |
| 1 | Kanawat | A-Kanawat | 15,987 | 25-Jul-96 | 11-Aug-96 | 17 | 94 | | 13-Nov-96 | 22-Nov-96 | 9 | 9 | 1-Dec-96 | 16-Dec-96 | 15 | 3 | 19-Dec-96 | 24-Jan-97 | 36 | 5 | 29-Jan-97 | 188 |
| | | B- DAWSSA | | 25-Jul-96 | 11-Aug-96 | | | | | | | | | | | | 19-Dec-96 | 24-Jan-97 | 36 | 113 | 17-May-97 | 296 |
| 2 | Zafna | Bab Musala | 6,294 | 4-Sep-96 | 28-Sep-96 | 24 | 44 | | 11-Nov-96 | 12-Nov-96 | 1 | 49 | 21-Dec-96 | 22-Dec-96 | 1 | 0 | 22-Dec-96 | 24-Jan-97 | 33 | 59 | 24-Mar-97 | 201 |
| 3 | Akrad | A- Akrad | 11,031 | 28-Jul-96 | 20-Aug-96 | 23 | 80 | | 8-Nov-96 | 13-Nov-96 | 5 | 26 | 9-Dec-96 | 16-Dec-96 | 7 | 10 | 26-Dec-96 | 20-Jan-97 | 25 | 10 | 30-Jan-97 | 186 |
| | | B-Al jeser Al Abiad | | 28-Jul-96 | 20-Aug-96 | | | | | | | | | | | | 26-Dec-96 | 20-Jan-97 | 25 | 10 | 30-Jan-97 | 186 |
| 4 | Janoub Yazid | Janoub Yazid | 6,587 | 10-Aug-96 | 25-Aug-96 | 15 | 75 | | 8-Nov-96 | 9-Nov-96 | 1 | 32 | 11-Dec-96 | 16-Dec-96 | 5 | 4 | 20-Dec-96 | 20-Jan-97 | 31 | 10 | 30-Jan-97 | 173 |
| 5 | Salhia Sharkia | A-Al jeser Al Abiad | 8,731 | 4-Aug-96 | 21-Aug-96 | 17 | 93 | | 22-Nov-96 | 29-Nov-96 | 7 | 5 | 4-Dec-96 | 16-Dec-96 | 12 | 13 | 29-Dec-96 | 20-Jan-97 | 22 | 10 | 30-Jan-97 | 179 |
| | | B- DAWSSA | | 4-Aug-96 | 21-Aug-96 | | | | | | | | | | | | 29-Dec-96 | 20-Jan-97 | 22 | 117 | 17-May-97 | 286 |
| 6 | Salhia Gharbia | Salhia Gharbia | 9,094 | 4-Aug-96 | 21-Aug-96 | 17 | 112 | | 11-Dec-96 | 11-Dec-96 | 0 | 39 | 17-Jan-97 | 19-Jan-97 | 2 | 0 | 19-Jan-97 | 3-Feb-97 | 15 | 12 | 15-Feb-97 | 195 |
| 7 | Mohajreen | Mohajreen | 13,923 | 18-Aug-96 | 18-Sep-96 | 31 | 47 | | 4-Nov-96 | 29-Nov-96 | 25 | 66 | 3-Feb-97 | 4-Feb-97 | 1 | 1 | 5-Feb-97 | 20-Feb-97 | 15 | 17 | 9-Mar-97 | 203 |
| 8,9,10 | Kimana | A-Shagour | 22,294 | 22-Aug-96 | 18-Sep-96 | 27 | 66 | | 23-Nov-96 | 11-Dec-96 | 18 | 66 | 15-Feb-97 | 19-Feb-97 | 4 | 1 | 15-Feb-97 | 26-Feb-97 | 11 | 4 | 2-Mar-97 | 192 |
| | | B-Baghdad st. | | 22-Aug-96 | 18-Sep-96 | | | | | | | | | | | | 16-Feb-97 | 26-Feb-97 | 10 | 4 | 2-Mar-97 | 192 |
| | | C-Bab Touma | | 22-Aug-96 | 18-Sep-96 | | | | | | | | | | | | 19-Feb-97 | 26-Feb-97 | 7 | 39 | 6-Apr-97 | 227 |
| | | D-Abasyin | | 22-Aug-96 | 18-Sep-96 | | | | | | | | | | | | 19-Feb-97 | 26-Feb-97 | 7 | 39 | 6-Apr-97 | 227 |
| 11 | Sharky Al Tijara | Abasyin | 1,835 | 19-Oct-96 | 31-Oct-96 | 12 | 10 | | 10-Nov-96 | 13-Nov-96 | 3 | 57 | 9-Jan-97 | 19-Jan-97 | 10 | 0 | 19-Jan-97 | 13-Feb-97 | 25 | 52 | 6-Apr-97 | 169 |
| 12 | Barza Al Balad | Masaken Barza | 3,012 | 15-Oct-96 | 6-Nov-96 | 22 | 52 | | 28-Dec-96 | 30-Dec-96 | 2 | 10 | 9-Jan-97 | 16-Jan-97 | 7 | 3 | 19-Jan-97 | 3-Feb-97 | 15 | 34 | 9-Mar-97 | 145 |
| 13 | Shagour | A-Shagour | 1,001 | 18-Aug-96 | 3-Sep-96 | 16 | 71 | | 13-Nov-96 | 17-Nov-96 | 4 | 44 | 31-Dec-96 | 2-Jan-97 | 2 | 0 | 2-Jan-97 | 20-Jan-97 | 18 | 41 | 2-Mar-97 | 196 |
| | | B- DAWSSA | | 18-Aug-96 | 3-Sep-96 | | | | | | | | | | | | 2-Jan-97 | 20-Jan-97 | 18 | 117 | 17-May-97 | 272 |
| 14 | Mudan | A-Al Ashmar | 15,141 | 23-Sep-96 | 15-Oct-96 | 22 | 64 | | 18-Dec-96 | 8-Jan-97 | 21 | 4 | 12-Jan-97 | 16-Jan-97 | 4 | 3 | 19-Jan-97 | 16-Feb-97 | 28 | 45 | 2-Apr-97 | 191 |
| | | B-Bab Musala | | 23-Sep-96 | 15-Oct-96 | | | | | | | | | | | | 19-Jan-97 | 16-Feb-97 | 28 | 36 | 24-Mar-97 | 182 |
| 15 | Sarouja | A-Baghdad st. | 14,241 | 1-Sep-96 | 22-Sep-96 | 21 | 43 | | 4-Nov-96 | 9-Nov-96 | 5 | 54 | 2-Jan-97 | 4-Jan-97 | 2 | 1 | 5-Jan-97 | 25-Jan-97 | 20 | 36 | 2-Mar-97 | 182 |
| | | B- DAWSSA | | 1-Sep-96 | 22-Sep-96 | | | | | | | | | | | | 5-Jan-97 | 25-Jan-97 | 20 | 112 | 17-May-97 | 258 |
| 16 | Mezze [2] | Mezze 1 | 16,127 | 10-Nov-96 | 30-Nov-96 | 20 | 39 | | 8-Jan-97 | 13-Jan-97 | 5 | 12 | 25-Jan-97 | 27-Jan-97 | 2 | 0 | 27-Jan-97 | 16-Feb-97 | 20 | 113 | 9-Jun-97 | 211 |
| | | Mezze 2 | | 10-Nov-96 | 30-Nov-96 | | | | | | | | | | | | 27-Jan-97 | 16-Feb-97 | 20 | 113 | 9-Jun-97 | 211 |
| 17,18 | Kiwan, Doumar [2] | Doumar | 12,701 | 2-Nov-96 | 12-Nov-96 | 10 | 82 | | 2-Feb-97 | 2-Feb-97 | 0 | 23 | 25-Feb-97 | 2-Mar-97 | 5 | 0 | 2-Mar-97 | 30-Mar-97 | 28 | 71 | 9-Jun-97 | 219 |
| 19 | Masaken Barza | Masaken Barza | 7,182 | 8-Oct-96 | 31-Oct-96 | 23 | 84 | | 23-Jan-97 | 27-Jan-97 | 4 | 20 | 16-Feb-97 | 16-Feb-97 | 0 | 1 | 17-Feb-97 | 2-Mar-97 | 13 | 7 | 9-Mar-97 | 152 |
| 20 | Kaboun | Kaboun | 5,492 | 17-Oct-96 | 29-Oct-96 | 12 | 82 | | 19-Jan-97 | 30-Jan-97 | 11 | 4 | 3-Feb-97 | 4-Feb-97 | 1 | 1 | 5-Feb-97 | 15-Mar-97 | 38 | 11 | 26-Mar-97 | 160 |
| 21 | Joubar | Joubar | 9,801 | 17-Sep-96 | 5-Oct-96 | 18 | 72 | | 16-Dec-96 | 18-Dec-96 | 2 | 47 | 3-Feb-97 | 12-Feb-97 | 9 | 19 | 3-Mar-97 | 20-Mar-97 | 17 | 17 | 6-Apr-97 | 201 |
| 22 | Tabala | Tabala | 2,826 | 23-Sep-96 | 17-Oct-96 | 24 | 62 | | 18-Dec-96 | 19-Dec-96 | 1 | 18 | 6-Jan-97 | 19-Jan-97 | 13 | 0 | 19-Jan-97 | 3-Feb-97 | 15 | 51 | 26-Mar-97 | 184 |
| 23 | Moukhtaam [2] | Moukhtaam | 18,813 | 13-Nov-96 | 3-Dec-96 | 20 | 78 | | 19-Feb-97 | 27-Feb-97 | 8 | 12 | 11-Mar-97 | 12-Mar-97 | 1 | 0 | 12-Mar-97 | 22-Mar-97 | 10 | 79 | 9-Jun-97 | 208 |
| 24 | Kadam | A-Kafersousse | 4,900 | 24-Oct-96 | 14-Nov-96 | 21 | 66 | | 19-Jan-97 | 20-Jan-97 | 1 | 6 | 26-Jan-97 | 27-Jan-97 | 1 | 0 | 27-Jan-97 | 3-Feb-97 | 7 | 49 | 24-Mar-97 | 151 |
| | | B-Al Ashmar | | 24-Oct-96 | 14-Nov-96 | | | | | | | | | | | | 27-Jan-97 | 3-Feb-97 | 7 | 58 | 2-Apr-97 | 160 |
| 25 | Kafersousse [2] | A-merzze | 9,332 | 21-Oct-96 | 15-Nov-96 | 25 | 74 | | 28-Jan-97 | 1-Feb-97 | 4 | 24 | 25-Feb-97 | 1-Mar-97 | 4 | 0 | 1-Mar-97 | 15-Mar-97 | 14 | 86 | 9-Jun-97 | 231 |
| | | B-Kafersousse | | 21-Oct-96 | 15-Nov-96 | | | | | | | | | | | | 1-Mar-97 | 15-Mar-97 | 14 | 9 | 24-Mar-97 | 154 |
| 26 | Kassioun | A-Akrad | 9,599 | 14-Sep-96 | 2-Oct-96 | 18 | 42 | | 13-Nov-96 | 27-Nov-96 | 14 | 26 | 23-Dec-96 | 28-Dec-96 | 5 | 0 | 28-Dec-96 | 30-Jan-97 | 33 | 0 | 30-Jan-97 | 138 |
| | | B-Mohajreen | | 14-Sep-96 | 2-Oct-96 | | | | 13-Nov-96 | 27-Nov-96 | 14 | 26 | 23-Dec-96 | 28-Dec-96 | 5 | 0 | 28-Dec-96 | 30-Jan-97 | 33 | 38 | 9-Mar-97 | 176 |
| | | Total | 225,944 | | Average [4] | 20 | 67 | | | Average [4] | 7 | 28 | | Average [4] | 5 | 3 | | Average [4] | 21 | 44 | Average [4] | 197 |
| | | | | Time to complete one cycle | | 131 | | | | | | | Time to complete one cycle | | 128 | | | | | | | |

Notes

1. Days = calendar days, seven calendar days=six working days, 1 day= .86 work days
2. Bills have not been delivered to collection centres as of June 9 1997, but meters have been read for next billing cycle.
3. Time from last meter reading until bill issued to payment collection centre
4. Averages are for completing one district

**Table E-1.4 Analysis of staffing levels for meter reading**

| | | |
|---|---|---|
| **Existing situation (billing no. 269)** | | |
| Time to read the meters for one complete billing cycle | Calendar days | 131 |
| | Working days | 112 |
| Number of bills (including government/institutional) | | 253,102 |
| Number of connections per day | | 2,254 |
| Number of staff available | Total | 38 |
| | less assigned to office duty | 5 |
| | less assigned to meter repairs | 5 |
| | less new trainees | 3 |
| | Net available for meter reading | 25 |
| Approximate meter reading productivity (Number of meters per reader per day) = | | 90 |
| Required meter reading productivity (Number of meters per reader per day) = | | 125 |
| Efficiency = | | 72% |
| **To read meters every three months** (Assuming the existing efficiency) | | |
| Calendar days = | | 90 |
| working days = | | 77 |
| Number of connections per day = | | 3,281 |
| Number of staff assuming existing productivity of 90 meters per reader per day = | | 36 |
| Number of staff assuming increase in daily productivity to 125 meters per reader per day = | | 26 |
| Required productivity with no change in staff (Number of meters per reader per day) = | | 131 |
| percentage increase over existing productivity | | 46% |

**Table E-1.5 Percentage of Unread Meters**

| Meter District Name | Book No. | Total No. of Meters | Unread Meters (1) | Percent Unread |
|---|---|---|---|---|
| Moukhaiam | 55 | 191 | 12 | 6.3 |
| | 8 | 286 | 40 | 14.0 |
| | 44 | 193 | 32 | 16.6 |
| | 28 | 400 | 78 | 19.5 |
| Kanawat | 104 | 238 | 19 | 8.0 |
| | 106 | 198 | 20 | 10.1 |
| | 54 | 240 | 35 | 14.6 |
| | 39 | 227 | 20 | 8.8 |
| | 30 | 295 | 20 | 6.8 |
| Sarouja | 129 | 162 | 6 | 3.7 |
| | 95 | 358 | 16 | 4.5 |
| | 59 | 188 | 10 | 5.3 |
| | 90 | 246 | 31 | 12.6 |
| | 120 | 350 | 18 | 5.1 |
| Kaboun | 5 | 335 | 35 | 10.4 |
| | 41 | 155 | 35 | 22.6 |
| | 23 | 202 | 37 | 18.3 |
| | 14 | 179 | 15 | 8.4 |
| | 8 | 214 | 49 | 22.9 |
| Mohajreen | 43 | 296 | 7 | 2.4 |
| | 11 | 138 | 14 | 10.1 |
| | 80 | 258 | 31 | 12.0 |
| | 29 | 268 | 15 | 5.6 |
| | 86 | 306 | 25 | 8.2 |
| Total | | 5,923 | 620 | 10.5 |

(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**

| | | Processsing Time | | | |
|---|---|---|---|---|---|
| Meter District | No. of bills | Average No. of Days | Average Bills per Day | No. of Errors | % errors |
| Mohajreen | 13,813 | 15 | 921 | 67 | 0.49% |
| Kaboun | 5,357 | 11 | 487 | 13 | 0.24% |
| Sarouja | 14,134 | 20 | 707 | 52 | 0.37% |
| kanawat | 15,894 | 36 | 442 | 104 | 0.65% |
| Moukhaiam | 18,171 | 10 | 1,817 | 117 | 0.64% |

Source - DAWSSA Consumer Affairs Directorate



**Table E-1.7 Number of Unpaid Bills per Billing Cycle**

| | | | | Unpaid (1) | | | |
|---|---|---|---|---|---|---|---|
| Cycle No. | Quarter | No of Bills | Value | No of Bills | Value | % of bills | % of value |
| 258 | 3/3/94 | 227,866 | 59,462,182 | 5,340 | 2,101,715 | 2.3% | 3.5% |
| 259 | 6/30/94 | 227,486 | 70,927,374 | 6,618 | 5,153,578 | 2.9% | 7.3% |
| 260 | 9/30/94 | 231,022 | 70,537,444 | 9,254 | 3,821,326 | 4.0% | 5.4% |
| 261 | 12/31/94 | 230,726 | 59,172,318 | 11,117 | 4,797,281 | 4.8% | 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 | 5.3% | 8.2% |
| 263 | 6/30/95 | 232,874 | 61,238,150 | 13,811 | 6,593,971 | 5.9% | 10.8% |
| 264 | 9/30/95 | 235,438 | 60,295,408 | 16,014 | 6,292,443 | 6.8% | 10.4% |
| 265 | 12/31/95 | 235,017 | 52,840,099 | 23,751 | 7,855,191 | 10.1% | 14.9% |
| total 1995 | | 936,790 | 233,689,142 | 65,992 | 25,621,764 | 7.0% | 11.0% |

Source - DAWSSA Consumer Affairs Directorate

(1) = unpaid bills as of May 31 1997

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

| Existing account code structure | | | |
|---|---|---|---|
| Main account | sub-account | sub-account | Description |
| 12 | | | **Fixed assetts** |
| | 121 | | land |
| | 122 | | buildings |
| | 123 | | equipment |
| | 124 | | transport |
| | 125 | | tools |
| | 126 | | office furniture |
| 31 | | | **wages/salary** |
| | 31.1 | | |
| | | 31.11 | basic |
| | | 31.12 | holiday wages |
| | | 31.13 | overtime |
| | | 31.14 | |
| | | 31.15 | encouragement bonus |
| | | 31.16 | production bonus |
| | 312 | | non-monetary advantages |
| | 313 | | special insurance |
| | 314 | | social insurance |
| 32 | | | **Raw materials used in production of manufactured goods** |
| | 321 | | basic |
| | | 3211 | chlorine |
| | 322 | | secondary |
| | 323 | | fuel & oil |
| | 324 | | tools & spare parts |
| | 325 | | not used by DAWSSA |
| | 326 | | not used by DAWSSA |
| | 327 | | stationary, books,printed materials |
| | 328 | | not used by DAWSSA |
| | 329 | | others |
| 33 | | | **Contract Services** |
| | 331 | | contracted maintenance |
| | 332 | | not used by DAWSSA |
| | 333 | | not used by DAWSSA |
| | 334 | | public relations, advertising, entertaining |
| | 335 | | transport |
| | 336 | | equipment & transportation rentals |
| | 337 | | Power & water |
| | 338 | | mail, cable, telephone, telex, etc... |
| | 339 | | miscellaneous service expenses |
| 34 | | | **Purchases for resale** |
| | 341 | | service connection materials |
| 35 | | | **Fixed costs** |
| | 351 | | taxes & stamp duties |
| | 352 | | depreciation |
| | | 3522 | buildings |
| | | 3523 | machine |
| | | 3525 | tools |
| | | 3526 | office assets |
| | 353 | | rents |
| 36 | | | **Special expenses** |
| | 363 | | damage claims |
| | 365 | | outsanding debts |
| | 367 | | retiring allowance |
| | 368 | | real estate tax |
| | 369 | | income tax from previous years |

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

| Item No. | Location | Hardware | Qty. | Users | Function |
|---|---|---|---|---|---|
| **1** | **Accounting, 6 floor** | **Bull DPX2000** | **1** | **Network No. 1** | **network file server** |
| 1a | 4 floor | Monochrome CRT | 4 | Computer Section, Special Studies Direct. | distribution network database |
| 1b | 3 floor | Monochrome CRT | 1 | Water Measurement Section | spring & wells, daily discharge database |
| 1c | 3 floor | Monochrome CRT | 1 | Environment Directorate | chemical & bacteriological tests database |
| 1d | 3 floor | Monochrome CRT | 1 | Telecom. Section | telephone switchboard |
| 1e | 1 floor | Monochrome CRT | 1 | Production Directorate | production center assets database |
| 1f | 2 floor | Monochrome CRT | 1 | Main Project Directorate | spring discharge database & forecasting |
| 1g | ground floor | Monochrome CRT | 1 | Planning Directorate | statistics |
| 1h | 6 floor | Monochrome CRT | 1 | Server console | |
| 1i | 1 floor | Monochrome CRT | 1 | Distribution Directorate | |
| 1j | Accounting, 6 floor | Alis 4440 line printer | 2 | Accounting Directorate | customer information, metering & billing data |
| 1k | Accounting, 6 floor | Alis 1020 dot matrix | 1 | Accounting Dept. | billing data |
| **2** | **Accounting, 6 floor** | **Bull DPX2000** | **1** | **second network** | **network file server** |
| 2a | 6 floor | Monochrome CRT | 6 | Computer Section, Accounting Directorate | Billing |
| 2b | 6 floor | Monochrome CRT | 1 | Server console | |
| 2c | 5 floor | Monochrome CRT | 1 | Accounting and Materials Inventory program | |
| 2d | Computer Section, 4 floor | Alis 1020 dot matrix | 1 | Computer Section, Special Studies Direct. | application programs |
| 2e | Computer Section, 4 floor | Calcomp plotter 10255E | 1 | Computer Section, Special Studies Direct. | Plot distribution network plans |
| 2f | Computer Section, 4 floor | Calcomp digitizer 953060 | 1 | Computer Section, Special Studies Direct. | Digitize distribution network drawings |

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

| Item No. | Location | Personal Computers | | | | Software | Peripheral Devices |
|---|---|---|---|---|---|---|---|
| | | Name Brand | Processor | Hard Disk | Drives | | |
| 3 | laboratory | Gateway | DX2, 66MHz, 8 MB RAM | 730MB | 8x CD ROM, FD 3.5 | sample analysis database | ink jet printer |
| 4 | telephone operator | Samsung | DX4, 100MHz, 12 MB RAM | 850 MB | 8x CD ROM, FD 5.25 & 3.25 | telephone number records | dot matrix printer |
| 5 | Planning Directorate | Samsung | DX2, 66MHz, 8 MB RAM | 340 MB | 8x CD ROM, FD 5.25 & 3.25 | Excel and Winword, work processes | laser printer |
| 6 | Planning Directorate | Phillips | Pentium, 133 MHz, 22 MB RAM | 1.7 GB | 10x CD ROM, FD 3.5 | Excel and Winword, statistical tables, reports | ink jet printer |
| 7 | Main Projects Directorate | Samsung | Cyrix 486, 87 MHz, 8 MB RAM | 250 MB | 6x CD ROM, FD 3.5 | Excel, daily discharge from wells & springs | ink jet printer |
| 8 | Main Projects Directorate | Phillips | Pentium, 133 MHz, 22 MB RAM | 1.7 GB | 10x CD ROM, FD 3.5 | Excel, statistics for wells & springs | scanner, A4 size |
| 9 | Water Resources Directorate | Phillips | Pentium, 133 MHz, 22 MB RAM | 1.7 GB | 10x CD ROM, FD 3.5 | program for well & spring measurements | laser printer |
| 10 | Telecom Section | DTC (local) | Pentium, 133 MHz, 32 MB RAM | 1.6 GB | 12x CD ROM, FD 3.5 | SCADA programs | ink jet printer |
| 11 | Director General | Phillips | Pentium, 133 MHz, 22 MB RAM | 1.7 GB | 10x CD ROM, FD 3.5 | typing admin. orders and tables, archiving | ink jet printer |
| 12 | Accounting Directorate | Samsung | DX2 486, 66MHz, 8 MB RAM | 420 MB | FD 3.5 & 5.25 | materials accounting program | dot matrix printer |
| 13 | Finance Directorate | Samsung | DX2, 66 MHz, 8 MB RAM | 250 MB | FD 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 | 10x CD ROM, FD 3.5 | Excel & Windows, tables, bonus pay | ink jet printer |
| 15 | Studies/works Directorate | Acer | DX2, 66MHz, 16 MB RAM | 1 GB & 540 MB | 4x CD ROM, FD 3.5 & 5.25 | structural analysis program | dot matrix printer |
| 16 | Studies/works Directorate | Samsung | DX2, 66 MHz, 8 MB RAM | 340 MB & 250 MB | FD 3.5 & 5.25 | AutoCad, Word, Excel | laser printer |
| 17 | Studies/works Directorate | Phillips | Pentium, 133 MHz, 40 MB RAM | 1.7 GB | 10x CD ROM, FD 3.5 | scan small drawings and use AutoCad | ink jet printer, scanner A4 size |
| 18 | Studies/works Directorate | Phillips | Pentium, 133 MHz, 40 MB RAM | 1.7 GB | CD Read & Write | scan large drawings and use AutoCad | plotter, scanner A0 size |
| 19 | Studies/works Directorate | assembled by DAWSS/ | Pentium, 200 MHz, 32 MB RAM | 2 GB | 10x CD ROM, FD 3.5 | distribution system drawings, AutoCad | ink jet printer & digitizer |
| 20 | Studies/works Directorate | Sicher | DX 33 MHz, 4 MB RAM | 850 MB | FD 5.25 | Excel and Winword for reports | |

**Table E-1.10 Computer Application Needs and Status of Development**

| Applications | Functional Areas: Production Centers | Distribution Network | Engineering | Customer Service | Finance | Accounting | Administrative Services | Human resources |
|---|---|---|---|---|---|---|---|---|
| Office automation | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Budgeting | ○ | ○ | ○ | | ○ | | | |
| Meter Reading | | | ○ | ○ | | ○ | | |
| Billing | | | | ○ | ○ | ○ | | |
| Customer Information | | | | ○ | ○ | ○ | | |
| General Ledger | | | | | | ● | | |
| Cost Accounting | | | | | | ○ | | |
| Expenditure Control | | | | | ○ | ○ | | |
| Cash Management | | | | | ○ | | | |
| Inventory Management | | | | | | ○ | | |
| Purchasing | | | | | ○ | ○ | | |
| Project Management | | | ○ | | ○ | ○ | | |
| Laboratory Information | ○ | ○ | ○ | ○ | | | | |
| Production Operations | ○ | ○ | | | | | | |
| Maintenance Management | ○ | ○ | ○ | ○ | | ○ | | |
| Human Resources Management | | | | | ● | ○ | ○ | |
| Geographic Information | ○ | ○ | ○ | ○ | | | | |
| Computer Aided Drawing | ○ | ○ | ○ | ○ | | | | |

Exists ●

Partially Developed ○

Needed ○

**Table E-2.1 Staffing Requirements for Information Technology Directorate**

| Branch | Location | Staff Position | Role | Number of Staff |
|---|---|---|---|---|
| Computer Center Group | DAWSSA HQ | Operator | Operating and maintaining CIS & FMIS, database, backups | 2 |
| | | Operator | Billing production, printing & exception reports | 2 |
| | | Operator | Billing data transfer and management | 4 |
| | | Clerk | follow-up exception reports | 1 |
| | | Clerk | coordination with cashiers | 1 |
| Technical Services Group | DAWSSA HQ | System Engineer | Developing office applications & providing users with support | 2 |
| | | System Engineer | Managing of CIS and FMIS applications and development, user suppor | 2 |
| | | Systems Engineer | Network Administration | 1 |
| | | Systems Engineer | Data communications support SCADA, LAN & WAN | 1 |
| | | Systems Engineer | SCADA applications development | 2 |
| | | SCADA technician | SCADA support and maintenance, Instrumentation & control technolog | 2 |
| | | Computer technician | hardware maintenance, and user support | 1 |
| | Remote sites | Computer technician | hardware maintenance, and user support | 5 |

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

| | | | | Consumer Affairs Directorate | | | | Accounting Directorate | | | | | | | | Consumer Affairs Directorate | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Read Meters | | | Reduced | Enter Data | | | Verify & | Produce Bills | | | Reduced | Statement Correction | | | | Statement issued | Total Time |
| No. | District name | Collection centre | No. of Bills | start | end | duration | delay | start | end | duration | Correct | printed | issue | Duration | delay | Received | Back to Acctg. | duration | delay | To cashier | lapse [3] |
| 1 | Kanawat | A-Kanawat | 15,987 | 25-Jul-96 | 11-Aug-96 | 17 | 14 | 25-Aug-96 | 4-Sep-96 | 9 | 9 | 12-Sep-96 | 27-Sep-96 | 15 | 2 | 29-Sep-96 | 4-Nov-96 | 36 | 7 | 11-Nov-96 | 109 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 2 | Zafsa | Bab Mussla | 6,294 | 4-Sep-96 | 28-Sep-96 | 24 | 14 | 12-Oct-96 | 13-Oct-96 | 1 | 39 | 21-Nov-96 | 22-Nov-96 | 1 | 2 | 24-Nov-96 | 27-Dec-96 | 33 | 7 | 3-Jan-97 | 121 |
| 3 | Akrad | A- Akrad | 11,031 | 28-Jul-96 | 20-Aug-96 | 23 | 14 | 3-Sep-96 | 8-Sep-96 | 5 | 26 | 4-Oct-96 | 11-Oct-96 | 7 | 2 | 13-Oct-96 | 7-Nov-96 | 25 | 7 | 14-Nov-96 | 109 |
| | | B-Al jeser Al Abiad | | | | | | | | | | | | | | | | | | | |
| 4 | Janoub Yazid | Janoub Yazid | 6,587 | 10-Aug-96 | 25-Aug-96 | 15 | 14 | 8-Sep-96 | 9-Sep-96 | 1 | 32 | 11-Oct-96 | 16-Oct-96 | 5 | 2 | 18-Oct-96 | 18-Nov-96 | 31 | 7 | 25-Nov-96 | 107 |
| 5 | Salhia Sharkia | A-Al jeser Al Abiad | 8,731 | 4-Aug-96 | 21-Aug-96 | 17 | 14 | 4-Sep-96 | 11-Sep-96 | 7 | 5 | 16-Sep-96 | 28-Sep-96 | 12 | 2 | 30-Sep-96 | 22-Oct-96 | 22 | 7 | 29-Oct-96 | 86 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 6 | Salhia Gharbia | Salhia Gharbia | 9,094 | 4-Aug-96 | 21-Aug-96 | 17 | 14 | 4-Sep-96 | 4-Sep-96 | 0 | 37 | 11-Oct-96 | 13-Oct-96 | 2 | 2 | 15-Oct-96 | 30-Oct-96 | 15 | 7 | 6-Nov-96 | 94 |
| 7 | Mohajreen | Mohajreen | 13,923 | 18-Aug-96 | 18-Sep-96 | 31 | 14 | 2-Oct-96 | 27-Oct-96 | 25 | 66 | 1-Jan-97 | 2-Jan-97 | 1 | 2 | 4-Jan-97 | 19-Jan-97 | 15 | 7 | 26-Jan-97 | 161 |
| 8,9,10 | Kimaria | A-Shagour | 22,294 | 22-Aug-96 | 18-Sep-96 | 27 | 14 | 2-Oct-96 | 20-Oct-96 | 18 | 66 | 25-Dec-96 | 29-Dec-96 | 4 | 2 | 31-Dec-96 | 11-Jan-97 | 11 | 7 | 18-Jan-97 | 149 |
| | | B-Baghdad st. | | | | | | | | | | | | | | | | | | | |
| | | C-Bab Touma | | | | | | | | | | | | | | | | | | | |
| | | D-Abasyin | | | | | | | | | | | | | | | | | | | |
| 11 | Sharky Al Tiara | Abasyin | 1,835 | 19-Oct-96 | 31-Oct-96 | 12 | 14 | 14-Nov-96 | 17-Nov-96 | 3 | 57 | 13-Jan-97 | 23-Jan-97 | 10 | 2 | 25-Jan-97 | 19-Feb-97 | 25 | 7 | 26-Feb-97 | 130 |
| 12 | Barza Al Balad | Masaken Barza | 3,012 | 15-Oct-96 | 6-Nov-96 | 22 | 14 | 20-Nov-96 | 22-Nov-96 | 2 | 10 | 2-Dec-96 | 9-Dec-96 | 7 | 2 | 11-Dec-96 | 26-Dec-96 | 15 | 7 | 2-Jan-97 | 79 |
| 13 | Shagour | A-Shagour | 1,001 | 18-Aug-96 | 3-Sep-96 | 16 | 14 | 17-Sep-96 | 21-Sep-96 | 4 | 44 | 4-Nov-96 | 6-Nov-96 | 2 | 2 | 8-Nov-96 | 26-Nov-96 | 18 | 7 | 3-Dec-96 | 107 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 14 | Midan | A-Al Ashmar | 15,141 | 23-Sep-96 | 15-Oct-96 | 22 | 14 | 29-Oct-96 | 19-Nov-96 | 21 | 4 | 23-Nov-96 | 27-Nov-96 | 4 | 2 | 29-Nov-96 | 27-Dec-96 | 28 | 7 | 3-Jan-97 | 102 |
| | | B-Bab Masala | | | | | | | | | | | | | | | | | | | |
| 15 | Sarouja | A-Baghdad st. | 14,241 | 1-Sep-96 | 22-Sep-96 | 21 | 14 | 6-Oct-96 | 11-Oct-96 | 5 | 54 | 4-Dec-96 | 6-Dec-96 | 2 | 2 | 8-Dec-96 | 28-Dec-96 | 20 | 7 | 4-Jan-97 | 125 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 16 | Mezze [2] | Mezze 1 | 16,127 | 10-Nov-96 | 30-Nov-96 | 20 | 14 | 14-Dec-96 | 19-Dec-96 | 5 | 12 | 31-Dec-96 | 2-Jan-97 | 2 | 2 | 4-Jan-97 | 24-Jan-97 | 20 | 7 | 31-Jan-97 | 82 |
| | | Mezze 2 | | | | | | | | | | | | | | | | | | | |
| 17,18 | Kiwan, Doumar [2] | Doumar | 12,701 | 2-Nov-96 | 12-Nov-96 | 10 | 14 | 26-Nov-96 | 26-Nov-96 | 0 | 23 | 19-Dec-96 | 24-Dec-96 | 5 | 2 | 26-Dec-96 | 23-Jan-97 | 28 | 7 | 30-Jan-97 | 89 |
| 19 | Masaken Barza | Masaken Barza | 7,182 | 8-Oct-96 | 31-Oct-96 | 23 | 14 | 14-Nov-96 | 18-Nov-96 | 4 | 20 | 8-Dec-96 | 8-Dec-96 | 0 | 2 | 10-Dec-96 | 23-Dec-96 | 13 | 7 | 30-Dec-96 | 83 |
| 20 | Kaboun | Kaboun | 5,492 | 17-Oct-96 | 29-Oct-96 | 12 | 14 | 12-Nov-96 | 23-Nov-96 | 11 | 4 | 27-Nov-96 | 28-Nov-96 | 1 | 2 | 30-Nov-96 | 7-Jan-97 | 38 | 7 | 14-Jan-97 | 89 |
| 21 | Jouber | Jouber | 9,801 | 17-Sep-96 | 5-Oct-96 | 18 | 14 | 19-Oct-96 | 21-Oct-96 | 2 | 47 | 7-Dec-96 | 16-Dec-96 | 9 | 2 | 18-Dec-96 | 4-Jan-97 | 17 | 7 | 11-Jan-97 | 116 |
| 22 | Tabala | Tabala | 2,826 | 23-Sep-96 | 17-Oct-96 | 24 | 14 | 31-Oct-96 | 1-Nov-96 | 1 | 18 | 19-Nov-96 | 2-Dec-96 | 13 | 2 | 4-Dec-96 | 19-Dec-96 | 15 | 7 | 26-Dec-96 | 94 |
| 23 | Moukhtasrn [2] | Moukhtasrn | 18,813 | 13-Nov-96 | 3-Dec-96 | 20 | 14 | 17-Dec-96 | 25-Dec-96 | 8 | 12 | 6-Jan-97 | 7-Jan-97 | 1 | 2 | 9-Jan-97 | 19-Jan-97 | 10 | 7 | 26-Jan-97 | 74 |
| 24 | Kadam | A-Kafersousse | 4,900 | 24-Oct-96 | 14-Nov-96 | 21 | 14 | 28-Nov-96 | 29-Nov-96 | 1 | 6 | 5-Dec-96 | 6-Dec-96 | 1 | 2 | 8-Dec-96 | 15-Dec-96 | 7 | 7 | 22-Dec-96 | 59 |
| | | B-Al Ashmar | | | | | | | | | | | | | | | | | | | |
| 25 | Kafersousse [2] | A-mezze | 9,332 | 21-Oct-96 | 15-Nov-96 | 25 | 14 | 29-Nov-96 | 3-Dec-96 | 4 | 24 | 27-Dec-96 | 31-Dec-96 | 4 | 2 | 2-Jan-97 | 16-Jan-97 | 14 | 7 | 23-Jan-97 | 94 |
| | | B-Kafersousse | | | | | | | | | | | | | | | | | | | |
| 26 | Kassoum | A-Akrad | 9,599 | 14-Sep-96 | 2-Oct-96 | 18 | 14 | 16-Oct-96 | 30-Oct-96 | 14 | 26 | 25-Nov-96 | 30-Nov-96 | 5 | 2 | 2-Dec-96 | 4-Jan-97 | 33 | 7 | 11-Jan-97 | 119 |
| | | B-Mohajreen | | | | | | | | | | | | | | | | | | | |
| | | Total | 225,944 | | Average [4] | 20 | 14 | | Average [4] | 7 | 28 | | Average [4] | 5 | 2 | | Average [4] | 21 | 7 | Average [4] | 103 |
| | | | | | Time for one cycle | 131 | | | | | | | Time for one cycle | 125 | | | | | | | |

Notes

1. Days = calendar days, seven calendar days=six working days, 1 day= .86 work days
2. Bills have not been delivered to collection centres as of June 9 1997, but meters have been read for next billing cycle.
3. Time from last meter reading until bill issued to collection centre
4. Averages are for completing one district

## Table E-2.3 Improved billing schedule (option 3d)

| No. | District name | Collection centre | | Consumer Affairs Directorate: Read Meters start | Read Meters end | Read Meters duration | delay | Accounting Directorate: Enter Data start | Enter Data end | Enter Data duration | Verify & Correct | Produce Bills printed | Produce Bills issue | Duration | delay (Reduced) | Consumer Affairs Directorate: Statement Correction Received | Statement Correction Back to Actg. | Statement Correction duration | delay (Reduced) | Issues Statement To cashier | Total Time lapse [3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | No. of Bills | | | | | | | | | | | | | | | | | | |
| 1 | Kanawat | A-Kanawat | 15,987 | 25-Jul-96 | 11-Aug-96 | 17 | 14 | 25-Aug-96 | 3-Sep-96 | 9 | 9 | 12-Sep-96 | 27-Sep-96 | 15 | 7 | 4-Oct-96 | 4-Oct-96 | 0 | 0 | 4-Oct-96 | 71 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 2 | Zafna | Bab Masala | 6,294 | 4-Sep-96 | 28-Sep-96 | 24 | 14 | 12-Oct-96 | 13-Oct-96 | 1 | 39 | 21-Nov-96 | 22-Nov-96 | 1 | 7 | 29-Nov-96 | 29-Nov-96 | 0 | 0 | 29-Nov-96 | 86 |
| 3 | Akrad | A- Akrad | 11,031 | 28-Jul-96 | 20-Aug-96 | 23 | 14 | 3-Sep-96 | 8-Sep-96 | 5 | 26 | 4-Oct-96 | 11-Oct-96 | 7 | 7 | 18-Oct-96 | 18-Oct-96 | 0 | 0 | 18-Oct-96 | 82 |
| | | B-Al jeser Al Abiad | | | | | | | | | | | | | | | | | | | |
| 4 | Janoub Yazid | Janoub Yazid | 6,567 | 10-Aug-96 | 25-Aug-96 | 15 | 14 | 8-Sep-96 | 9-Sep-96 | 1 | 32 | 11-Oct-96 | 16-Oct-96 | 5 | 7 | 23-Oct-96 | 23-Oct-96 | 0 | 0 | 23-Oct-96 | 74 |
| 5 | Salhia Sharkia | A-Al jeser Al Abiad | 8,731 | 4-Aug-96 | 21-Aug-96 | 17 | 14 | 4-Sep-96 | 11-Sep-96 | 7 | 5 | 16-Sep-96 | 28-Sep-96 | 12 | 7 | 5-Oct-96 | 5-Oct-96 | 0 | 0 | 5-Oct-96 | 62 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 6 | Salhia Gharbia | Salhia Gharbia | 9,094 | 4-Aug-96 | 21-Aug-96 | 17 | 14 | 4-Sep-96 | 4-Sep-96 | 0 | 37 | 11-Oct-96 | 13-Oct-96 | 2 | 7 | 20-Oct-96 | 20-Oct-96 | 0 | 0 | 20-Oct-96 | 77 |
| 7 | Mohajreen | Mohajreen | 13,923 | 18-Aug-96 | 18-Sep-96 | 31 | 14 | 2-Oct-96 | 27-Oct-96 | 25 | 66 | 1-Jan-97 | 2-Jan-97 | 1 | 7 | 9-Jan-97 | 9-Jan-97 | 0 | 0 | 9-Jan-97 | 144 |
| 8,9,10 | Kimana | A-Shagour | 22,294 | 22-Aug-96 | 18-Sep-96 | 27 | 14 | 2-Oct-96 | 20-Oct-96 | 18 | 66 | 25-Dec-96 | 29-Dec-96 | 4 | 7 | 5-Jan-97 | 5-Jan-97 | 0 | 0 | 5-Jan-97 | 136 |
| | | B-Baghdad st. | | | | | | | | | | | | | | | | | | | |
| | | C-Bab Touma | | | | | | | | | | | | | | | | | | | |
| | | D-Abasyin | | | | | | | | | | | | | | | | | | | |
| 11 | Sherky Al Tijara | Abasyin | 1,835 | 19-Oct-96 | 31-Oct-96 | 12 | 14 | 14-Nov-96 | 17-Nov-96 | 3 | 57 | 13-Jan-97 | 23-Jan-97 | 10 | 7 | 30-Jan-97 | 30-Jan-97 | 0 | 0 | 30-Jan-97 | 103 |
| 12 | Barza Al Balad | Mwaken Barza | 3,012 | 15-Oct-96 | 6-Nov-96 | 22 | 14 | 20-Nov-96 | 22-Nov-96 | 2 | 10 | 2-Dec-96 | 9-Dec-96 | 7 | 7 | 16-Dec-96 | 16-Dec-96 | 0 | 0 | 16-Dec-96 | 62 |
| 13 | Shagour | A-Shagour | 1,001 | 18-Aug-96 | 3-Sep-96 | 16 | 14 | 17-Sep-96 | 21-Sep-96 | 4 | 44 | 4-Nov-96 | 6-Nov-96 | 2 | 7 | 13-Nov-96 | 13-Nov-96 | 0 | 0 | 13-Nov-96 | 87 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 14 | Midan | A-Al Ashmar | 15,141 | 23-Sep-96 | 15-Oct-96 | 22 | 14 | 29-Oct-96 | 19-Nov-96 | 21 | 4 | 23-Nov-96 | 27-Nov-96 | 4 | 7 | 4-Dec-96 | 4-Dec-96 | 0 | 0 | 4-Dec-96 | 72 |
| | | B-Bab Masala | | | | | | | | | | | | | | | | | | | |
| 15 | Sarouja | A-Baghdad st. | 14,241 | 1-Sep-96 | 22-Sep-96 | 21 | 14 | 6-Oct-96 | 11-Oct-96 | 5 | 54 | 4-Dec-96 | 6-Dec-96 | 2 | 7 | 13-Dec-96 | 13-Dec-96 | 0 | 0 | 13-Dec-96 | 103 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 16 | Mezze [2] | Mezze 1 | 16,127 | 10-Nov-96 | 30-Nov-96 | 20 | 14 | 14-Dec-96 | 19-Dec-96 | 5 | 12 | 31-Dec-96 | 2-Jan-97 | 2 | 7 | 9-Jan-97 | 9-Jan-97 | 0 | 0 | 9-Jan-97 | 60 |
| | | Mezze 2 | | | | | | | | | | | | | | | | | | | |
| 17,18 | Kiwan Doumar [2] | Doumar | 12,701 | 2-Nov-96 | 12-Nov-96 | 10 | 14 | 26-Nov-96 | 26-Nov-96 | 0 | 23 | 19-Dec-96 | 24-Dec-96 | 5 | 7 | 31-Dec-96 | 31-Dec-96 | 0 | 0 | 31-Dec-96 | 59 |
| 19 | Mawaken Barza | Mawaken Barza | 7,182 | 8-Oct-96 | 31-Oct-96 | 23 | 14 | 14-Nov-96 | 18-Nov-96 | 4 | 20 | 8-Dec-96 | 8-Dec-96 | 0 | 7 | 15-Dec-96 | 15-Dec-96 | 0 | 0 | 15-Dec-96 | 68 |
| 20 | Kaboun | Kaboun | 5,492 | 17-Oct-96 | 29-Oct-96 | 12 | 14 | 12-Nov-96 | 23-Nov-96 | 11 | 4 | 27-Nov-96 | 28-Nov-96 | 1 | 7 | 5-Dec-96 | 5-Dec-96 | 0 | 0 | 5-Dec-96 | 49 |
| 21 | Jouber | Jouber | 9,801 | 17-Sep-96 | 5-Oct-96 | 18 | 14 | 19-Oct-96 | 21-Oct-96 | 2 | 47 | 7-Dec-96 | 16-Dec-96 | 9 | 7 | 23-Dec-96 | 23-Dec-96 | 0 | 0 | 23-Dec-96 | 97 |
| 22 | Tabala | Tabala | 2,826 | 23-Sep-96 | 17-Oct-96 | 24 | 14 | 31-Oct-96 | 1-Nov-96 | 1 | 18 | 19-Nov-96 | 2-Dec-96 | 13 | 7 | 9-Dec-96 | 9-Dec-96 | 0 | 0 | 9-Dec-96 | 77 |
| 23 | Moukhtasm [2] | Moukhtasm | 18,813 | 13-Nov-96 | 3-Dec-96 | 20 | 14 | 17-Dec-96 | 25-Dec-96 | 8 | 12 | 6-Jan-97 | 7-Jan-97 | 1 | 7 | 14-Jan-97 | 14-Jan-97 | 0 | 0 | 14-Jan-97 | 62 |
| 24 | Kadam | A-Kafersousse | 4,900 | 24-Oct-96 | 14-Nov-96 | 21 | 14 | 28-Nov-96 | 29-Nov-96 | 1 | 6 | 5-Dec-96 | 6-Dec-96 | 1 | 7 | 13-Dec-96 | 13-Dec-96 | 0 | 0 | 13-Dec-96 | 50 |
| | | B-Al Ashmar | | | | | | | | | | | | | | | | | | | |
| 25 | Kafersousse [2] | A-mezze | 9,332 | 21-Oct-96 | 15-Nov-96 | 25 | 14 | 29-Nov-96 | 3-Dec-96 | 4 | 24 | 27-Dec-96 | 31-Dec-96 | 4 | 7 | 7-Jan-97 | 7-Jan-97 | 0 | 0 | 7-Jan-97 | 78 |
| | | B-Kafersousse | | | | | | | | | | | | | | | | | | | |
| 26 | Kasmoun | A-Akrad | 9,599 | 14-Sep-96 | 2-Oct-96 | 18 | 14 | 16-Oct-96 | 30-Oct-96 | 14 | 26 | 25-Nov-96 | 30-Nov-96 | 5 | 7 | 7-Dec-96 | 7-Dec-96 | 0 | 0 | 7-Dec-96 | 84 |
| | | B-Mohajreen | | | | | | | | | | | | | | | | | | | |
| | | Total | 225,944 | | Average [4] | 20 | 14 | | Average [4] | 7 | 28 | | Average [4] | 5 | 7 | | Average [4] | 0 | 0 | Average [4] | 80 |
| | | | | | Time for one cycle | 131 | | | | | | | Time for one cycle | 128 | | | | | | | |

Notes

1. Days = calendar days, seven calendar days=six working days, 1 day= .86 work days
2. Bills have not been delivered to collection centres as of June 9 1997, but meters have been read for next billing cycle.
3. Time from last meter reading to bill issued to collection centre

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

Reduce ▼ Reduce ▼

| No. | District name | Collection centre | | Consumer Affairs Directorate: Read Meters | | | | Accounting Directorate: Enter Data | | | Verify & | Produce Bills | | | | Consumer Affairs Directorate: Statement Correction | | | | Issues Statement | Total Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | No. of Bills | start | end | duration | delay | start | end | duration | Correct | printed | issue | Duration | delay | Received | Back to Acctg. | duration | delay | To cashier | Lapse [3] |
| 1 | Kanawat | A-Kanawat | 15,987 | 25-Jul-96 | 11-Aug-96 | 17 | 2 | 13-Aug-96 | 14-Aug-96 | 1 | 0 | 14-Aug-96 | 21-Aug-96 | 7 | 7 | 28-Aug-96 | 28-Aug-96 | 0 | 0 | 28-Aug-96 | 34 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 2 | Zifta | Bab Mustafa | 6,294 | 4-Sep-96 | 28-Sep-96 | 24 | 2 | 30-Sep-96 | 1-Oct-96 | 1 | 0 | 1-Oct-96 | 2-Oct-96 | 1 | 7 | 9-Oct-96 | 9-Oct-96 | 0 | 0 | 9-Oct-96 | 35 |
| 3 | Akrad | A- Akrad | 11,031 | 28-Jul-96 | 20-Aug-96 | 23 | 2 | 22-Aug-96 | 23-Aug-96 | 1 | 0 | 23-Aug-96 | 26-Aug-96 | 3 | 7 | 2-Sep-96 | 2-Sep-96 | 0 | 0 | 2-Sep-96 | 36 |
| | | B-Al jeser Al Abiad | | | | | | | | | | | | | | | | | | | |
| 4 | Janoub Yanid | Janoub Yanid | 6,587 | 10-Aug-96 | 25-Aug-96 | 15 | 2 | 27-Aug-96 | 28-Aug-96 | 1 | 0 | 28-Aug-96 | 30-Aug-96 | 2 | 7 | 6-Sep-96 | 6-Sep-96 | 0 | 0 | 6-Sep-96 | 27 |
| 5 | Salhia Sharkia | A-Al jeser Al Abiad | 8,731 | 4-Aug-96 | 21-Aug-96 | 17 | 2 | 23-Aug-96 | 24-Aug-96 | 1 | 0 | 24-Aug-96 | 30-Aug-96 | 6 | 7 | 6-Sep-96 | 6-Sep-96 | 0 | 0 | 6-Sep-96 | 33 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 6 | Salhia Gharbia | Salhia Gharbia | 9,094 | 4-Aug-96 | 21-Aug-96 | 17 | 2 | 23-Aug-96 | 24-Aug-96 | 1 | 0 | 24-Aug-96 | 25-Aug-96 | 1 | 7 | 1-Sep-96 | 1-Sep-96 | 0 | 0 | 1-Sep-96 | 28 |
| 7 | Mohayreen | Mohayreen | 13,923 | 18-Aug-96 | 18-Sep-96 | 31 | 2 | 20-Sep-96 | 21-Sep-96 | 1 | 0 | 21-Sep-96 | 22-Sep-96 | 1 | 7 | 29-Sep-96 | 29-Sep-96 | 0 | 0 | 29-Sep-96 | 42 |
| 8,9,10 | Kimana | A-Shagour | 22,294 | 22-Aug-96 | 18-Sep-96 | 27 | 2 | 20-Sep-96 | 21-Sep-96 | 1 | 0 | 21-Sep-96 | 23-Sep-96 | 2 | 7 | 30-Sep-96 | 30-Sep-96 | 0 | 0 | 30-Sep-96 | 39 |
| | | B-Baghdad st. | | | | | | | | | | | | | | | | | | | |
| | | C-Bab Touma | | | | | | | | | | | | | | | | | | | |
| | | D-Abaiyn | | | | | | | | | | | | | | | | | | | |
| 11 | Sharky Al Tijara | Abeiyn | 1,835 | 19-Oct-96 | 31-Oct-96 | 12 | 2 | 2-Nov-96 | 3-Nov-96 | 1 | 0 | 3-Nov-96 | 8-Nov-96 | 5 | 7 | 15-Nov-96 | 15-Nov-96 | 0 | 0 | 15-Nov-96 | 27 |
| 12 | Barra Al Balad | Masaken Barra | 3,012 | 15-Oct-96 | 6-Nov-96 | 22 | 2 | 8-Nov-96 | 9-Nov-96 | 1 | 0 | 9-Nov-96 | 12-Nov-96 | 3 | 7 | 19-Nov-96 | 19-Nov-96 | 0 | 0 | 19-Nov-96 | 35 |
| 13 | Shagour | A-Shagour | 1,001 | 18-Aug-96 | 3-Sep-96 | 16 | 2 | 5-Sep-96 | 6-Sep-96 | 1 | 0 | 6-Sep-96 | 8-Sep-96 | 2 | 7 | 15-Sep-96 | 15-Sep-96 | 0 | 0 | 15-Sep-96 | 28 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 14 | Midan | A-Al Ashmar | 15,141 | 23-Sep-96 | 15-Oct-96 | 22 | 2 | 17-Oct-96 | 18-Oct-96 | 1 | 0 | 18-Oct-96 | 20-Oct-96 | 2 | 7 | 27-Oct-96 | 27-Oct-96 | 0 | 0 | 27-Oct-96 | 34 |
| | | B-Bab Masala | | | | | | | | | | | | | | | | | | | |
| 15 | Sarenga | A-Baghdad st. | 14,241 | 1-Sep-96 | 22-Sep-96 | 21 | 2 | 24-Sep-96 | 25-Sep-96 | 1 | 0 | 25-Sep-96 | 26-Sep-96 | 1 | 7 | 3-Oct-96 | 3-Oct-96 | 0 | 0 | 3-Oct-96 | 32 |
| | | B- DAWSSA | | | | | | | | | | | | | | | | | | | |
| 16 | Mezze [2] | Mezze 1 | 16,127 | 10-Nov-96 | 30-Nov-96 | 20 | 2 | 2-Dec-96 | 3-Dec-96 | 1 | 0 | 3-Dec-96 | 4-Dec-96 | 1 | 7 | 11-Dec-96 | 11-Dec-96 | 0 | 0 | 11-Dec-96 | 31 |
| | | Mezze 2 | | | | | | | | | | | | | | | | | | | |
| 17,18 | Kiwan, Doumar [2] | Doumar | 12,701 | 2-Nov-96 | 12-Nov-96 | 10 | 2 | 14-Nov-96 | 15-Nov-96 | 1 | 0 | 15-Nov-96 | 17-Nov-96 | 2 | 7 | 24-Nov-96 | 24-Nov-96 | 0 | 0 | 24-Nov-96 | 22 |
| 19 | Masaken Barra | Masaken Barra | 7,182 | 8-Oct-96 | 31-Oct-96 | 23 | 2 | 2-Nov-96 | 3-Nov-96 | 1 | 0 | 3-Nov-96 | 3-Nov-96 | 0 | 7 | 10-Nov-96 | 10-Nov-96 | 0 | 0 | 10-Nov-96 | 33 |
| 20 | Kaboun | Kaboun | 5,492 | 17-Oct-96 | 29-Oct-96 | 12 | 2 | 31-Oct-96 | 1-Nov-96 | 1 | 0 | 1-Nov-96 | 2-Nov-96 | 1 | 7 | 9-Nov-96 | 9-Nov-96 | 0 | 0 | 9-Nov-96 | 23 |
| 21 | Jouber | Jouber | 9,801 | 17-Sep-96 | 5-Oct-96 | 18 | 2 | 7-Oct-96 | 8-Oct-96 | 1 | 0 | 8-Oct-96 | 12-Oct-96 | 4 | 7 | 19-Oct-96 | 19-Oct-96 | 0 | 0 | 19-Oct-96 | 32 |
| 22 | Tabala | Tabala | 2,826 | 23-Sep-96 | 17-Oct-96 | 24 | 2 | 19-Oct-96 | 20-Oct-96 | 1 | 0 | 20-Oct-96 | 26-Oct-96 | 6 | 7 | 2-Nov-96 | 2-Nov-96 | 0 | 0 | 2-Nov-96 | 40 |
| 23 | Moukhaiam [2] | Moukhaiam | 18,813 | 13-Nov-96 | 3-Dec-96 | 20 | 2 | 5-Dec-96 | 6-Dec-96 | 1 | 0 | 6-Dec-96 | 7-Dec-96 | 1 | 7 | 14-Dec-96 | 14-Dec-96 | 0 | 0 | 14-Dec-96 | 31 |
| 24 | Kadam | A-Kafersousse | 4,900 | 24-Oct-96 | 14-Nov-96 | 21 | 2 | 16-Nov-96 | 17-Nov-96 | 1 | 0 | 17-Nov-96 | 18-Nov-96 | 1 | 7 | 25-Nov-96 | 25-Nov-96 | 0 | 0 | 25-Nov-96 | 32 |
| | | B-Al Ashmar | | | | | | | | | | | | | | | | | | | |
| 25 | Kafersousse [2] | A-merze | 9,332 | 21-Oct-96 | 15-Nov-96 | 25 | 2 | 17-Nov-96 | 18-Nov-96 | 1 | 0 | 18-Nov-96 | 20-Nov-96 | 2 | 7 | 27-Nov-96 | 27-Nov-96 | 0 | 0 | 27-Nov-96 | 37 |
| | | B-Kafersousse | | | | | | | | | | | | | | | | | | | |
| 26 | Kassoun | A-Akrad | 9,599 | 14-Sep-96 | 2-Oct-96 | 18 | 2 | 4-Oct-96 | 5-Oct-96 | 1 | 0 | 5-Oct-96 | 7-Oct-96 | 2 | 7 | 14-Oct-96 | 14-Oct-96 | 0 | 0 | 14-Oct-96 | 30 |
| | | B-Mohayreen | | | | | | | | | | | | | | | | | | | |
| | | Total | 225,944 | | Average [4] | 20 | 2 | | Average [4] | 1 | 0 | | Average [4] | 2 | 7 | | Average [4] | 0 | 0 | Average | 32 |
| | | | | **Time for completing one cycle** | | **131** | | | | | | **Time for completing one cycle** | | **116** | | | | | | | |

Notes

1. Days = calendar days, seven calendar days=six working days, 1 days .86 work days
2. Bills have not been delivered to collection centres as of June 9 1997, but meters have been read for next billing cycle.
3. Time from last meter reading to bill issued to collection centre
4. Averages are for completing one district

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

| | | Existing (billing no. 269) | | | Proposed 4 month cycle | | |
|---|---|---|---|---|---|---|---|
| Month | Week | Bills issued | Value [1] | Cumulative | Bills issued | Value [1] | 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 | 1 | | | | 1,001 | 400,400 | 29,417,600 |
| | 2 | | | | - | - | 29,417,600 |
| | 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 | - | - | 52,118,400 |
| | 2 | 21,735 | 8,693,800 | 34,305,000 | 34,541 | 13,816,400 | 65,934,800 |
| | 3 | | | | - | - | 65,934,800 |
| | 4 | 29,304 | 11,721,400 | 46,026,400 | 2,826 | 1,130,400 | 67,065,200 |
| 4 | 1 | 28,575 | 11,430,100 | 57,456,500 | 14,509 | 5,803,600 | 72,868,800 |
| | 2 | | | | 3,012 | 1,204,800 | 74,073,600 |
| | 3 | | | | 26,933 | 10,773,200 | 84,846,800 |
| | 4 | | | | - | - | 84,846,800 |
| 5 | 1 | | | | 16,127 | 6,450,800 | 91,297,600 |
| | 2 | | | | 18,813 | 7,525,200 | 98,822,800 |
| | 3 | 18,908 | 7,563,200 | 65,019,700 | 15,987 | 6,394,800 | 105,217,600 |
| | 4 | | | | 37,743 | 15,097,200 | 120,314,800 |
| 6 | 1 | | | | 1,001 | 400,400 | 120,715,200 |
| | 2 | 52307 | 20,922,800 | 85,942,500 | - | - | 120,715,200 |
| | 3 | | | | 42511 | 17004400 | 137,719,600 |
| | 4 | | | | 14241 | 5696400 | 143,416,000 |

(1) average metered bill = 400 SL

## Table E-2.6 Number of Bills per Collection Center per Week

**Existing situation**

| Collection Center No | Name | Meter Districts No | Month 1 | | | | Month 2 | | | | Month 3 | | | | Month 4 | | | | Month 5 | | | | Month 6 | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | |
| 1 | Kanawat | 1 | | | | 7,994 | | | | | | | | | | | | | | | | | | | | | 7,994 |
| 2 | Bab Massla | 2,14 | | | | | | | | | | | | 13,865 | | | | | | | | | | | | | 13,865 |
| 3 | Al jeser Al Abad | 3,5 | | | | 8,809 | | | | | | | | | | | | | | | | | | | | | 8,809 |
| 4 | Al Sibkey | 6 | | | | | | | 9,094 | | | | | | | | | | | | | | | | | | 9,094 |
| 5 | Mohajreen | 7,26 | | | | | | | | | | 18,723 | | | | | | | | | | | | | | | 18,723 |
| 6 | Al Shagour | 8,13 | | | | | | | | | 6,074 | | | | | | | | | | | | | | | | 6,074 |
| 7 | Baghdad St | 8,15 | | | | | | | | | 12,694 | | | | | | | | | | | | | | | | 12,694 |
| 8 | Bab Touma | 8,9,10 | | | | | | | | | | | | | 5,574 | | | | | | | | | | | | 5,574 |
| 9 | Abasyin | 8,9,10 | | | | | | | | | | | | | 5,574 | | | | | | | | | | | | 5,574 |
| 10 | Barza | 12,19 | | | | | | | | | 7,182 | 3,012 | | | | | | | | | | | | | | | 10,194 |
| 11 | Al Ashmar | 14,24 | | | | | | | | | | | | | 10,021 | | | | | | | | | | | | 10,021 |
| 12 | Merze 1 | 16,25 | | | | | | | | | | | | | | | | | | | | | | 12,730 | | | 12,730 |
| 13 | Merze 2 | 16 | | | | | | | | | | | | | | | | | | | | | | 8,064 | | | 8,064 |
| 14 | Doumar | 17,18 | | | | | | | | | | | | | | | | | | | | | | 12,701 | | | 12,701 |
| 15 | Kaboun | 20 | | | | | | | | | | | | | | | | 5,492 | | | | | | | | | 5,492 |
| 16 | Joubar | 21 | | | | | | | | | | | | | 9,801 | | | | | | | | | | | | 9,801 |
| 17 | Tabala | 22 | | | | | | | | | | | | 2,826 | | | | | | | | | | | | | 2,826 |
| 18 | Moukbaim | 23 | | | | | | | | | | | | | | | | | | | | | | 18,813 | | | 18,813 |
| 19 | Kafersousah | 24,25 | | | | | | | | | | | | 4,666 | | | | | | | | | | | | | 4,666 |
| 20 | Rocken Al Deen | 4,26 | | | | 4,800 | | | | | | | | | | | | | | | | | | | | | 4,800 |
| H.Q | | 1,5,13,15 | | | | | | | | | | | | | | | | | | | 18,908 | | | | | | 18,908 |
| | | | - | - | - | 21,602 | - | - | 9,094 | - | 25,950 | 21,735 | - | 21,357 | 30,969 | - | - | 5,492 | - | - | 18,908 | - | - | 52,307 | - | - | 207,413 |

**Four Month Billing Cycle**

| Collection Center No | Name | Meter District No | Month 1 | | | | Month 2 | | | | Month 3 | | | | Month 4 | | | | Month 5 | | | | Month 6 | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | |
| 1 | Kanawat | 1 | | | 7,994 | | | | | | | | | | | | | | | | 7,994 | | | | | | 15,987 |
| 2 | Bab Massla | 2,14 | | | | | | | 6,294 | | | 7,571 | | | | | | | | | | | | | 6,294 | | 20,159 |
| 3 | Al jeser Al Abad | 3,5 | | | | 8,809 | | | | | | | | | | | | | | | | 8,809 | | | | | 17,618 |
| 4 | Al Sibkey | 6 | | | | 9,094 | | | | | | | | | | | | | | | | 9,094 | | | | | 18,188 |
| 5 | Mohajreen | 7,26 | | | | | | | 13,923 | | | 4,800 | | | | | | | | | | | | | 13,923 | | 32,646 |
| 6 | Al Shagour | 8,13 | | | | | 501 | | 5,574 | | | | | | | | | | | | | | 501 | | 5,574 | | 12,148 |
| 7 | Baghdad St | 8,15 | | | | | | | 5,574 | 7,121 | | | | | | | | | | | | | | | 5,574 | 7,121 | 25,390 |
| 8 | Bab Touma | 8,9,10 | | | | | | | 5,574 | | | | | | | | | | | | | | | | 5,574 | | 11,147 |
| 9 | Abasyin | 8,9,10,11 | | | | | | | 5,574 | | | | | | 1,835 | | | | | | | | | | 5,574 | | 12,982 |
| 10 | Barza | 12,19 | | | | | | | | | | | | | 7,182 | 3,012 | | | | | | | | | | | 10,194 |
| 11 | Al Ashmar | 14,24 | | | | | | | | | | 7,571 | | | | | 2,450 | | | | | | | | | | 10,021 |
| 12 | Merze 1 | 16,25 | 8,064 | | | | | | | | | | | | | | 4,666 | | 8,064 | | | | | | | | 20,793 |
| 13 | Merze 2 | 16 | 8,064 | | | | | | | | | | | | | | | | 8,064 | | | | | | | | 16,127 |
| 14 | Doumar | 17,18 | | | | | | | | | | | | | | | 12,701 | | | | | | | | | | 12,701 |
| 15 | Kaboun | 20 | | | | | | | | | | | | | 5,492 | | | | | | | | | | | | 5,492 |
| 16 | Joubar | 21 | | | | | | | | | | 9,801 | | | | | | | | | | | | | | | 9,801 |
| 17 | Tabala | 22 | | | | | | | | | | | | 2,826 | | | | | | | | | | | | | 2,826 |
| 18 | Moukbaim | 23 | | 18,813 | | | | | | | | | | | | | | | | 18,813 | | | | | | | 37,626 |
| 19 | Kafersousah | 24,25 | | | | | | | | | | | | | | | 7,116 | | | | | | | | | | 7,116 |
| 20 | Rocken Al Deen | 3,4,26 | | | | 16,547 | | | | | | 4,800 | | | | | | | | | | 16,547 | | | | | 37,893 |
| H.Q | | 1,5,13,15 | | | 7,994 | 3,294 | 501 | | | 7,121 | | | | | | | | | | | 7,994 | 3,294 | 501 | | | 7,121 | 37,816 |
| | | | 16,127 | 18,813 | 15,987 | 37,743 | 1,001 | - | 42,511 | 14,241 | | 34,541 | - | 2,826 | 14,509 | 3,012 | 26,933 | - | 16,127 | 18,813 | 15,987 | 37,743 | 1,001 | - | 42,511 | 14,241 | 374,662 |

**Table E-2.7 Impact of 4 month billing cycle on payment collection centers**

| Collection Center No. | Name | Meter District No. | Peak Trans/week | Required staffing minutes per transaction 2 | 5 | 10 | 15 | Existing staff levels | Recommended No. of Cashiers |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Kanawat | 1 | 906 | 1 | 2 | 4 | 6 | 1 | 2 |
| 2 | Bab Masala | 2,14 | 1,571 | 1 | 4 | 7 | 11 | 1 | 3 |
| 3 | Al jeser Al Abid | 3,5 | 998 | 1 | 2 | 5 | 7 | 1 | 2 |
| 4 | Al Sibkey | 6 | 1,030 | 1 | 2 | 5 | 7 | 1 | 2 |
| 5 | Mohajreen | 7,26 | 2,121 | 2 | 5 | 10 | 15 | 1 | 4 |
| 6 | Al Shagour | 8,13 | 688 | 1 | 2 | 3 | 5 | 2 | 2 |
| 7 | Baghdad St | 8,15 | 1,438 | 1 | 3 | 7 | 10 | 2 | 3 |
| 8 | Bab Touma | 8,9,10 | 631 | 1 | 1 | 3 | 4 | 1 | 1 |
| 9 | Abasyin | 8,9,10 | 631 | 1 | 1 | 3 | 4 | 1 | 1 |
| 10 | Barza | 12,19 | 1,155 | 1 | 3 | 5 | 8 | 2 | 2 |
| 11 | Al Ashmar | 14,24 | 1,135 | 1 | 3 | 5 | 8 | 1 | 2 |
| 12 | Mezze 1 | 16,25 | 1,442 | 1 | 3 | 7 | 10 | 1 | 3 |
| 13 | Mezze 2 | 16 | 914 | 1 | 2 | 4 | 6 | 1 | 1 |
| 14 | Doumar | 17,18 | 1,439 | 1 | 3 | 7 | 10 | 1 | 3 |
| 15 | Kaboun | 20 | 2,419 | 2 | 6 | 11 | 17 | 1 | 5 |
| 16 | Joubar | 21 | 1,110 | 1 | 3 | 5 | 8 | 1 | 3 |
| 17 | Tabala | 22 | 320 | 1 | 1 | 1 | 2 | 1 | 1 |
| 18 | Moukhaim | 23 | 2,132 | 2 | 5 | 10 | 15 | 1 | 4 |
| 19 | Kafersousch | 24,25 | 806 | 1 | 2 | 4 | 6 | 1 | 1 |
| 20 | Rocken Al Deen | 4,26 | 2,419 | 2 | 6 | 11 | 17 | 1 | 5 |
| H.Q. | | 1,5,13,15 | 2,142 | 2 | 5 | 10 | 15 | 3 | 4 |
| | | | 27,448 | 26 | 64 | 127 | 191 | 26 | 54 |

For collection center with only one metering district

Transactions per day during peak week Tpk =0.65/6 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 x Nb1

For collection center with more than one metering district

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

and 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**

| Main cost code | Cost code Sub-account structure | | | Description |
|---|---|---|---|---|
| **5** | | | | **Production centres** |
| | **5100** | | | **Production directorate** |
| | | 5101 | | Figeh & side springs |
| | | 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 | reserved for future use |
| | **5300** | | | **Standby wells directorate** |
| | | | | |
| **6** | | | | **Production Service Centers** |
| | **6100** | | | **Planning and statistics directorate** |
| | **6200** | | | **Water resources directorate** |
| | **6300** | | | **Environment directorate** |
| | **6400** | | | **Water quality directorate** |
| | **6500** | | | **Major projects & studies** |
| | **6600** | | | **Maintenance directorate** |
| | | 6610 | | Maintenance directorate (bldgs. & grounds) |
| | | 6620 | | Maintenance directorate (vehicles) |
| | | 6630 | | Maintenance directorate (electrical) |
| | | 6640 | | Maintenance directorate (mechanical) |
| | | | | |
| **7** | | | | **Marketing (ie. Consumer Services)** |
| | **7100** | | | **Consumer section** |
| | | | | |
| | **7200** | | | **Metering section** |
| | | | | |
| | **7300** | | | **Service connections section** |
| | | | | |
| | **7400** | | | **Meter repairs/maintenance section** |
| | | | | |
| **8** | | | | **Finance & Administration** |
| | **8100** | | | **Finance Directorate (less stores & salary section)** |
| | | | | |
| | **8200** | | | **Administration Directorate (plus salary section)** |
| | | | | |
| | **8300** | | | **Accounting directorate (less materials inventory section)** |
| | | | | |
| | **8400** | | | **Materials Management (finance + accounting)** |
| | | | | |
| **9** | | | | **Capital Projects** |
| | **9100** | | | use as required |
| | | | | |

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

| New cost accounting code | | | | | |
|---|---|---|---|---|---|
| Main cost code | Sub cost code | Description | | | |
| 5.1 | | **Production Directorate** | | | |
| | 5.102 | **Barada Springs** | | | |
| | | Existing account code structure | | | |
| | | Main account | sub-account | sub-account | Description |
| | | **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** |
| | | | 5.102.31.1 | | |
| | | | | 5.102.31.11 | basic |
| | | | | 31.12 | holiday wages |
| | | | | 31.13 | overtime |
| | | | | 31.14 | not used by DAWSSA |
| | | | | 31.15 | encouragement bonus |
| | | | | 31.16 | production bonus |
| | | | 5.102.31.2 | | non-monetary advantages |
| | | | 31.3 | | special insurance |
| | | | 31.4 | | social insurance |
| | | **5.102.32** | | | **Raw materials used in production of manufactured goods** |
| | | | 5.102.32.1 | | basic |
| | | | | 5.102.32.11 | chlorine |
| | | | 5.102.32.2 | | secondary |
| | | | 32.3 | | fuel & oil |
| | | | 32.4 | | tools & spare parts |
| | | | 32.5 | | not used by DAWSSA |
| | | | 32.6 | | not used by DAWSSA |
| | | | 32.7 | | stationary, books,printed materials |
| | | | 32.8 | | not used by DAWSSA |
| | | | | | others |
| | | **5.102.33** | | | **Contract Services** |
| | | | 5.102.33.1 | | contracted maintenance |
| | | | 33.2 | | not used by DAWSSA |
| | | | 33.3 | | not used by DAWSSA |
| | | | 33.4 | | public relations, advertising, entertaining |
| | | | 33.5 | | transport |
| | | | 33.6 | | equipment & transportation rentals |
| | | | 33.7 | | Power & water |
| | | | 33.8 | | mail, cable, telephone, telex, etc... |
| | | | 33.9 | | miscellaneous service expenses |
| | | **5.102.34** | | | **Purchases for resale** |
| | | | 5.102.34.1 | | service connection materials |
| | | **5.102.35** | | | **Fixed costs** |
| | | | 5.102.35.1 | | taxes & stamp duties |
| | | | 35.2 | | depreciation |
| | | | | 5.102.35.22 | buildings |
| | | | | 35.23 | machine |
| | | | | 35.25 | tools |
| | | | | 35.26 | office assets |
| | | | 5.102.35.3 | | rents |
| | | **5.102.36** | | | **Special expenses** |
| | | | 5.102.36.3 | | damage claims |
| | | | 36.5 | | outsanding debts |
| | | | 36.7 | | retiring allowance |
| | | | 36.8 | | real estate tax |
| | | | 36.9 | | income tax from previous years |

**Table E-3.1 Number of Workstations Required at Remote Sites**

| Collection Center No. | Name | Meter District No. | Cashiers | Customer Service representatives | Meter repairs | Service Connection 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 | 1 |
| 11 | Al Ashmar | 14,24 | 2 | | | |
| 12 | Mezze 1 | 16,25 | 3 | 2 | 1 | 1 |
| 13 | Mezze 2 | 16 | 1 | 1 | 1 | 2 |
| 14 | Doumar | 17,18 | 3 | | | |
| 15 | Kaboun | 20 | 5 | | | |
| 16 | Joubar | 21 | 3 | | | |
| 17 | Tabala | 22 | 1 | 3 | 1 | 2 |
| 18 | Moukhaim | 23 | 4 | | | |
| 19 | Kafersouseh | 24,25 | 1 | | | |
| 20 | Rocken Al Deen | 4,26 | 5 | | | |
| H.Q. | | 1,5,13,15 | 4 | 5 | 1 | 2 |
| **Total number of cashiers** | | | **54** | 13 | 5 | 8 |
| **Total number of customer service workstations** | | | | **26** | | |

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

# Table E-3.2 Equipment and Hardware Requirements

**Remote Payment Collection Centers**

| Equipment | | Function | 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 GB | 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 | cashiers | 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 scanners | 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 | | Function | Quantity |
|---|---|---|---|
| Server (PC) | CPU, 128 MB, 200 Mhz | for CIS and FMIS (redundant configuration | 4 |
| | Ethernet card | for LAN | |
| | Floppy drive | for information transfer | |
| | Hard Disks 4 GB x 2 | storing data and processing applications | |
| | Tape Backup | backing up & restoring files | 1 |
| Secondary Storage | Hard Disk, 4 GB x 2 | on line data storage for FMIS | 1 |
| | Optical disk, 16 GB | on line data storage & retrieval for CIS | 1 |
| Printer | laser | 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 | | |
| | Floppy Drive | | |
| Workstations (PC) | CPU 32 MB, 166 Mhz | network management | 1 |
| | Hard Drive 2 GB | | |
| | Floppy Drive | | |
| UPS | 5 KVA, 1/2 hour battery | power supply & transient protection | 1 |

**DAWSSA Headquarter LAN**

| Equipment | | Function | Quantity |
|---|---|---|---|
| Network Server (PC) | CPU 128 MB, 200 Mhz | Novell Netware, newtwork management | 1 |
| | X25 card | for commnications with WAN | |
| | Ethernet card | for LAN | |
| | Hard Disk, 8 GB | | |
| HDET'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 | miscellaneous users | 46 |
| | Hard Drive, 2 GB | | |
| | Floppy Drive | | |
| Network | 10 MBps, Ethernet co-ax bus | headquarters PC LAN | 1 |

## Table E-3.3 Computer Hardware and Software Needs at Headquarters [1]

| Section/Department | Location | HDET | Work Stations | Printers | Application software [2] | Function |
|---|---|---|---|---|---|---|
| **Consumer Affairs Directorate** | | | | | | |
| Consumer Affairs Director | Headquarters ground floor | | 1 | 1 | CIS & FMIS | budget preparation and cost control |
| Meter Reading Section | Headquarters, basement | 30 | 3 | 1 | CIS | enter consumption data, prepare service requests for failed meters |
| Service Connections | Headquarters basement | | 2 | 1 | CIS | obtain requests for service connections and issue notices to customer |
| Service Disconnections | Headquarters basement | 5 | 1 | 1 | CIS | obtain requests for service disconnections |
| Consumer Accounts Department | Headquarters basement | | 3 | 1 | CIS, Document Management | to manage customer information and files |
| **Finance Directorate** | | | | | | |
| Finance Director | Headquarters 6 floor | | 1 | 1 | CIS & FMIS | budget preparation and cost control |
| Cash Collection Department | Headquarters, basement | | 1 | 1 | CIS | follow up late payments, delinquent accounts, |
| Cashier Audit Section | Headquarters, side building | | 3 | 1 | CIS | audit cashiers |
| Ordinary Budget Section | Headquarters, 5 floor | | 3 | 1 | FMIS | monitor expenditures against budget |
| Investment Budget Section | Headquarters 5 floor | | 2 | 1 | FMIS | monitor expenditures against budget |
| Budget Department | Headquarters 5 floor | | 2 | 1 | FMIS | prepare budget, & generate monthly budget reports |
| Treasury Department | Headquarters | | 1 | 1 | FMIS | cash management and forecast treasury forecast |
| Payroll Department | Headquarters 5 floor | | 3 | 1 | FMIS | prepare monthly payroll |
| **Accounting Directorate** | | | | | | |
| Accounting Department | Headquarters 5 floor | | 6 | 1 | CIS & FMIS | 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 | FMIS | materials accounting |
| **Planning Directorate** | | | | | | |
| Planning & statistics | Headquarters, old building, ground floor | | 2 | 1 | CIS & FMIS | 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 & FMIS | budget preparation and cost control |
| **Others** | | | | | CIS & FMIS | |
| Director General | | | 1 | 1 | CIS & FMIS | |
| 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 | 21 | | |

(1) not including computer center requirements

(2) all workstations should have word standard office application software

## Table E-4.1 Budget Estimates for Consultancies and Software

| Item | | Unit price[1] | Remote Sites | | Computer Center | | Headquarters | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | | Qty. | Price | Qty. | Price | Qty. | Price | |
| Operating system | DOS | 3,500 | 20 | 70,000 | 4 | 14,000 | - | - | 54,000 |
| Database [2] | Oracle DBMS | 570 | 80 | 45,600 | - | 10,000 | - | - | 50,000 |
| Compiler | C+ | 500 | - | - | 1 | 500 | - | - | 40,500 |
| Operating System for workstation | DOS Windows | 500 | 80 | 40,000 | 3 | 1,500 | - | - | 1,500 |
| Network software for LAN | Novell Netware | 2,000 | 20 | 40,000 | - | - | - | - | 40,000 |
| Application software | MicroSoft Office | 500 | 80 | 40,000 | 3 | 1,500 | - | - | 41,500 |
| Document management system | Kodak | 10,000 | - | | - | - | 1 | 10,000 | 10,000 |
| Consultancy No.1 [3] | Project Management | 15,000 | - | - | - | - | 18 | 270,000 | 270,000 |
| Consultancy No.1 [3] | Short term experts | 12,000 | - | - | - | - | 20 | 240,000 | 240,000 |
| Consultancy No.2 [4] | FMIS & CIS development | 8,000 | - | - | - | - | 100 | 800,000 | 920,000 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | 120,000 | | 27,500 | | 1,320,000 | 1,667,500 |

| | |
|---|---|
| Physical contingency (10%) = | 166,750 |
| Price contingency (5%) = | 91,713 |
| Total cost = | 1,925,963 |

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

## Table E-4.2 Budget Estimates for Computer Equipment and Hardware

**Remote Payment Collection Centers**

| Equipment | | Function | Quantity | Unit price (US$) | Total cost |
|---|---|---|---|---|---|
| Server (PC) | CPU 64 MB, 200 Mhz | for customer information system | 20 | 15,000 | 300,000 |
| | X25 card | for communications 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 | 54 | 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 Mhz | for meter repair crews | 5 | 2,500 | 12,500 |
| | Hard Drive 2 GB | | | | - |
| Bar code scanners | pen laser | for reading bar codes on bills | 67 | 2,500 | 167,500 |
| UPS | 5 KVA, 15 min battery, | power supply & transient protection | 20 | 7,000 | 140,000 |

**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 | | | |
| | Floppy drive | for information transfer | | | |
| | Hard Disks 4 GB x 2 | storing data and processing applications | | | |
| | Tape Backup | backing up & restoring files | 1 | 2,000 | 2,000 |
| Secondary Storage | Hard Disk, 4 GB 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 |

**DAWSSA Headquarter LAN**

| Equipment | | Function | Quantity | Unit price (US$) | Total cost |
|---|---|---|---|---|---|
| Network Server (PC) | CPU 128 MB, 200 Mhz | Novell Netware, newtwork management | 1 | 25,000 | 25,000 |
| | X25 card | for communications 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 | miscellaneous users | 46 | 2,500 | 115,000 |
| | Hard Drive, 2 GB | | | | |
| | Floppy Drive | | | | |
| Network | 10 MBps, Ethernet co-ax bus | headquarters PC LAN | 1 | 10,000 | 10,000 |

| | |
|---|---|
| Total hardware cost = | 1,353,500 |
| Physical contingency (10%) = | 135,350 |
| Price contingency (5%) = | 74,443 |
| Total cost = | 1,563,293 |

# *FIGURES*

| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
| --- |
| *THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY* |
| Figure E1.1<br>Exiting Organizational Structure |
| NIPPON KOEI CO., LTD. |

| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
| --- |
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure EI.2<br>Generic Organizational Structure |
| NIPPON KOEI CO., LTD. |

| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
|---|
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure E1.3 Organizational Structure-Directorates Involved in Financial Management |
| NIPPON KOEI CO., LTD. |

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 prepared 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.

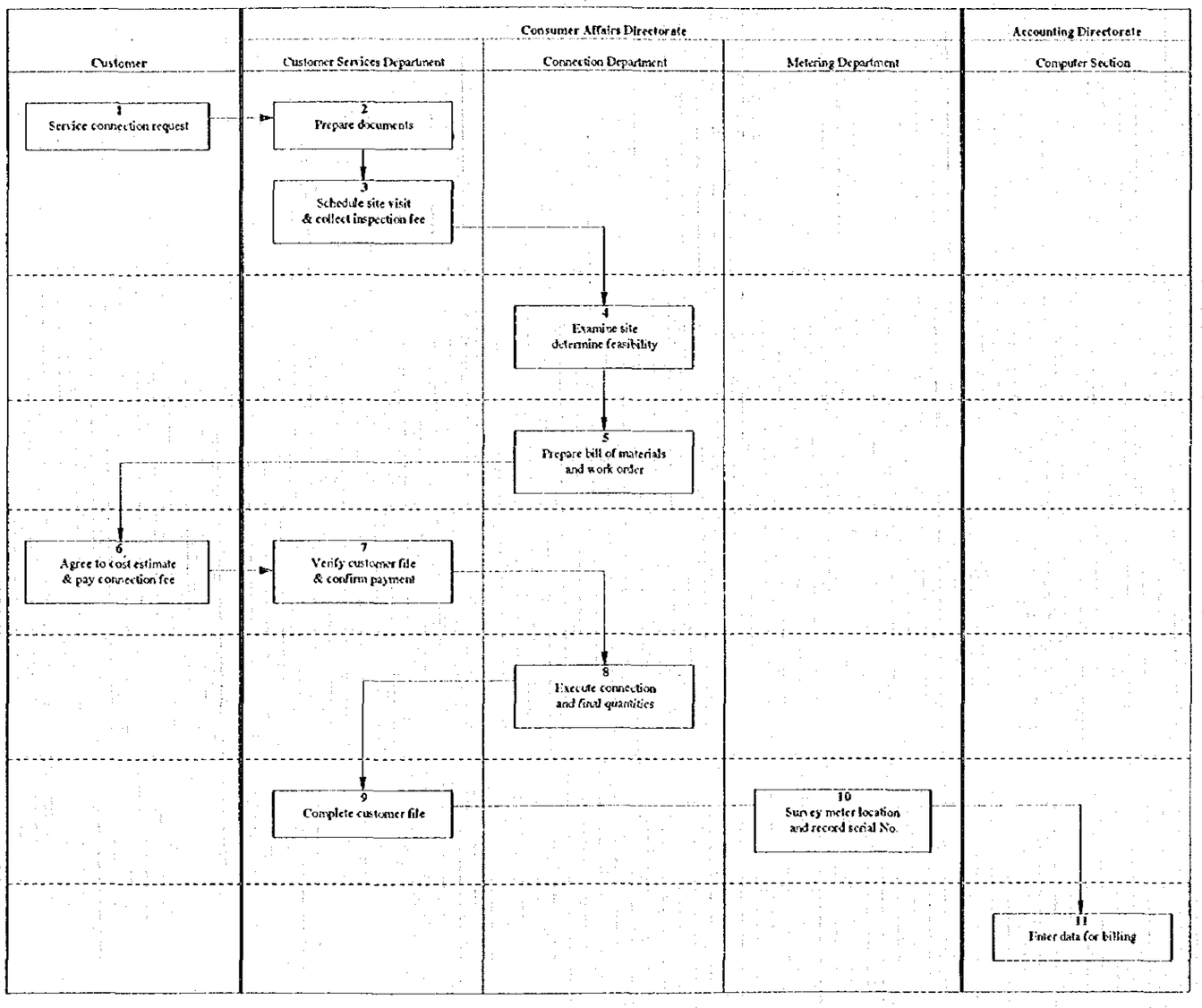
7. The file booklet is sent to the Customer Service Department who verifies the information on the various documents, and sends the connection work order to the connection section.

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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|---|
| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure E1.4 Work Flow Chart For New Subscriber Process |
| NIPPON KOEI CO., LTD. |

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 district 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 $m^3$ 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 meter readings recorded in the books. Corrections are made and the bills are printed.

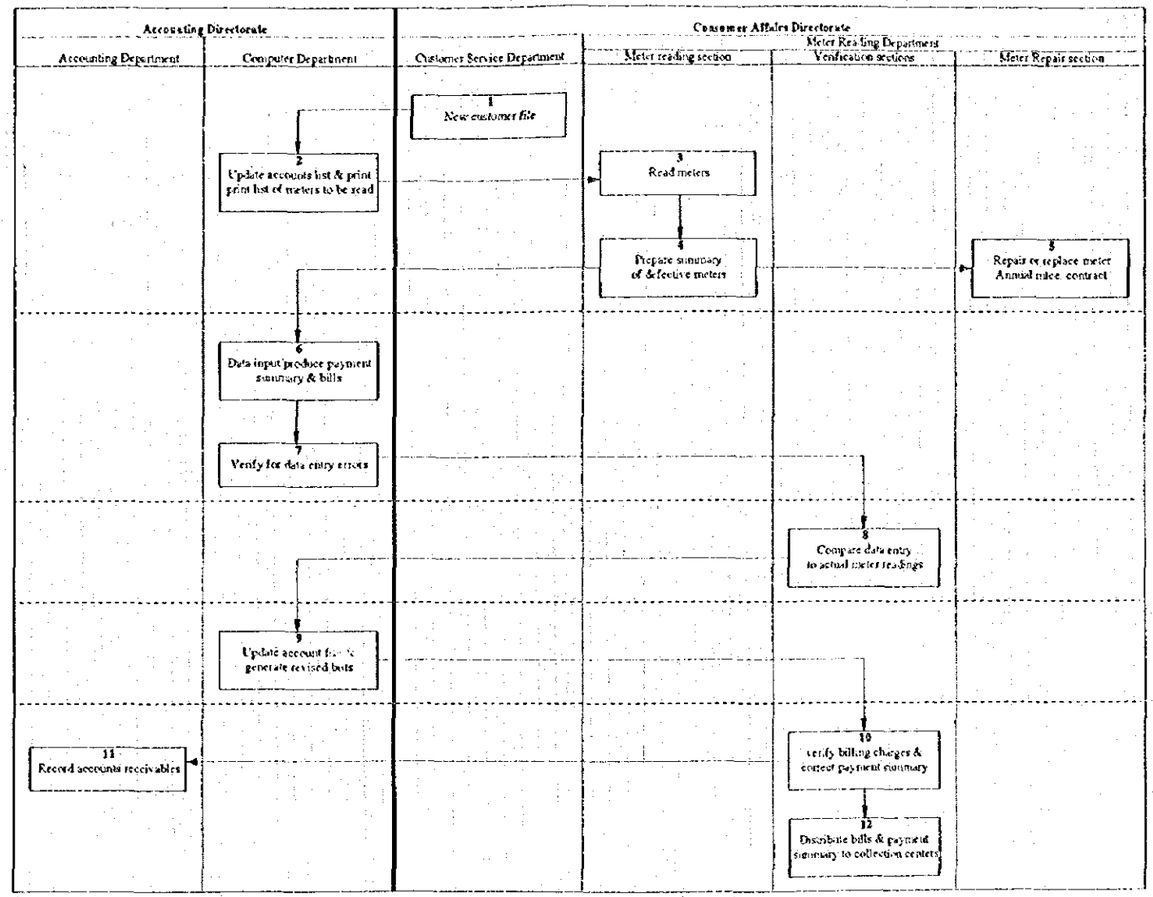
8. All meter books are returned to the meter section, along with the bills and a summary for each payment collection office of the billing charges for each customer and the totals to be collected by the cashier. The meter readings entered into the computer are compared against the readings written in 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 E1.5 Work Flow Chart For Meter Reading And Billing Process |
| NIPPON KOEI CO., LTD. |

(billing cycle no. 269)

| Billing district | | July | | | | August | | | | September | | | | October | | | | November | | | | December | | | | January | | | | February | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| No. Name | Bills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Kanawat | 15,987 | | | | m | | | | | | | | | | | | | | | d | | | | | | | | | | | | |
| 3 Akrad | 11,031 | | | | | m | | | | | | | | | | | | | d | | | | | | | | | | | | | |
| 4 Janoub Yazid | 11,031 | | | | | | m | | | | | | | | | | | | d | | | | | | | | | | | | | |
| 5 Salhia Sharkia | 6,587 | | | | | m | | | | | | | | | | | | | | d | | | | | | | | | | | | |
| 6 Salhia Gharbia | 9,094 | | | | | m | | | | | | | | | | | | | | | | d | | | | | | | | | | |
| 13 Shagour | 1,001 | | | | | | m | | | | | | | | | | | | | d | | | | | | | | | | | | |
| 7 Mohajreen | 13,923 | | | | | | m | | | | | | | | | | | d | | | | | | | | | | | | | | |
| 8 9,10, Kimaria | 22,294 | | | | | | m | | | | | | | | | | | | | | d | | | | | | | | | | | |
| 2 Ziftia | 6,294 | | | | | | | | | m | | | | | | | | | d | | | | | | | | | | | | | |
| 15 Sarouja | 14,241 | | | | | | | | | m | | | | | | | | d | | | | | | | | | | | | | | |
| 14 Midan | 15,141 | | | | | | | | | | m | | | | | | | | | | | | d | | | | | | | | | |
| 21 Joubar | 9,801 | | | | | | | | | | m | | | | | | | | | | | | d | | | | | | | | | |
| 26 Kassioun | 9,599 | | | | | | | | | | m | | | | | | | | | d | | | | | | | | | | | | |
| 22 Tabala | 2,826 | | | | | | | | | | | m | | | | | | | | | | | d | | | | | | | | | |
| 19 Masaken Barza | 7,182 | | | | | | | | | | | | | m | | | | | | | | | | | | | | | d | | | |
| 20 Kaboun | 5,492 | | | | | | | | | | | | | | m | | | | | | | | | | | | | d | | | | |
| 11 Sharky Al Tijara | 1,835 | | | | | | | | | | | | | | m | | | | d | | | | | | | | | | | | | |
| 12 Barza Al Balad | 3,012 | | | | | | | | | | | | | | m | | | | | | | | | d | | | | | | | | |
| 17 18, Doumar, Kiwan | 12,701 | | | | | | | | | | | | | | | | | m | | | | | | | | | | | d | | | |
| 24 Kadam | 4,900 | | | | | | | | | | | | | | | m | | | | | | | | | | | | d | | | | |
| 25 Kafersousse (2) | 9,332 | | | | | | | | | | | | | | | m | | | | | | | | | | | | | d | | | |
| 16 Mezze(2) | 16,127 | | | | | | | | | | | | | | | | | m | | | | | | | | | d | | | | | |
| 23 Moukhaiam (2) | 18,813 | | | | | | | | | | | | | | | | | | m | | | | | | | | | | | | | d | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

m = meter reading;
d = data entry;

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E1.6 (1/2) Meter Reading And Data Entry Schedule

NIPPON KOEI CO., LTD.

| Billing district No. | Name | Bills | January 1 | 2 | 3 | 4 | February 1 | 2 | 3 | 4 | March 1 | 2 | 3 | 4 | April 1 | 2 | 3 | 4 | May 1 | 2 | 3 | 4 | June 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Kanawat | 15,987 | | | | | 1 | | | | | | | | | | | | | | HQ | | | | | |
| 3 | Akrad | 11,031 | | | | 3,20 | | | | | | | | | | | | | | | | | | | | |
| 4 | Jaroub Yazid | 11,031 | | | | 20 | | | | | | | | | | | | | | | HQ | | | | | |
| 5 | Salhia Sharkia | 6,587 | | | | 3 | | | | | | | | | | | | | | | | | | | | |
| 6 | Salhia Gharbia | 9,094 | | | | | 4 | | | | | | | | | | | | | | HQ | | | | | |
| 13 | Shagour | 1,001 | | | | | | | | | 6 | | | | | | | | | | | | | | | |
| 7 | Mohajreen | 13,923 | | | | | | | | | | 5 | | | | | | | | | | | | | | |
| 8 | 9,10 Kimaria | 22,294 | | | | | | | | | 6,7 | | | | 8,9 | | | | | | | | | | | |
| 2 | Zifta | 6,294 | | | | | | | | | | | | | 2 | | | | | | HQ | | | | | |
| 15 | Sarouja | 14,241 | | | | | | | | | 7 | | | | | | | | | | | | | | | |
| 14 | Midan | 15,141 | | | | | | | | | | | | | 2 | 11 | | | | | | | | | | |
| 21 | Joubar | 9,801 | | | | | | | | | | | | | | 16 | | | | | | | | | | |
| 26 | Kaseioun | 9,599 | | | | | 20 | | | | | | | | 5 | | | | | | | | | | | |
| 22 | Tabala | 2,826 | | | | | | | | | | | | | 17 | | | | | | | | | | | |
| 19 | Masaken Barza | 7,182 | | | | | | | | | 10 | | | | | | | | | | | | | | | |
| 20 | Kaboun | 5,492 | | | | | | | | | | | | | 15 | | | | | | | | | | | |
| 11 | Sharky Al Tijara | 1,835 | | | | | | | | | | | | | | 9 | | | | | | | | | | |
| 12 | Barza Al Balad | 3,012 | | | | | | | | | | | | 10 | | | | | | | | | | | | |
| 17 | 18, Doumar, Kiwan | 12,701 | | | | | | | | | | | | | | | | | | | | | | | | 14 |
| 24 | Kadam | 4,900 | | | | | | | | | | | | | 19 | 11 | | | | | | | | | | |
| 25 | Kafersousse (2) | 9,332 | | | | | | | | | | | | | | 19 | | | | | | | | | | 12 |
| 16 | Mezze(2) | 16,127 | | | | | | | | | | | | | | | | | | | | | | | | 12,13 |
| 23 | Moukhaiam (2) | 18,813 | | | | | | | | | | | | | | | | | | | | | | | | 18 |

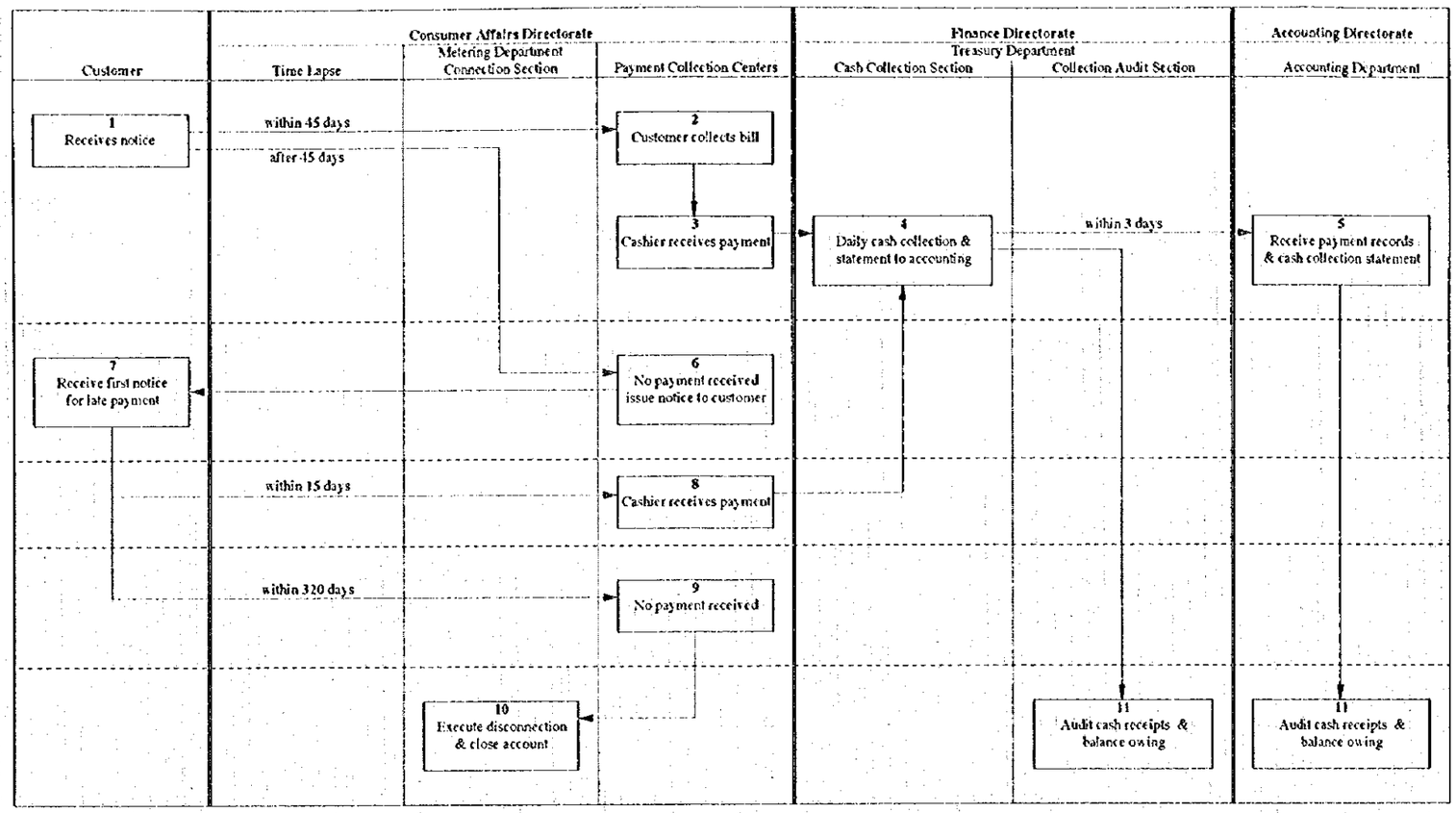
13 = bills issued to payment collection centers No. 1 and 3;

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

NIPPON KOEI CO., LTD.




1. The customer is notified that bills have been issued.
2. The customer has 45 days to pay the bill before a late payment fine is levied. The customer goes to the payment center with a copy of his last bill in order to provide the cashier with the correct identification and customer reference number. The bills, are organized in order of customer number and are manually retrieved by the cashier. The customer then pays the bill and is given a copy of the bill stamped with a receipt of payment.
3. The cashier keeps a daily transaction record of cash collected.
4. The cash and the daily transaction record is collected by the cash collection section of the Treasury Department (Finance Directorate). The cash is counted back at headquarters and reconciled with the cashiers' statement. Cash is deposited daily at the bank.
5. A copy of each cashiers' statement and the bank deposit is sent to Accounting Department for journal entries and to the Auditing Section of the Finance Directorate for control.
6. If no payment is received within the 45 day period, the red copy of the bill is hand delivered to the customer by the meter repair workmen stationned at each payment collection center.
7. The customer receives the notice of late payment and has 15 days to make payment of the original bill plus the penalty.
8. Wether or not payment is received no further action is taken. The next series of bills is delivered to the cashier who takes all the non-paid bills from the previous billing cycle and attaches them to the new billing statements for each delinquent account.
9. When the cashier has collected 4 bills for a non-paying customer he sends the billings back to the Customer Service Department, The Late Payment Section who issues a final notice, in the newspaper, for all late paying customers. The totals required to be collected by the cashier are amended by the Consumer Affairs Directorate and the change noted by the Auditing Section and the Accounting Section by the issue of an administrative order.
10. If no payment is received within 15 days then a request is sent to the Consumer Affairs Director to issue an order to disconnect the service. Once the order is signed, the Disconnection Section executes the work and the customer account is closed. If the customer wants to have the service re-instated, he must make a new application for service and pay all the previous bills, and a new connection fee. Unpaid accounts are sent to the legal branch for follow-up action.
11. The Finance Directorate and the Accounting Directorate audit the cashiers by comparing the amounts collected for each billing cycle against the total amounts issued to each cashier less the amount of bills remaining to be collected.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E1.7 Work Flow Chart For Payment Collection Process

NIPPON KOEI CO., LTD.

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

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.

4. The bill is amended as required and a notice is issued to the Finance Directorate

5. If the bill has already been paid by the customer then the Finance Directorate issues a payment order to refund the customer for the balance between the adjusted amount and the billed amount.

6. The payment order is sent to Accounting Department for entry into the payment journal.

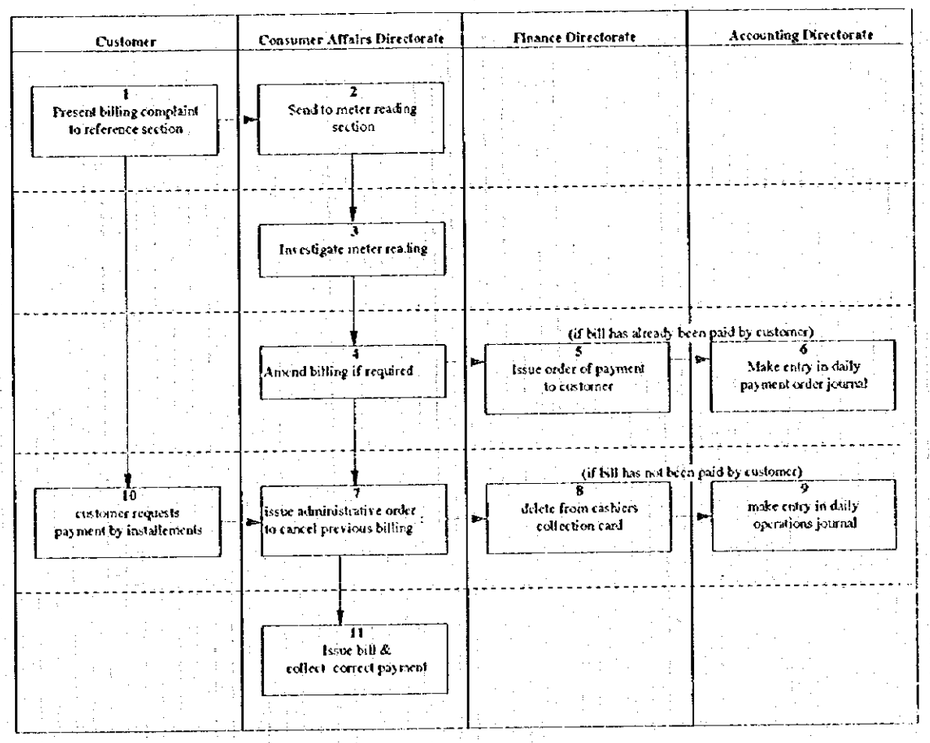
7. If the payment has not yet been made by the customer then the process is slightly more complicated because of the need to adjust the amounts collected by the cashiers for auditing purposes. The process begins by issuing an administrative order from the Consumer Affairs Directorate to the Finance Directorate to cancel the previous billing. The Consumer Affairs Directorate retrieves the bill from the payment collection center. The Billing Verification 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.

8. The Finance Directorate corrects the cashiers payment summary list showing the revised amount that must be collected for auditing purposes.

9. 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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|---|
| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure E1.8 Work Flow Chart For Billing adjustment Process |
| NIPPON KOEI CO., LTD. |

1. The user submits a request for materials or services to his immediate supervisor. The request is reviewed and approved by the director in charge and sent to the finance director.

2. the finance director reviews the request and forwards it to the Budget Control Department (ordinary or investment budget section)

3. the Budget Control Department verifies the amount required for the purchase.

4. If funds are available, a purchase order is sent to the finance director for approval. If funds are not available, the request is held until a budget transfer is made to cover the request.

5. The request, signed by the finance director is sent to the director general for approval and signature.

6. The Purchasing Department receives the approved request and obtains quotations/tenders for the materials and services.

7. The finance director reviews the quotations from the different suppliers/contractors and makes a recommendation (usually the lowest price) to the director making the purchase request.

8. If the user agrees with the recommendation from finance then the request with all the quotations is sent to the Budget Control Department.

9. The Budget Control Department verifies the documentation and the correctness of the calculations. It enters the amount in the disbursement journal and issues a spending order.

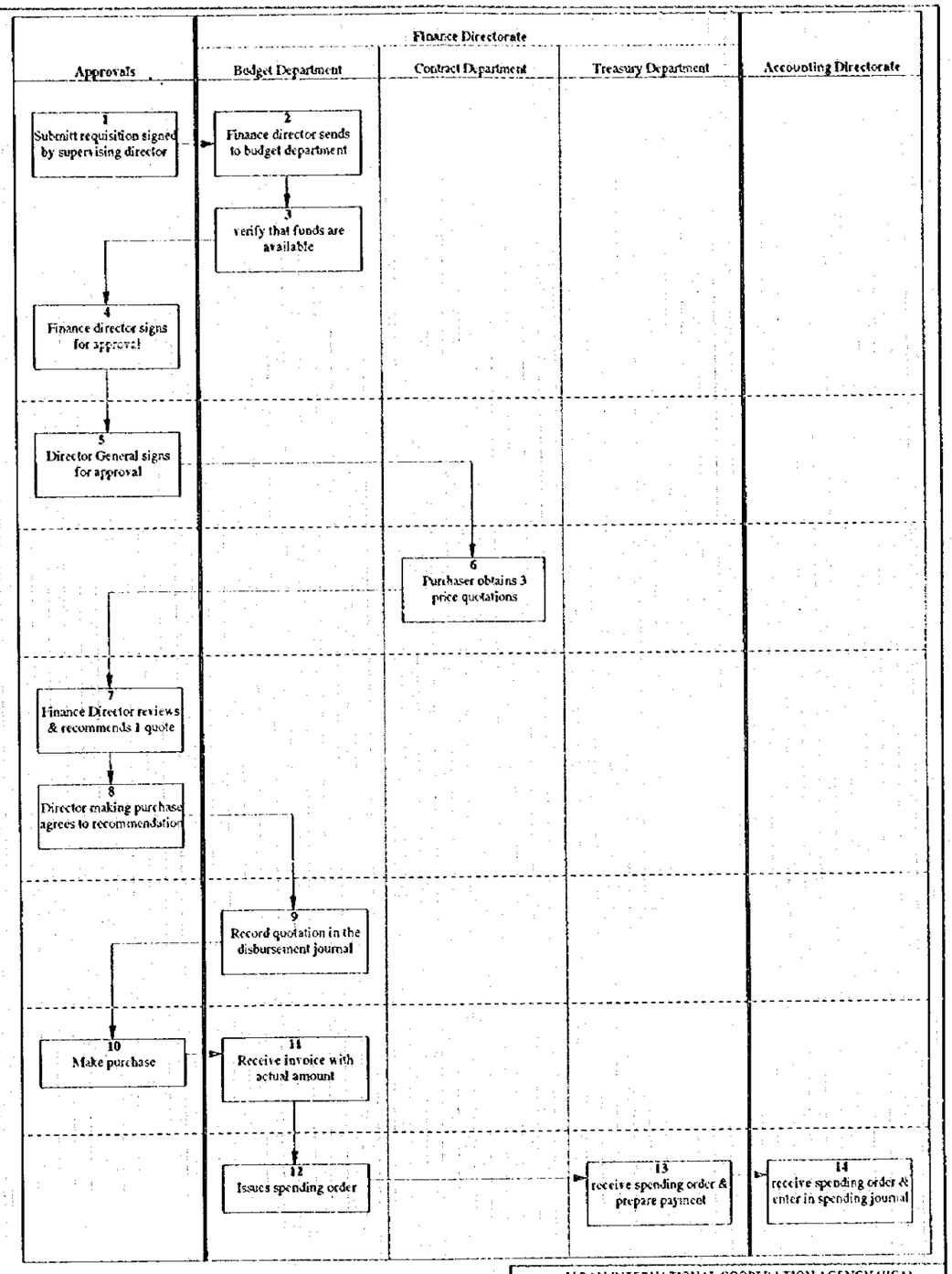
10. The spending order is sent to the Treasury Department who issues a cheque for purchases greater than 5000 pounds and cash for smaller purchases. The purchase is then made. In some cases the supplier invoices DAWSSA at a later date.

11. The invoice is received with the actual amount which is entered into the disbursement journal

12. A spending order is issued to the Treasury Department.

13. The suppliers will present themselves at the treasury section to collect their money. A cheque or money is issued and a record of the payment transaction is kept.

14. The Accounting Department receives a copy of the spending orders, invoices and payment records all together for each purchase.

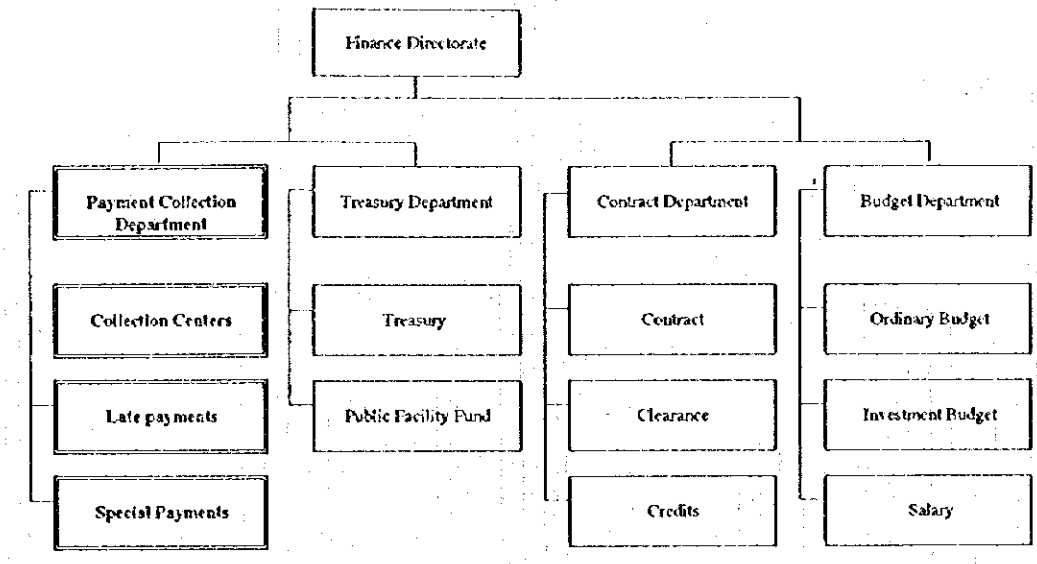



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

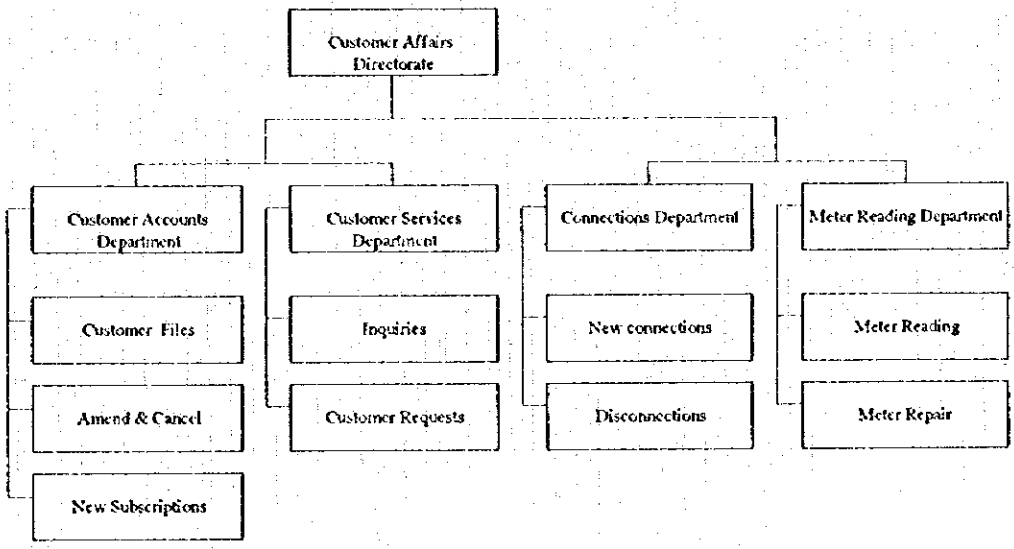
THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E1.9 Work Flow Chart For Spending And Payment Process

NIPPON KOEI CO., LTD.




indicates responsibility moved from Customer Affairs Directorate




| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
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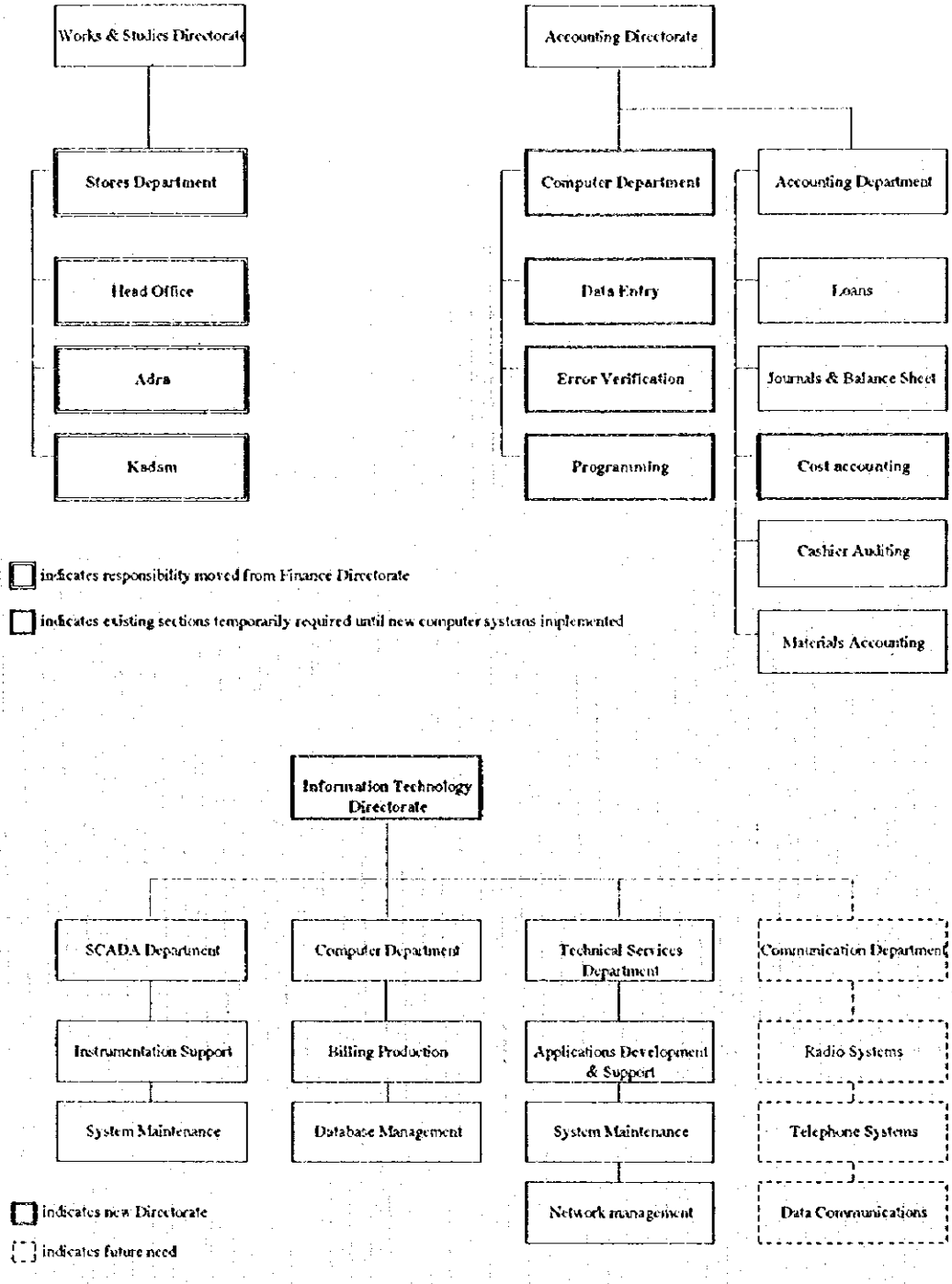
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure E2.1 (1/2)<br>Proposed Organizational Changes |
| NIPPON KOEI CO., LTD. |







| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
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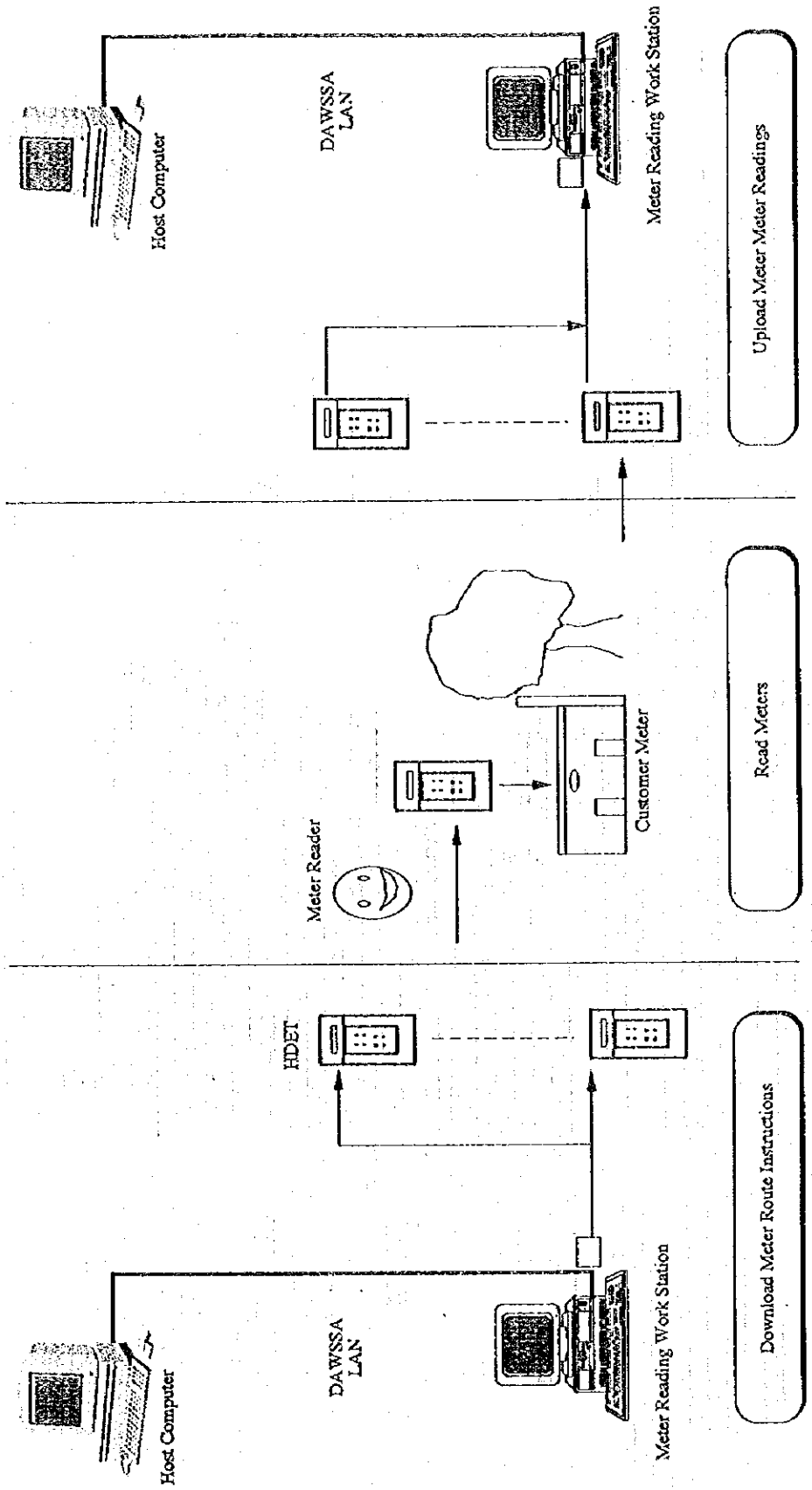
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure E2.1 (2/2)<br>Proposed Organizational Changes |
| NIPPON KOEI CO., LTD. |



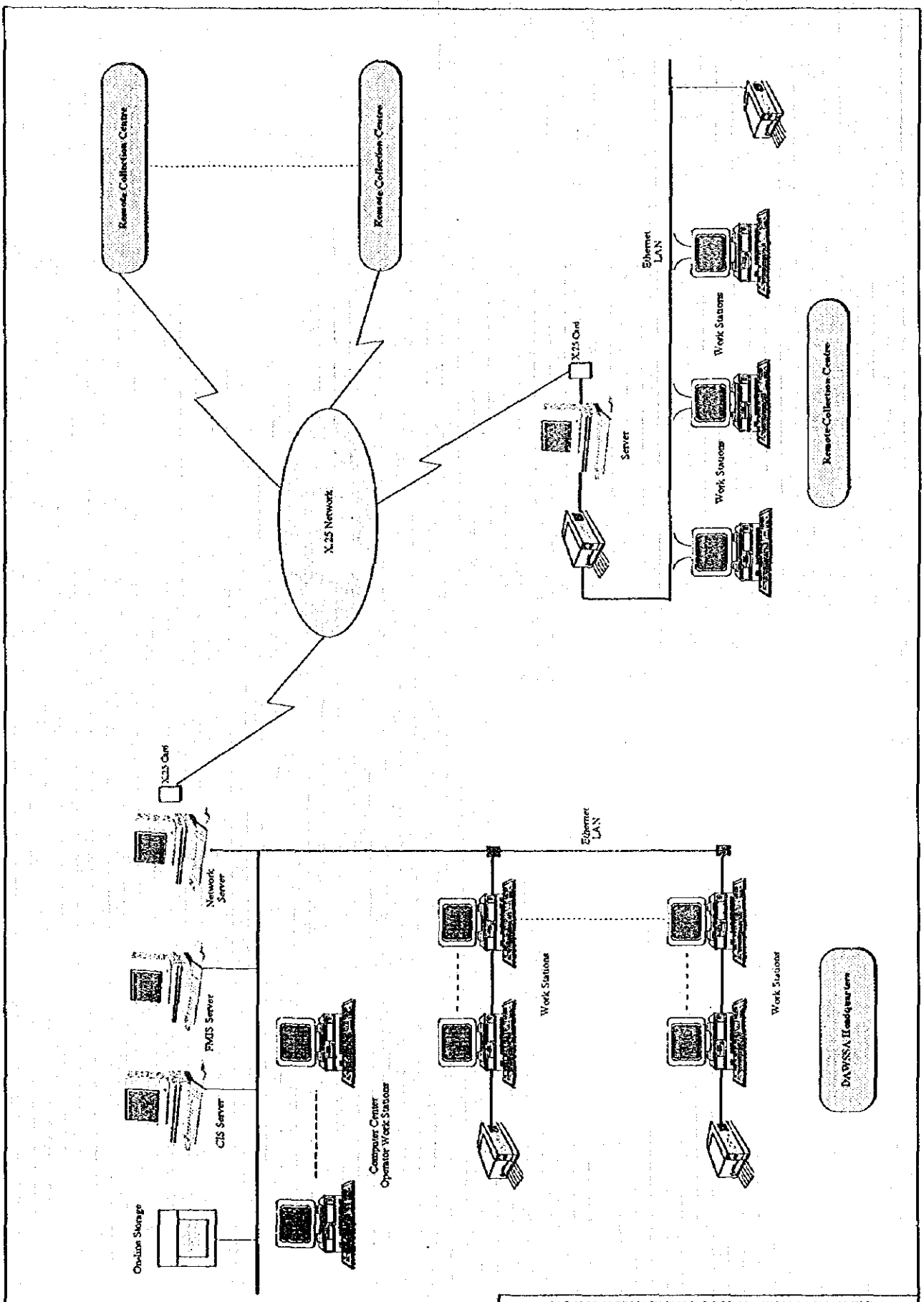

| |
|---|
| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure E2.2 Meter Reading Process Using HDET's |
| NIPPON KOEI CO., LTD. |

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E2.3 Billing Schedule
Based On A 4 Month Cycle (Option 3f)

NIPPON KOEI CO., LTD.




JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E3.1 Computer System Configuration

NIPPON KOEI CO., LTD.

| Area Affected by Change | Option No. | Recommended Change | Improvement Objectives | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | implement modular and integrated systems to meet organizational priorities | accelerate decision making | clarify roles & responsibilities | improve access to account information | improve speed and accuracy of transactions | improve retrieval and archiving of customer information | reduce duration of the billing process | reduce billing errors | accelerate the collection of payments | provide accurate and timely financial information | provide cost information to control expenditures | provide the information required to prepare the budgets |
| Planning | | Computer needs planning study | ◎ | | | | | | | | | | | |
| Overall Organization | 1b | Move payment collection operations to Finance Directorate | | ◎ | ◎ | | | | | | | | | |
| | 1c | Move stores management to New Works & Stores Directorate | | ◎ | ◎ | | | | | | | | | |
| | 1d | Create a new information technology directorate | | | ◎ | | | | | | | | | |
| Customer services | 2a | Implement a document management system | | ● | | ● | | ● | | | | ● | | |
| | 2b | Implement a customer information system | | ● | | ● | ● | ◎ | | | | ◎ | | |
| Metering, billing & collection | 3a | Implement meter installation standards | | | | | ● | | ○ | | | | | |
| | 3b | Implement hand held data entry terminals | | | | ● | ● | | ● | ● | | ● | | |
| | 3c | Enter meter data as soon as readings are completed | | | | | | | ● | ● | | | | |
| | 3d | Consolidate error detection and correction process | | | ○ | | | | ○ | | | | | |
| | 3e | Implement a billing and customer accounting system | | | | ● | | | ● | ◎ | | | | |
| | 3f | Adopt a 4 month billing cycle | | | | | | | | | ○ | | | |
| | 3g | Reduce payment period to 30 days, and issue notices monthly | | | | | | | | | ◎ | | | |
| Management Information | 4a | Implement cost accounting | | | | | | | | | | ○ | ○ | |
| | 4b | Provide financial management information system | | ● | | | | | | | | ● | ● | ● |

Priority 1 ○ can be implemented without organizational change or budget approval
Priority 2 ◎ requires funding for consultant study
Priority 3 ◑ requires approval for organizational change or budget increase
● requires the implementation of new computer systems

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E4.1 Summary Of Change Strategy

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THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure E4.2 Implementation Schedule For Computer Systems

NIPPON KOEI CO., LTD.

# *APPENDIX F*

# *TOPOGRAPHIC SURVEY*

APPENDIX F
TOPOGRAPHIC SURVEY

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# 1. INTRODUCTION

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.

## 2. 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 Area.

# 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 Souseh-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 Damascus.

### 3.2.1 Supplementary Topographic Survey

The following works were executed during this study stage mainly to clarify 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 areas)
- Work Quantity : about 1,700,000 $m^2$
- Survey Method : Tachymetric method or equivalent
- Drawings : prepared by the CAD system with the DAWSSA's standard scale of 1/2,000

(2) Existing house number and location survey

- Accuracy of scale : 1/500 for House location measuring
- Work Quantity : about 1,700,000 $m^2$
- Survey Method : Tachymetric method or equivalent
- Drawings : prepared by the CAD system with the DAWSSA's standard scale of 1/2,000

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

## 3.3 Survey Results

### 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:

| | |
|---|---|
| Total Area (ha) | 136.0 |
| Length of Road (km) | |
| • less than 4 m of Wide | 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 | 714.89 |
| • Minimum | 701.21 |
| • Average | 710.21 |

(2) Kafar Sousch-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

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:

| | |
|---|---|
| Total Area (ha) | 55.0 |
| Length of Road (km) | |
| • less than 4 m of Wide | 0.394 |
| • 4m to 6 m of Wide | 1.060 |
| • 5m to 7m of Wide | 0.828 |
| • 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

Mezze-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)

| Type of Building | Mezze-Razy | Kafar Sousch-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:

| Flow Rate Monitering Points | Elevation above mean sea level (m) | |
|---|---|---|
| | 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 mm | 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 Distribution Mains | Length (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:

| 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.

# *TABLES*

Table F-3.1 Classification of Roads in Mezze-Razy

| MEZZE - RAZY INFORMAL AREA | | | | | |
|---|---|---|---|---|---|
| TABLE OF ROADS SPECIFICATIONS | | | | | |
| ROAD | LENTH | WIDE | | ELEVATIONS | |
| | KM | M | MAXIMUM | MINIMUM | AVERAGE |
| A | 1.831 | 6 TO 8 | 713.93 | 706.79 | 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 | | | |
| D2 | 0.426 | 4 TO 6 | | | |
| D (TOTAL ) | 0.656 | | 711.7 | 706.83 | 708.98 |
| | | | | | |
| E | 0.865 | 4 TO 6 | 709.08 | 705.24 | 706.86 |
| F | 0.974 | 6 TO 8 | 711.27 | 705.09 | 708.87 |
| G | 0.382 | 4 TO 6 | 712.32 | 710.95 | 711.71 |
| H | 0.662 | 4 TO 6 | 710.65 | 709.07 | 709.71 |
| I | 0.306 | LESS THAN 4 | 703.61 | 701.93 | 703.05 |
| J | 0.14 | 4 TO 6 | | | |
| 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 | 0.24 | 4 TO 6 | 711.15 | 714.89 | 713.42 |
| O | 0.137 | 4 TO 6 | 713.21 | 714.72 | 713.95 |
| R | 0.203 | LESS THAN 4 | 710.91 | 714.7 | 713.27 |
| S | 0.185 | 4 TO 6 | 711.78 | 714.19 | 713.39 |
| TOTAL | 9.185 | | | | |

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

| | KAFAR SOUSEH-LAWAN INFORMAL AREA | | | | |
|---|---|---|---|---|---|
| | TABLE OF ROADS SPECIFICATIONS | | | | |
| ROAD | LENTH | WIDE | | ELEVATIONS | |
| | KM | M | MAXIMUM | MINIMUM | AVERAGE |
| L1 | 0.336 | 5 TO 7 | 706.11 | 705.6 | 705.87 |
| L2 | 0.668 | MOER THAN 8 | 706.8 | 700.38 | 703.53 |
| L3 | 0.093 | 4 TO 6 | 706.11 | 705.46 | 705.74 |
| L4 | 0.179 | 4 TO 6 | 707.01 | 706.2 | 706.65 |
| L5 | 0.248 | 5 TO 7 | 704.53 | 704 | 704.23 |
| L6-1 | 0.193 | 4 TO 6 | | | |
| L6-2 | 0.349 | 8 TO 11 | | | |
| TOTAL | 0.542 | | 701.84 | 700.9 | 701.13 |
| L7 | 0.492 | 5 TO 7 | 701.13 | 696.64 | 698.65 |
| L8 | 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 | | | | |

Table F-3.3 Type and Number of Buildings and House

MEZZE- RAZY INFORMAL AREA

TABLE OF NUMBERS AND TYPES OF ENUMERATED HOUSES / BUILDINGS

( Unit : properties)

| Block number | 1 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 | | | 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 | 3 | 74 | 4 |

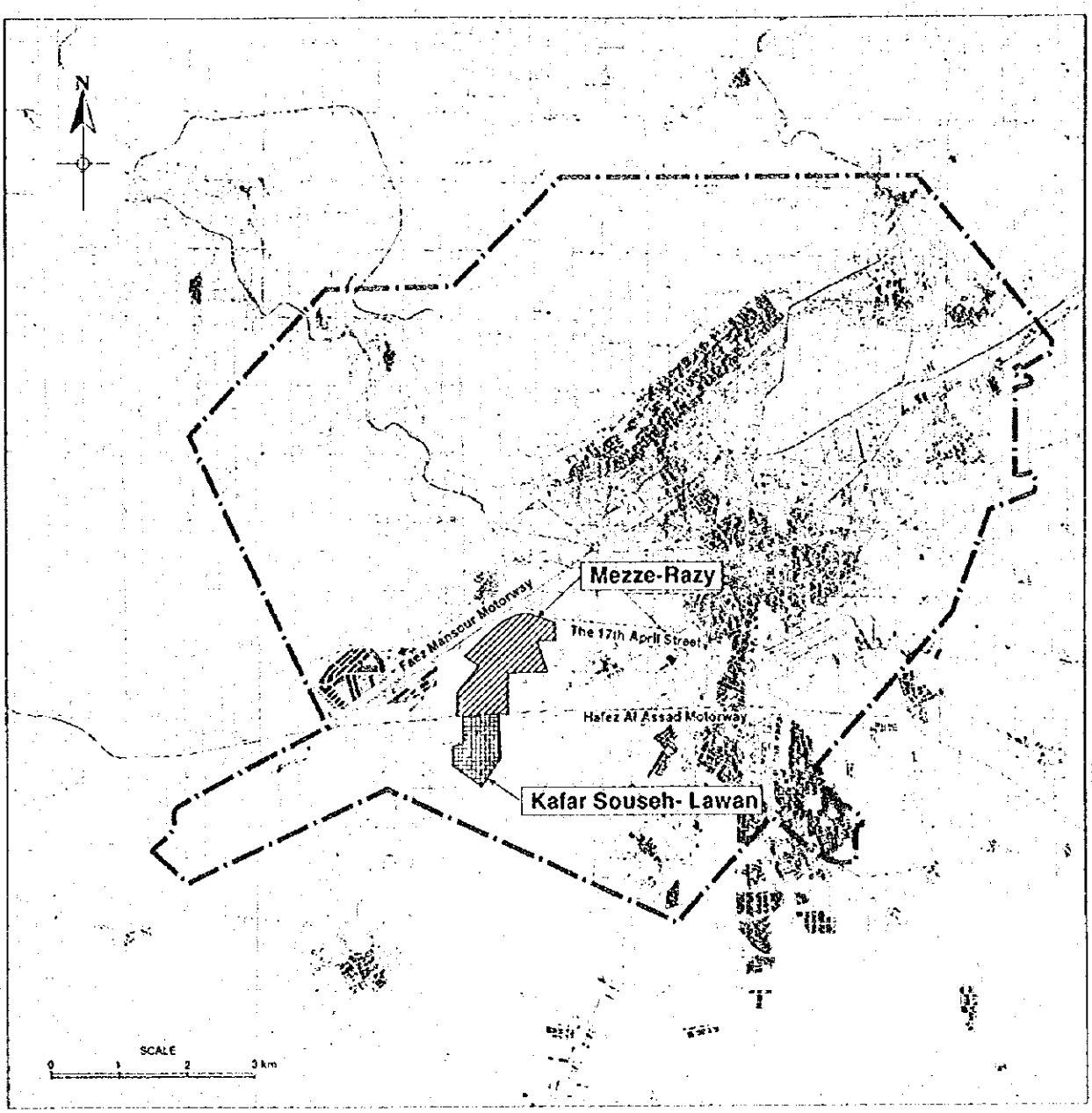
KAFAR SOUSEH - LAWAN AREA

TABLE OF NUMBERS AND TYPES OF ENUMERATED HOUSES / BUILDINGS

( Unit : properties)

| Block | 1 story | 2 stories | 3 stories | School | Mosque | shop | Workshop | Nursery | Swim.Bath |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 22 | 11 | | | | 1 | 2 | | |
| 2 | 40 | 9 | | | | 1 | 7 | | |
| 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 |

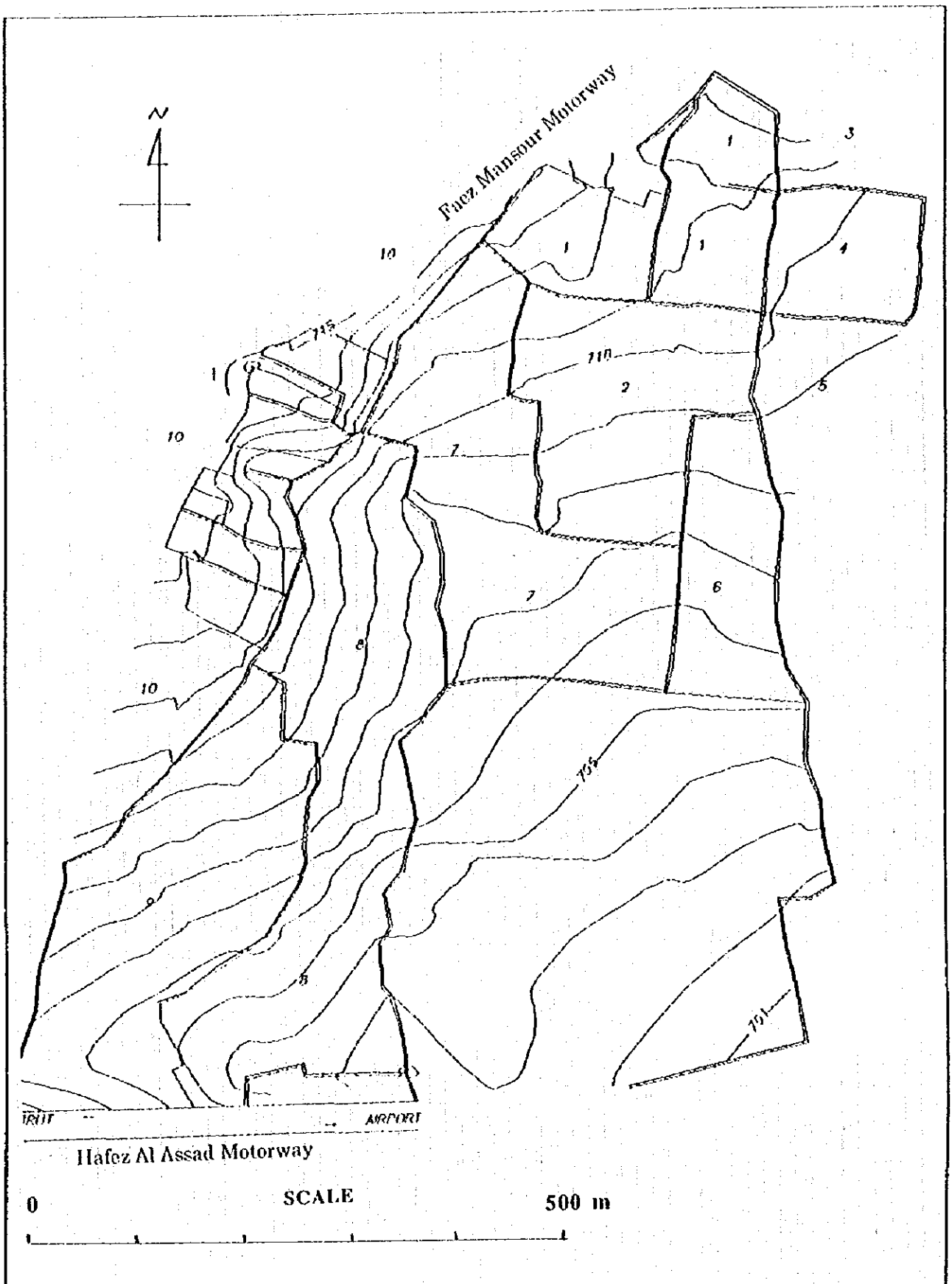
*FIGURES*




| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
|---|
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure F-2.1 Location Map |
| NIPPON KOEI CO., LTD |

| Work Item | 1997 | | | | |
|---|---|---|---|---|---|
| | April | May | June | July | August |
| Site Preparation | | | | | |
| Supplementary Topographic Survey | | | | | |
| Leveling Survey | | | | | |
| Analysis | | | | | |
| Report Preparation | | | | | |

| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
|---|
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure F-3.1 Work Schedule |
| NIPPON KOEI CO., LTD. |

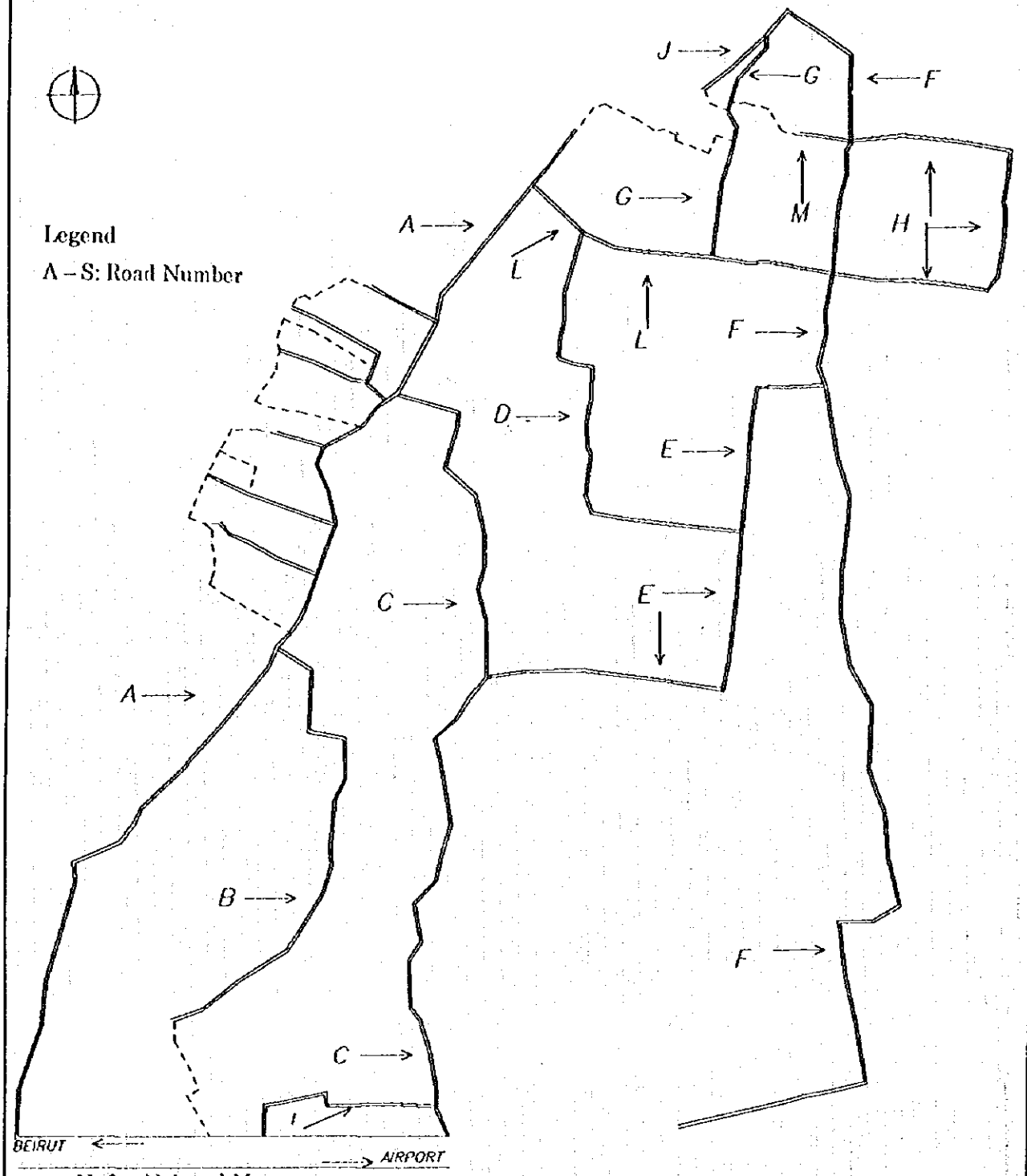



Legend

1 – 10: Block Number

710: Elevation

| |
|---|
| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure F-3.2 Topographic Map (Mezze-Razy) |
| NIPPON KOEI CO., LTD. |




Hafez Al Assad Motorway

*Length of Road (km)*

| | |
|---|---|
| less than 4m of Wide | 0.509 |
| 4m to 6m of Wide | 5.641 |
| 6m to 8m of Wide | 3.035 |
| more than 8m of Wide | |
| Total | 9.165 |

*Classification of Elevation (m)*

| | |
|---|---|
| Maximum | 714.89 |
| Minimum | 701.93 |
| Average | 710.21 |

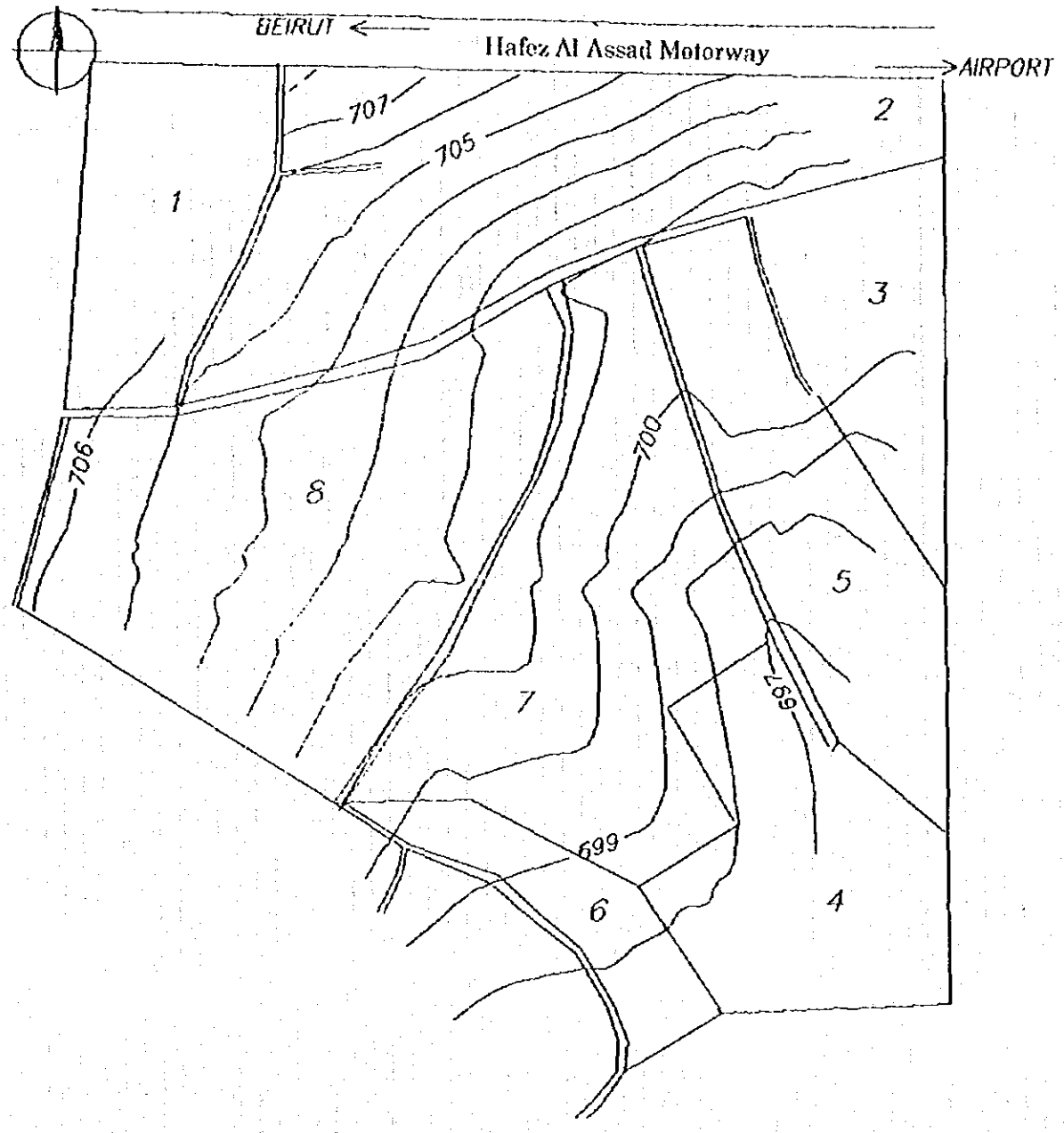
Scale 0 100 200 300 m

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure F-3.3 Road Map (Mezze-Razy)

NIPPON KOEI CO., LTD.




0 SCALE 500 m

Legend

1 – 8: Block Number

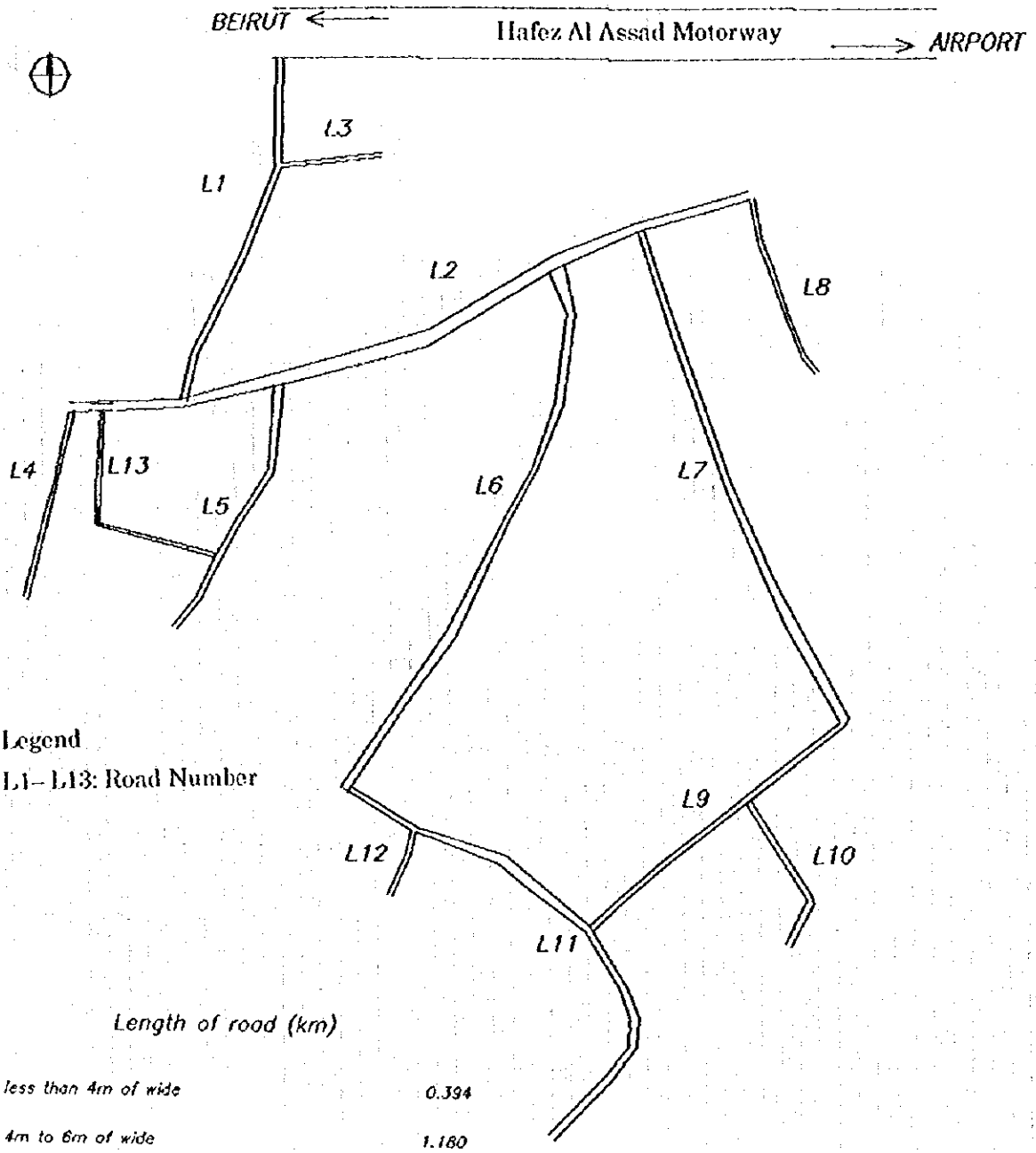
705: Elevation

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure F-3.4 Topographic Map (Kafar Seusch-Lawan)

NIPPON KOEI CO., LTD.




Legend

L1– L13: Road Number

*Length of road (km)*

| | |
|---|---|
| less than 4m of wide | 0.394 |
| 4m to 6m of wide | 1.180 |
| 6m to 8m of wide | 1.376 |
| more than 8m of wide | 1.017 |
| total | 3.967 |

*Classification of Elevation (m)*

| | |
|---|---|
| Maximum | 706.80 |
| Minimum | 696.64 |
| Average | 701.90 |

0 100 200 300 m

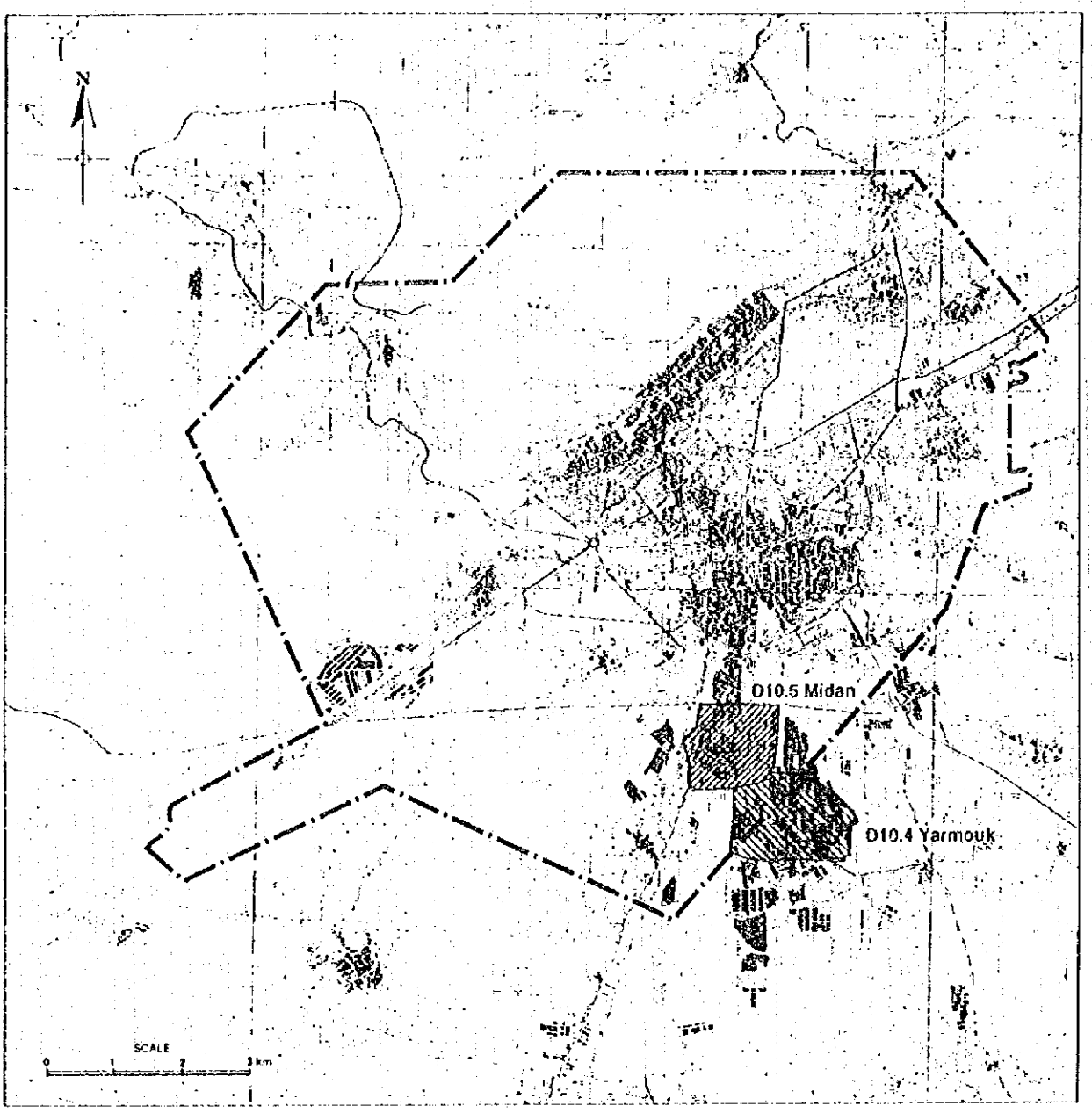
Scale: 1/5,000

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY

Figure F-3.5 Road Map (Kafar Souseh-Lawan)

NIPPON KOEI CO., LTD.




**LEGEND**

:D10.5 Midan

:D10.4 Yarmouk

| JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) |
|---|
| THE STUDY ON THE DEVELOPMENT OF WATER SUPPLY SYSTEM FOR THE DAMASCUS CITY |
| Figure F-3.6 Location Map of Pilot Area |
| NIPPON KOEI CO., LTD. |