S.7.5 Computer Aided Tariff Collection System

S.7.5.1 Proposed Tariff Collection Procedure

The Study Team hold the seminar dedicated to the effective tariff collection procedure at Tashkent Vodokanal and Chirchik Vodokanal. In this section we attach the minute of Tashkent seminar and documents.

(1)Minute of Seminar at Tashkent Vodokanal

Date: 03.December, 1999

Place: "Vodokanal" trust, Tashkent

Attended on the part of "Vodokanal": Mr. A.V. Filatov/ Head of Water Supply Department. and the cheifs of several sections.

on the part of JICA: Explainer: Mrs. N. Yano, Mr. Y. Chikamatsu
Mr. A. Nakagome Mr. A. Shimizu
Interpreter: Miss. N.Okabayashi
Minutes: Mrs. O.Bourenina

AGENDA:

Seminar dedicated to the effective tariff collection procedure using computer system in Japan.

1) Opening Address.

The opening address was given by Mr. A.V. Filatov, Head of Water Supply Department. He introduced the personnel, attended at the seminar: Head of outstanding tariff control dept and his assistant, Head of communal service dept, Head of ASU (Automated system of operation) dept, Head of industrial sector dept, Head of private sector dept, Chief engineer, Legal expert and Technician. Mr. Filatov expressed his hopes on this seminar being on benefit to both parties.

2) The Substance of the Presentation

Mrs. Yano explains the substance of this seminar, she wishes the seminar should help improvement of business procedure and be a part of information transfer.

3) Outline of Japanese System

4) Tariff Collection System

5) The Different Points

Mrs. Yano and Mr. Chikamatsu explain.

6) Question and Answer

After the end of main part of the seminar, some time was dedicated to questions and answers. The following questions and answers were arisen after the slide show:

i) Why does the Bureau of Waterworks entrust another companies for meter reading?

This decision depends on resolution of local government. In Tokyo Bureau of Waterworks entrusted another company for fulfillment of these procedures with the purpose to save time for more important and complicated questions and activities and to save money on assigning of new employees.

ii) If user refuses to pay during a very long period, what is Water Bureau doing?

The recurring bill is given during 3 months after the date of meter reading, then user receives a "blue paper", after that Water Bureau sends his representative to visit the user, then user is advised about water supply suspension with "white paper" and finally the water supply is suspended.

iii) If meter reading is conducted once per two months, how does Water Bureau know about the defects and breakage of water meters? Defects of water supply pipes?

This happens very seldom, abnormal results of meter reading are shown in computer and are usually checked by Bureau specialists (repair, removal etc.). The situation with pipes is similar.

iv) If the slip, left in mailbox, was taken by somebody else, was missed, what shall user do?

These slips are not necessary to anybody else, except the user. In most cases payment is

deducted automatically from users bank account. Water Bureau personnel settles these kinds of problems.

v) Do Japanese people understand the important role of water in their lives?

There is a deficiency in water resources in Tokyo. So, annually government conducts a campaign on save of water. Also, active measures on increase of self-consciousness are taken, e.g. brochures on important role of water, process and cost of preparation of drinking water, ways of save of water.

vi) Do Japanese use the water for car washing?

Yes, they do, but car washing services use different devices to save the water, in accordance with edicts and resolutions by government.

vii) Are there different tariffs for different kinds of users (industrial, private etc.)?

Progressive tariff table is used in Japan. Tariffs without limits exceeding are the same. Average water consumption for 1 person per 1 day in Tokyo amounts 200 liters of water.

viii) Who establishes the tariffs?

Local government is in charge of establishment of tariffs.

ix) Is the system of Water Bureau in Japan absolutely perfect?

It is impossible to contend it. Water Bureau receives many claims on quality of water, users require the modification of purification methods etc. Bureau of Waterworks is doing all its best for improvement of present system, conducts the sociological surveys among the population etc.

7) Closing Address

The closing address was also given by Mr. Filatov. He expressed his thanks to Study Team for useful information, given during this seminar. He also expressed his appreciation for the way of explanation and organization of seminar.

3. Outline of Japanese System

3-1 The Position of the Administration

3-2 Comparison of Cities

3-3 Organization

3-4 Works and Organization

3-1 The Position of the Administration

Utilities

The Diet	Resolution	Postage etc.
Government	Decision	National school fee etc.
Government	Approval	Electricity charge, Gas charge, Telephone charge, Bus fare etc.
Local Government	Decision	Public school fee Water supply charge

3-1 The Position of the Administration

The Local Government Law

This stipulates the rules, such as for establishment, management, and water charges of water supply systems as local government's facilities for the public welfare, etc.

The Local Public Enterprise Law

This stipulates the basic management of local public enterprise, such as organization, finance, personnel, etc.

3-2 Comparison of Cities

Facility 1

	Tokyo	Kyoto	Tashkent	Chirchik
Population served ;thousand people	10,941	1,429	2,200	146
Rate of service pervasion %	100	100	98.6	100
Number of service connection ;thousand cases	5,506	653	568.8	46.3
Total length of distribution pipes ;Km	22,329	3,680	3,652	248

3-2 Comparison of Cities

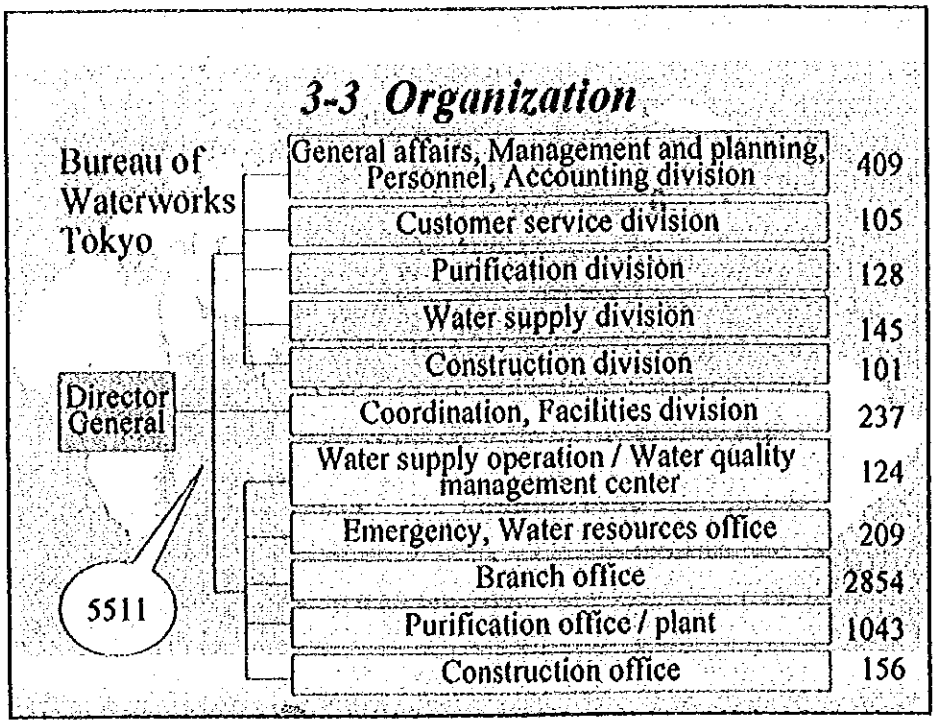
Facility 2

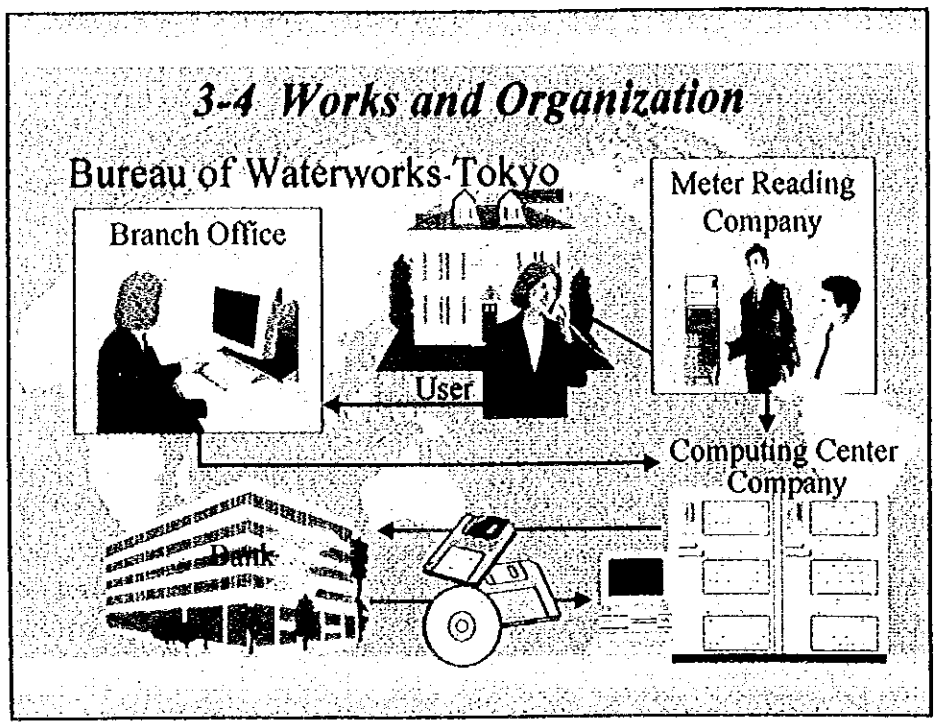
	Tokyo	Kyoto	Tashkent	Chirchik
Total production capacity ;thousand m3/day	6,960	1,050	2,296	179
Total annual water supply volume ;thousand m3	1,688,805	240,917	899,706	38,700
Max. daily water supply volume ;thousand m3/day	5,413	846	2,830	196
Av. daily water supply volume ;thousand m3/day	4,627	673	2,465	106

3-2 Comparison of Cities

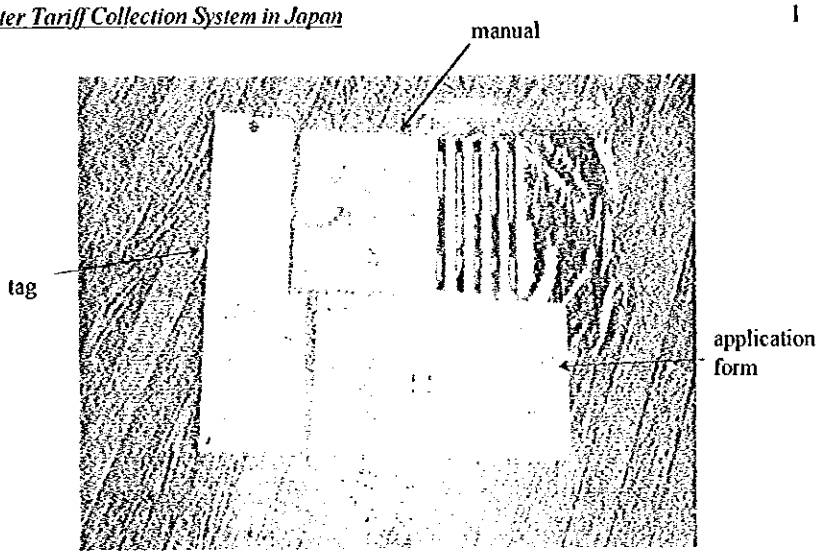
Finance

	M US Dollar;1US$=105YEN		M US Dollar;1US$= 110Sum	
	Tokyo	Kyoto	Tashkent	Chirchik
Water supply revenues (net)	2,909.5	289.1	18.6	1.99
Other operating revenues	373.7	30.4	0.1	0.05
Operating expenditures	2,720.8	242.9	14.1	1.85
Net income (loss)	268.9	33.4	2.8	0.02
Total of capital	19,476.2	2,502.4	30.4	0.73


3-3 Organization
Bureau of Waterworks Tokyo
Director General
5511
General affairs, Management and planning, Personnel, Accounting division 409
Customer service division 105
Purification division 128
Water supply division 145
Construction division 101
Coordination, Facilities division 237
Water supply operation / Water quality management center 124
Emergency, Water resources office 209
Branch office 2854
Purification office / plant 1043
Construction office 156

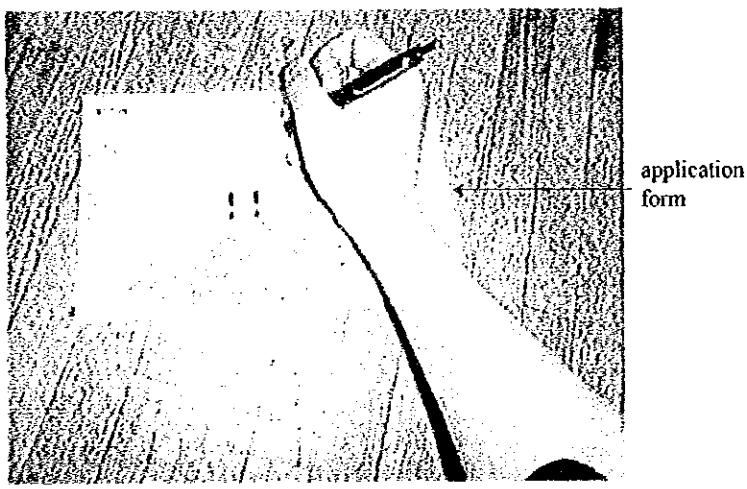

3-4 Works and Organization
Bureau of Waterworks-Tokyo
Branch Office
Meter Reading Company
User
Computing Center Company
Bank

Water Tariff Collection System in Japan 1



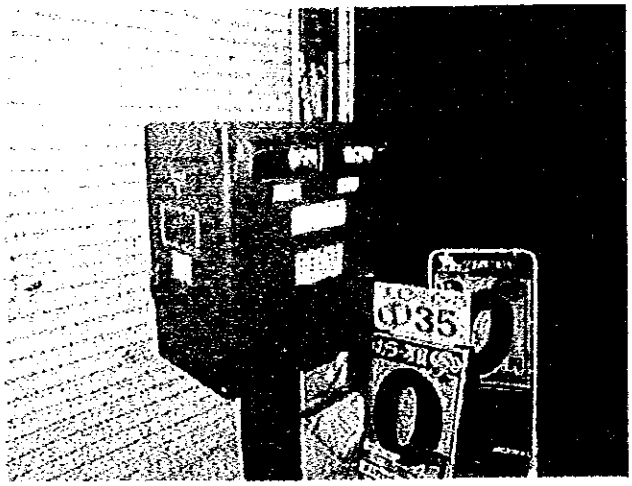
A new user receives a set of application documents for water use.
The documents include manual, tags and application form.

Water Tariff Collection System in Japan 2



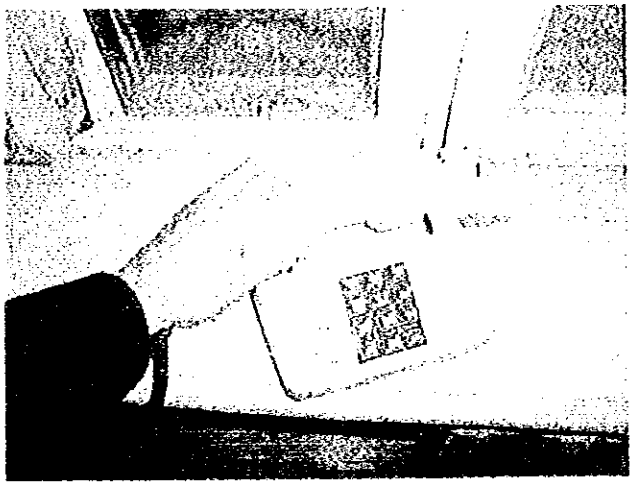
The application form is filled in by a user at home. The items filled include name, address, telephone, the date when the user started to use water, etc. Bank account number and signatory stamp are also required if the user wishes to pay through his bank account.

Water Tariff Collection System in Japan 3



After filling the form, the user sends it by mail. He does not have to go to Water Department Office.

Water Tariff Collection System in Japan 4

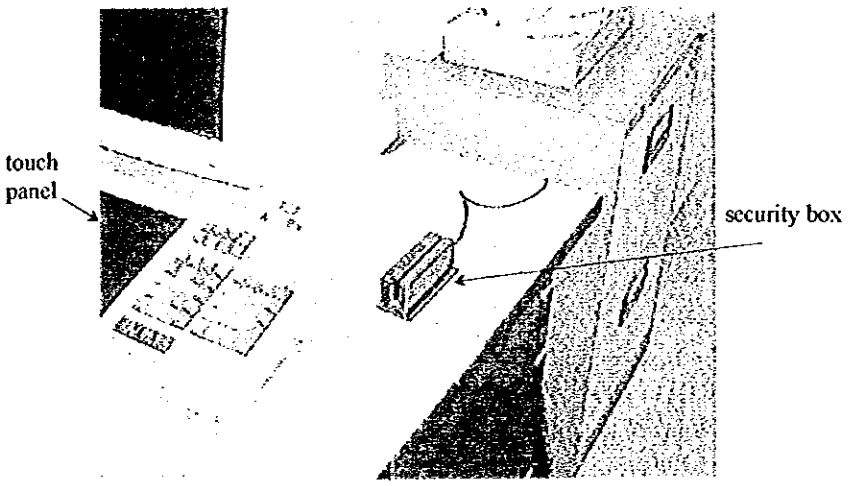


If any changes arise, the user can notify such change by a telephone call. Inquiries and claims are also handled at Customer Support Centre.

Water Tariff Collection System in Japan 5

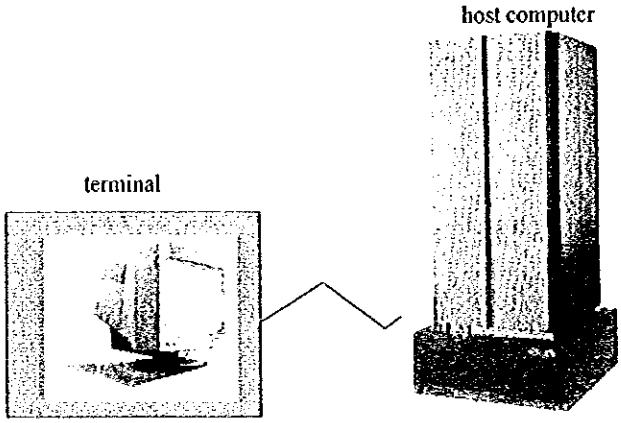
When a Water Department receives an application from users, the information is inputted into the computer system.

Water Tariff Collection System in Japan 6



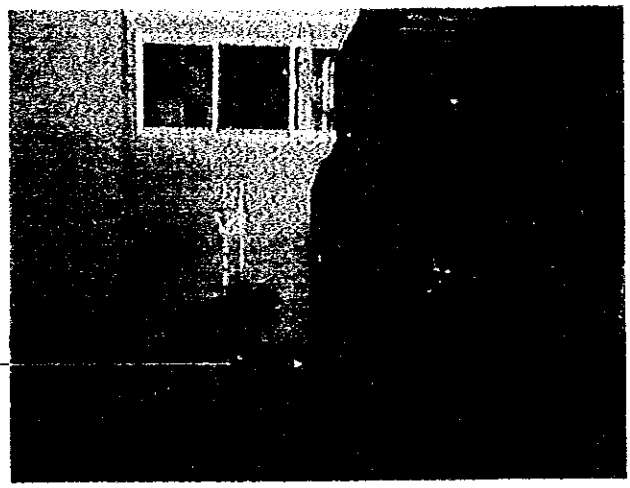
This computer terminal is connected to a host computer, which holds all the information of users in Tokyo. The computer terminal is specifically designed for Water Works (e.g., touch panel, security box etc).

Water Tariff Collection System in Japan 7



A host computer is connected with several hard disc drives which contain various database.

Water Tariff Collection System in Japan 8

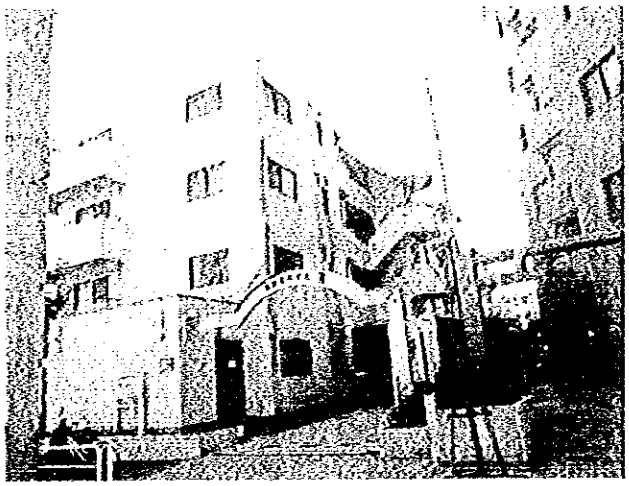


A water meter (covered by blue metal on the ground) is usually situated outside a house, so that controllers may read water meter while the user is out.

Water Tariff Collection System in Japan 9

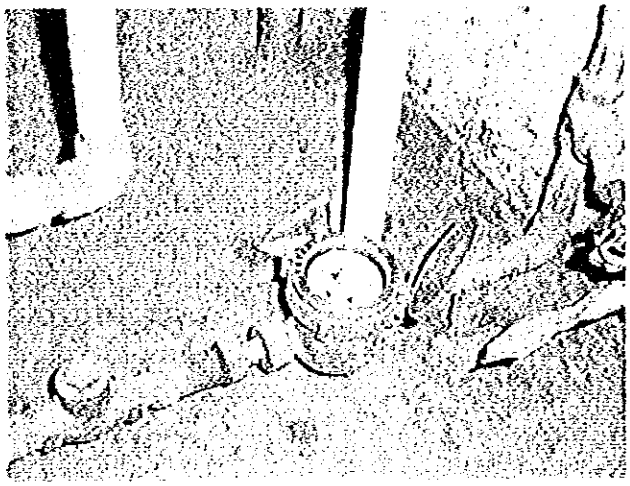
The electricity meter is also situated outside the house.

Water Tariff Collection System in Japan 10



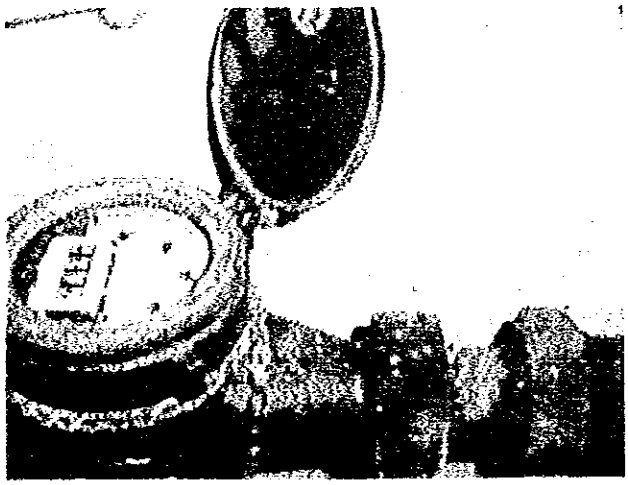
A typical apartment building in Japan. A water meter is usually installed at each apartment.

Water Tariff Collection System in Japan 11



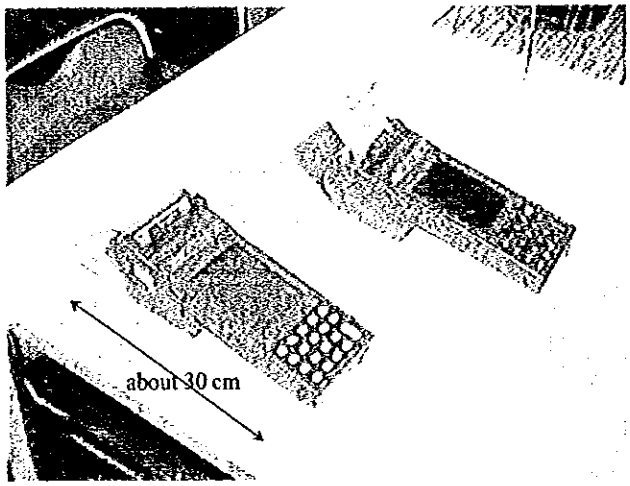
A water meter (see red item) is situated outside the apartment so that controllers may read water meter while user is out.

Water Tariff Collection System in Japan 12



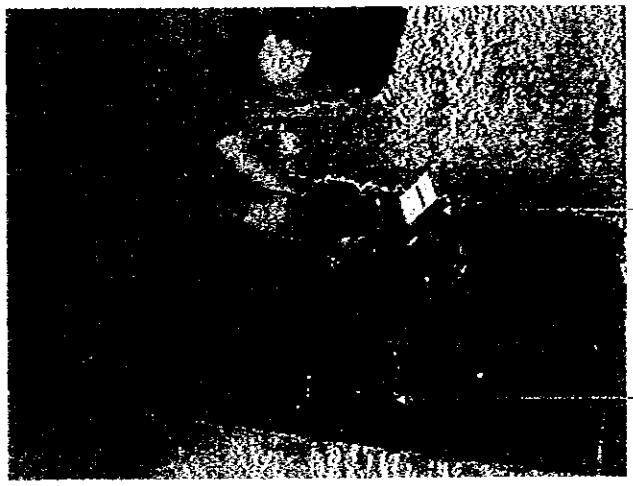
This blue water meter is used for big pipe (50 mm).

Water Tariff Collection System in Japan 13



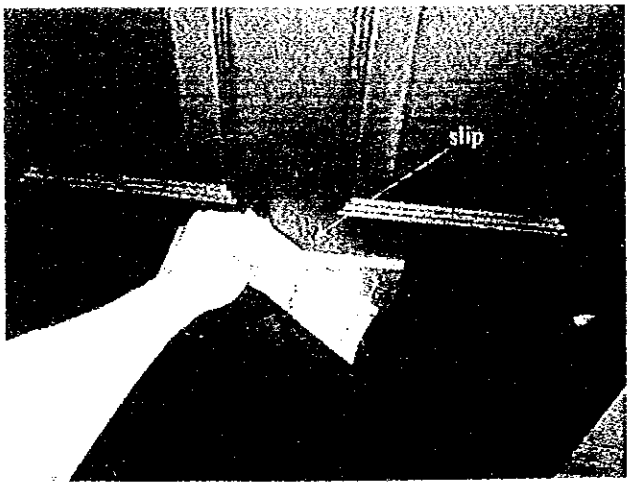
A hand-held terminal is widely used for meter reading. It weighs about 400 grams. It can print out a slip which indicates the result of meter reading.

Water Tariff Collection System in Japan 14



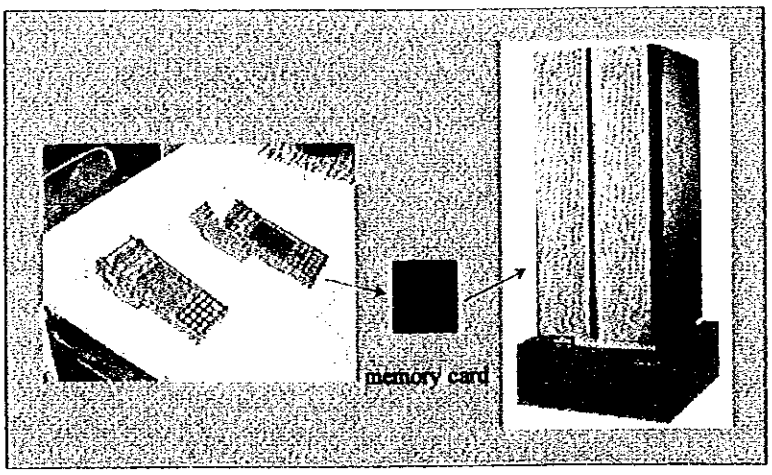
A uniformed controller is reading a water meter and inputting the amount into the hand-held terminal.

Water Tariff Collection System in Japan 15



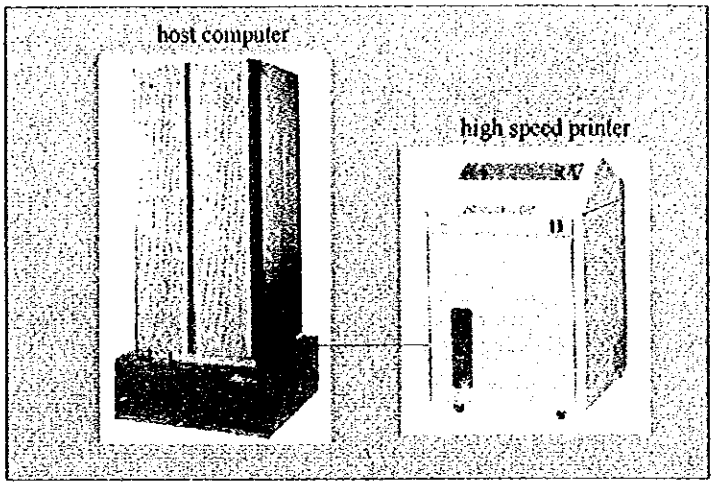
The hand-held terminal prints out a slip, which is inserted into the post box of each user.

Water Tariff Collection System in Japan 16



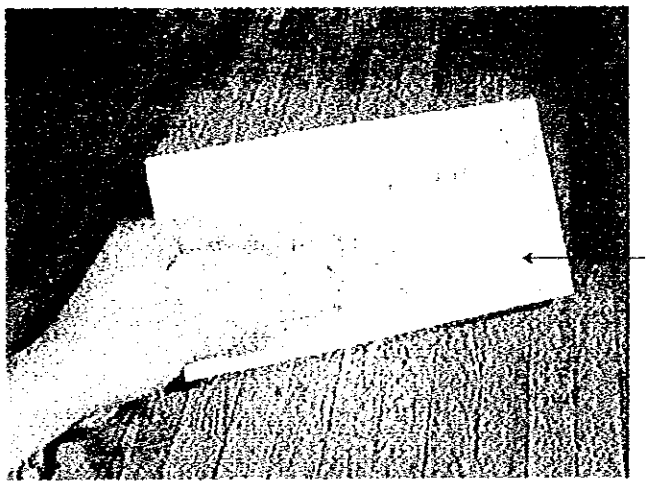
The information of meter reading is transmitted from hand-held terminals to the host computer via a memory card.

Water Tariff Collection System in Japan 17



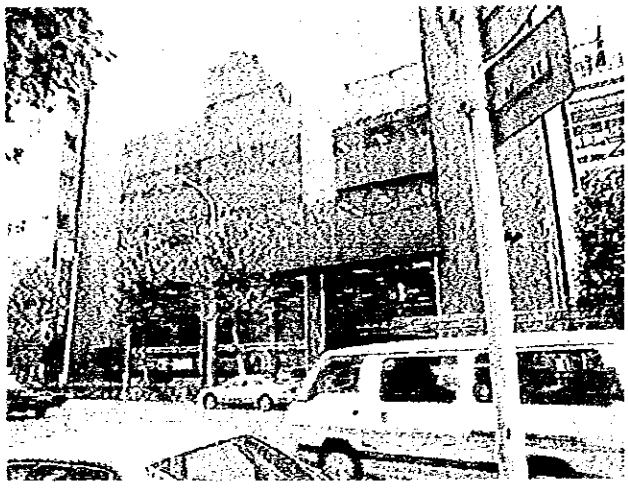
Bills can be printed out from a high speed printer which is connected to the host computer regularly.

Water Tariff Collection System in Japan 18



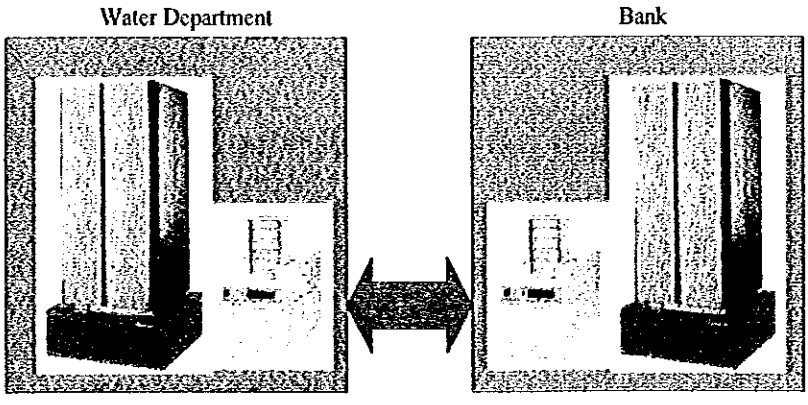
A bill is inserted into an envelop which has two transparent windows. A user name and his postal address is printed on the bill and seen from the window so that it is not necessary to write an addressee on the envelop.

Water Tariff Collection System in Japan 19



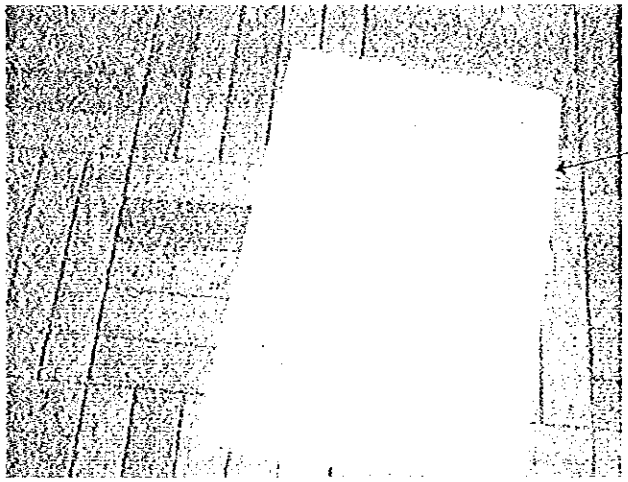
Most of the users in Japan have their own bank accounts and the amount to be paid is automatically deducted from the balance of their accounts.

Water Tariff Collection System in Japan 20



After deducting the amount paid from the balance of users accounts, the bank sends a magnetic tape to the Water Department where reconciliation takes place.

Water Tariff Collection System in Japan 21



The users who do not wish to pay from their bank accounts receive bills.

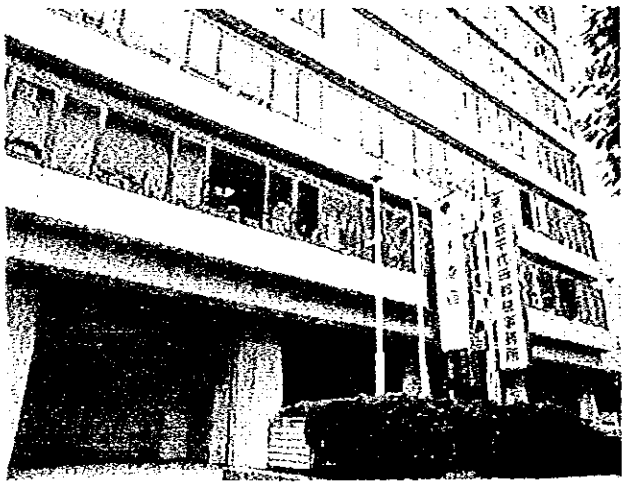
Water Tariff Collection System in Japan 22

The users who do not wish to pay from their own bank account can pay at banks and post offices. There are tens of thousands of post offices in Japan.

Water Tariff Collection System in Japan 23

In some big cities including Tokyo, users can also pay at convenience stores which are open 24 hours a day.

Water Tariff Collection System in Japan 24

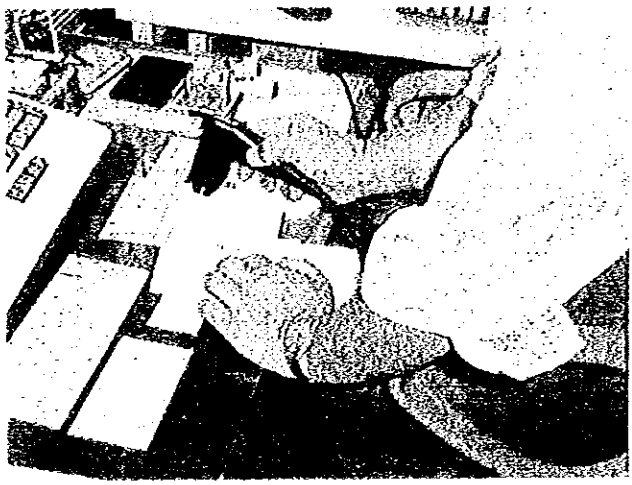


Some users can pay at Water Department branches.

Water Tariff Collection System in Japan 25

The customer counter of the Water Department Branch.

Water Tariff Collection System in Japan 26

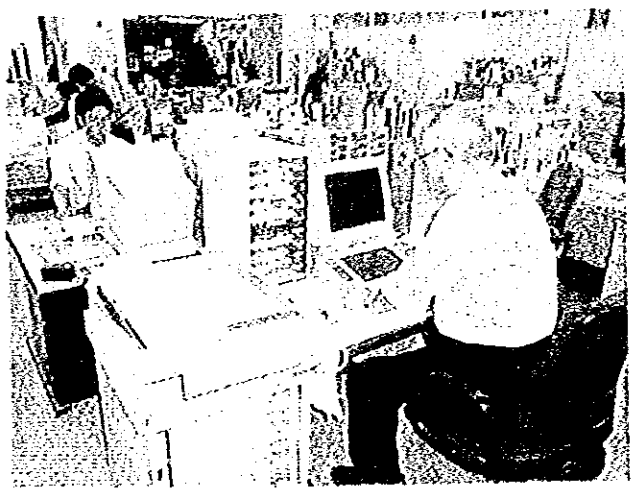


A bar code is printed on the bill. The information about the user is retrieved from the bar code reader so that it is not necessary to input the customer number, name, address etc by keyboard.

Water Tariff Collection System in Japan 27

The user paid at the Customer Counter and receives the receipt and change.

Water Tariff Collection System in Japan 28



One of the staff is making query about payment status of users.

Water Tariff Collection System in Japan 29

A controller is inserting a notification of payment arrears ("blue paper") into the mailbox of users who do not pay by the date specified on the bill.

Water Tariff Collection System in Japan 30

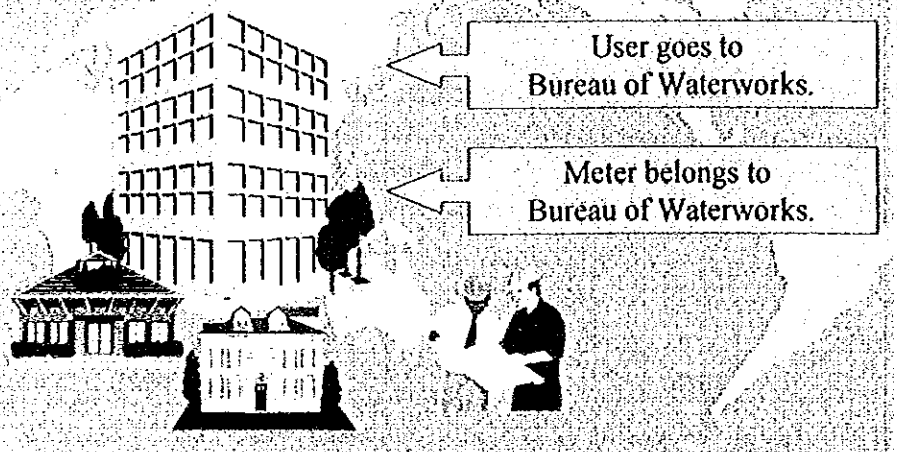
A controller is inserting a notification of suspension of water supply ("white paper") into the mailbox of users who do not pay even after they are urged to pay several times.

5. Difference Points

5-1 Application for Water Supply
5-2 Reading Meter
5-3 Billing
5-4 Receipt of Tariff
5-5 Outstanding Tariff Control

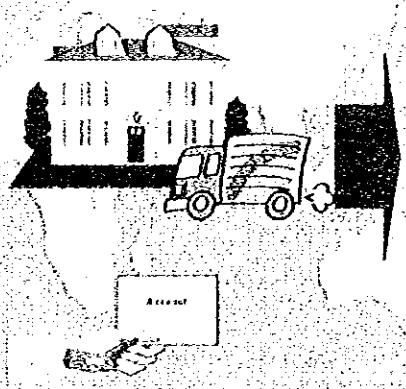
5-1 Application for Water Supply

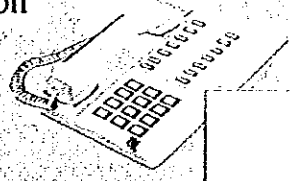
Construction New House / Building



5-1 Application for Water Supply

Moving, Change of Condition





Telephone or Postal letter

Update user's information

5-2 Reading Meter

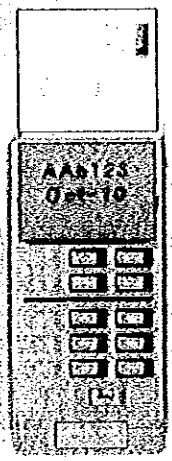
Read by Himself and Leave the Slip

Decided method of installation water meter
--- water meter installed outside the house
--- water meter belongs to Bureau of Waterworks

Entrust to other companies
--- Bureau of Waterworks does not know who reads whose meter

5-2 Reading Meter

Hand-held Terminal



- You do not have to do preparation.
- Only input the number of water meter.
- You do not have to calculate anything.
- Slip is printed out automatically.
- You do not have to input the data into computer after meter reading.

5-2 Meter Reading

Leave Slip to Every Users

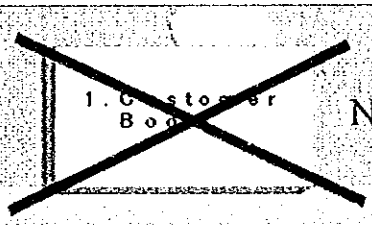
From Bureau of Waterworks Tokyo User name Customer number Meter reading number
Notice of deduction from your account Period Consumption volume (water supply, sewage) Amount deducted
Notice of your water consumption Period Figure (this time, last time) Consumption volume Bill Next meter reading date
Branch office and Meter reading company TEL Meter reader's name

5-3 Billing

Send the Bills to Some Users

80% -- Deduction from user's account
20% -- Payment at bank, post office, or 24 hours shop

Send bills to the users by mail



Not use Customer Book

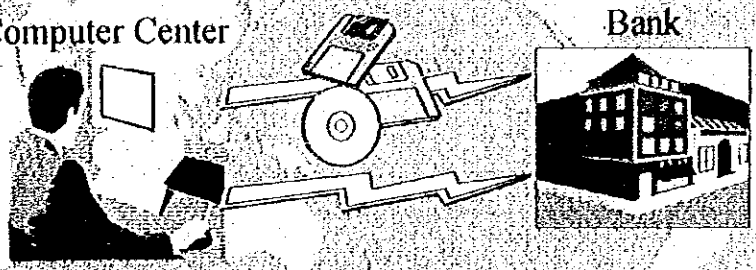
5-4 Receipt of Tariff

Withdraw from Users' Bank Accounts.

Send electricity receivable data to bank.

Computer Center

Bank



Receive electricity cash-in data from bank.

Automatically check receivable data with them.

5-4 Receipt of Tariff

Many Payment Places

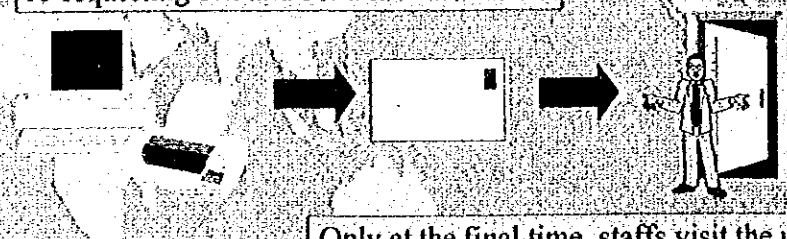
24 hours shop
--- We can buy many kinds of things at any time.
--- For getting the tariff, clerk can use bar code like sales other things.

We do not set off
--- Any kind of organization pay the money.

5-5 Outstanding Tariff Control

Automatically Request the Bill

During some period, automatically output re-requesting bill and send it.



Only at the final time, staffs visit the user and request to pay.
After that, they stop to supply the water.

S.7.5.2 Master Plans and Feasibility Analysis

(1) Estimated Costs

Table S.7.5.1 Initial Cost Estimates (Unit: US Dollar)

REQUIREMENTS ANALYSIS	Unit Cost	Quantity	Unit	Total
Expatriate Staff Fee	15,000	15	ManMonths	225,000
Expatriate Staff Fares, Accommodations	20,000	3	people	60,000
Local Staff Fee	5,000	30	ManMonths	150,000
Contingency			20%	87,000
TOTAL				522,000
DETAILED DESIGN	Unit Cost	Quantity	Unit	Total
Expatriate Staff Fee	15,000	8	ManMonths	120,000
Expatriate Staff Fares, Accommodations	20,000	1	people	20,000
Local Staff Fee	5,000	48	ManMonths	240,000
Contingency			20%	76,000
TOTAL				456,000
PROCUREMENT	Unit Cost	Quantity	Unit	Total
Database Servers	15,000	2		30,000
Computer Terminals (PC)	1,500	40		60,000
Computer Terminals (Meter Reading)	3,000	75		225,000
Fundamental Software				50,000
High Speed Line Printers	3,000	4		12,000
LAN Equipment				20,000
Security Equipment				10,000
Contingency			20%	81,400
TOTAL				488,400
DEVELOPMENT AND TESTING	Unit Cost	Quantity	Unit	Total
Conversion to Russian Languages				200,000
Local Staff Fee (see Table Mandays)	5,000	25	ManMonths	125,000
Contingency			20%	65,000
TOTAL				390,000
TRANSITION ARRANGEMENTS & TRAINI	Unit Cost	Quantity	Unit	Total
Training for Systems Developer (Overseas)	15,000	3	People	45,000
Training for Systems Administrator (Local)	3,000	10	People	30,000
Training for Systems Users (Internal)				-
Contingency			20%	15,000
TOTAL				90,000
TOTAL				1,946,400

Table S.7.5.2 Mandays for Development and Testing

Display	Item	Complexity	Volume	Man Day
Menu	Initial Menu			1
	Confirm User-ID & Password	++		5
	Customer Management Sub-Menu			1
	Meter Reading Sub-Menu			1
	Billing & Payment Sub-Menu			1
	Debtor Control Sub-Menu			1
	Summary Sub-Menu			1
	Additional Features			2
	Security & Backup Sub-Menu			1
Customer Management	Register New User (I=Industry)		+	4
	Register New User (C=Communal)		+	4
	Register New User (H=House)		+	4
	Register New User (A=Apartment)		+	4
	Search Customer	+		5
	Browse, Print, Update & Delete User's Information (I)	+	+	8
	Browse, Print, Update & Delete User's Information (C)	+	+	8
	Browse, Print, Update & Delete User's Information (H)	+	+	8
	Browse, Print, Update & Delete User's Information (A)	+	+	8
Meter Reading	Register New Meter		+	5
	Browse, Print, Update & Delete Meter Information	+		5
	Register New Controller		+	5
	Browse, Print, Update & Delete Controller Information	+		5
	Browse, Print & Update Standard Tariff Table	++	+	10
	Register, Browse, Print, Update & Delete Conditions on Ta	+		5
	Browse & Print Meter Reading Schedule	+		5
	Input Meter Reading	+		5
	Browse, Print, Update & Delete Meter Reading	+	+	10
Billing & Payment	Calculate Tariff	++		8
	Print Bills (Payment Orders)			2
	Reprint Bills (Payment Orders)			2
	Register New Financial Institution			2
	Browse, Print, Update & Delete Financial Institution	+		5
	Input Payment Information	+		5
	Browse, Print, Update & Delete Payment Information		+	5
Debtor Control	Query Debtors	++	+	10
	Browse & Print Age Analysis	+	+	8
	Input Reminding & Suspension Information	+		5
Summary	Statistics of Customer	+		5
	Statistics of Installed Meter	+		5
	Statistics of Billing	+		5
	Statistics of Payment	+		5
	Statistics of Unpaid Tariff	+		5
	Statistics of Miscellaneous Information		+	5
Interfaces With Banks	Receive Information From Bank (Diskette)	++	++	15
	Perform Data Validation	++		8
	Update Payment Information & Logging	+	+	8
	Return Information To Bank (Diskette)	++	+	10

Display	Item	Complexit	Volume	Man Day
Interfaces With Hand-held PC	Download Data To Hand-held PC	++	++	15
	Upload Data From Hand-held PC	++	++	15
	Perform Data Validation	++		8
Security & Backup	Register New Operator		+	5
	Browse, Update & Delete Operator		+	5
	Register New Master Files	+	+++	20
	Browse, Print, Update & Delete Master Files	+	+++	20
	Perform Backup			2
	Perform Recovery	+		5
SUBTOTAL				340
	Customer List			5
	Customer Details			5
	Meter List			5
	Billing Details			5
	Payment Details			5
	Unpaid Tariff Details			5
	Other Documents			5
SUBTOTAL				35

Data Transition	Customer & Meter	+++		20
(Excluding Operators)	Billing & Payment	+++		20
SUBTOTAL				40

Programming SUBTOTAL				415

Test By System Users				83

TOTAL(ManDays)				498
TOTAL(ManMonths)				24.9

(2) Expected Benefits

1) Current Situation

Table S.7.5.3 Current Situation

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
	The Number of User	case	961	8,553	110,620	446,309	566,443
	The Number of Water Meter	site	846	5,517	6,362	2,909	15,634
	The Frequency of Meter Reading per Year	time	12	12	4	4	
	The Number of Controller	people	10	23	15	8	56
	The Number of User per One Controller	case	96.10	371.87	7,374.67	55,788.63	
	The Calculated Number of Meter Reading Site per Day, per Controller	site	4.23	11.99	7.07	6.06	
	The Number of Meter Reading Site per Day, per Controller	site		4.00			
	The Number of Building per One Controller	building				1.250	
	The Average Time of Meter Reading per Site	minute	25	25	12	10	20
	The Average Time of Visit Outstanding User per User	minute	50	30	15	10	29
	The Number of Staff at Vodokanal Office	people	4	12	6	4	26
	The Estimated Outstanding Number	case	550	2,300	1,725	6,600	?
	The Percentage of Outstanding User	%	0.57	0.27	0.02	0.01	?

2) The Estimated Situation in 2004

Table S.7.5.4 The Estimated Situation in 2004

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
	The Number of Water Meter	site	1,000	9,000	111,000	10,000	131,000
The Same Situation Except the Number of Meter							
	The Number of Meter Reading Site per Day, per Controller under Every Month Operation	site	5.00	19.57	370.00	62.50	
	The Number of Meter Reading Site per Day, per Controller under Every Quarter Operation	site	1.67	6.52	123.33	20.83	
Employee Increase with the Increase Proportion of Water Meter							
	The Number of Controller	people	12	38	262	28	340
	The Number of Staff at Vodokanal Office	people	5	20	105	14	144
	Total	people					484

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
The Estimated Situation by Using the Proposed System							
1) Meter Reading							
	The Efficiency by Introduction Hand-held Terminal	%	0.61	0.61	0.65	0.65	
	The Efficiency by Abolition of the Presence	%	0.42	0.42	0.44	0.44	
	The Average of Above	%	0.52	0.52	0.55	0.55	
	The Improved Time of Meter Reading per Site	minute	12.88	12.88	6.54	5.45	
	The Working Hours for Meter Reading	minute	300	300	300	300	
	The Improved Number of Meter Reading Site per Day, per Controller	site	23	23	46	55	
	The Number of Staff for Meter Reading at Every Month Operation	people	3	20	121	10	154
	The Number of Staff for Meter Reading at Once 2 Months Operation	people	2	10	61	5	78
	The Number of Staff for Meter Reading at Once a Quarter Operation	people	1	7	41	4	53
	The Total Needed Number of Staff	people	3.0	20.0	41.0	4.0	68.0
	The Time for Arrange or Input the Data	minute	-	-	-	-	
	The Estimated Percentage of Uncorrected Data	%	0.01	0.01	0.03	0.03	
	The Number of Uncorrected Data per Month	site	10	90	1,110	100	
	The Estimated Time of Investigation per Case	minute	30	30	15	15	
	The Total Time of Investigation per Month	minute	300	2,700	16,650	1,500	
	The Number of the Staff for Investigation per Month (working hours per day; 7)	people	1.0	1.0	2.0	1.0	5.0

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
2) Billing							
	The Number of Distributed Bill per Day, per Person	site	200	200	300	200	
	The Number of Staff for Distribution Bill per Month (distribution hours per day; 6)	people	0.04	0.38	3.08	0.42	3.92
	The Time of Processing Payment Order and Going to Bank per Day	minute	-	-	-	-	2.00
	The Time of Processing payment Order and Going to Bank per Month	minute	-	-	-	-	40.00
	The Number of Staff for Processing Payment Order and Going to Bank per Month	people	-	-	-	-	0.29
3) Receipt of Tariff							
	The Time of Going to Bank and Processing Cash-in Data per Day	minute	-	-	-	-	2.00
	The Time of Going to Bank and Processing Cash-in Data per Month	minute	-	-	-	-	40.00
	The Number of Staff for Going to Bank and Processing Cash-in Data per Month	people	-	-	-	-	0.29
	The Percentage of Unmatched Cash-in Data with Account Receivable	%	0.20	0.20	0.40	0.30	
	The Number of Unmatched Cash-in Data per Month	site	200	1,800	14,800	1,000	
	The Estimated Time of Investigation per Case	minute	5	5	5	5	
	The Total Time of Investigation per Month	minute	1,000	9,000	74,000	5,000	
	The Number of the Staff for Investigation per Month (working hours per day; 7)	people	1.00	2.00	9.00	1.00	13.00
4) Outstanding Control							
	The Number of Outstanding User per Month	site	572.32	2,420.20	1,730.93	147.88	4,871.33
	The Needed Time of Visit All Outstanding User per Month	minute	28,616.02	72,606.10	25,963.89	1,478.80	
	The Number of the Staff for Visit Outstanding Users per Month (visiting hours per day; 5)	people	5.00	13.00	5.00	1.00	24.00

S.8.3 Tariff Collection

A water tariff collection system should be formed in harmonization with the execution bodies and users. Countermeasures and proposed solutions for tariff collection categorized by users in Chirchik City are explained as follows.

S.8.3.1 Explanation of Table S.8.3.1

(1) House with Meter

1) The quality of meters should be improved, such as meters with plastic impellers and waterproof meters. All meters should pass a performance examination. Proper inspection and maintenance systems for meters should also be established.

2) Meter reading needs to be carried out efficiently and smoothly. For this purpose, attendance of users at the time of meter reading should be abolished to avoid delay in meter reading.

3) A meter installation criteria, including structure of the meter box, location and depth of meters for easy meter readings, should be prepared. Besides, proper methods and standards should be prepared for removal and replacement of defective meters or meters damaged by freezing.

4) Owing to efficient meter readings and delivery of notification to users, the handy terminal/logger should be introduced for meter reading . This equipment, using electronic information, can enter information for the previous water charge and a new meter reading value. At the same time of meter reading, meter readers should carry out other works such as confirmation of the meter performance and dealing with simple complaints from users. To do these things smoothly, a proper training should be provided for meter readers.

(2) Houses without Meters

1) The present tariff table which is computed complicatedly by installment and others, needs to be revised to a simple one such as calculated only by the number of family or water taps.

2) The metered rate system should be expanded as early as possible. As for the proposal of the meter establishment plan, refer to another chapter.

3) Same as above.

(3) House in Common

1) Payment periods need to be clearly specified so that a penalty regulation can be enforced in the case of nonpayment. With the establishment of the definite payment period, it is recommended to introduce a discount rate system for the users who make early payment for the improvement of users' service. Such a system would work to improve payment.

(4) Apartments with Meters

1) Same as (1) 1)

2) Same as (2) 2)

(5) Apartments without Meters

1) On the basis of the executable plan, early conversion into the metered rate system is required. To improve tariff collection, meters must be installed in all units. At first, installation of the bulk meters is also needed. The residents of the first and second floors use water for watering the garden which is a common part of the apartments. Such consumption should not be charged to individual but

should be accounted as common charge of all residents. As for the proposal of the meter establishment plan, refer to another chapter.

2) By installing meters, it is possible to judge if there is an inner house leakage at the downstream of meters. A leak of water in houses should be more than the leaks of water on roads.

(6) Apartments in Common

1) Same as (3) 1)

2) Considering various commission companies including JEK, it is necessary to reconsider an appropriate commission fee for repairs and maintenance from the view point of good management.

(7) Communal/Industries with Meters

i) Same as 1) i

ii) Same as 1) ii

iii) Same as 1) iii

iv) Because of big consumption users, the Vodokanal may accept serious influences on the water supply management. Therefore, to increase water conservation consciousness in users and enforce suitable water tariffs, are needed. Also, it is necessary to make cash income in a suitable degree in order that salary for staff is paid without delay. For this reason, the offset settlement, which is now accounted at about 72 percent of tariff, should be avoided to the proper standard in some cases.

v) It is necessary to enforce a discount rate system for early payment for users on the basis of a clear payment period. In this way, payment incentive for users can improve.

S.8.3.2 Example of Meter Installation

Examples of actual meter installation in Japan as shown below may be a good reference.

(1) Meter Management

As the readings of meters are the basis of calculating water tariffs, sufficient attention shall be paid to the management of meters. Under the Japanese Measurement Law, meters with metallic impellers and those with plastic impellers are checked for their accuracy, every six and eight years, respectively.

One city in Japan (population served is approximately 3,100,000) in which the waterworks' meters are of the plastic impeller type, about 100,000 meters are replaced annually. The replacement work is carried out by contract. About 9,000 irregular cases are found unfitting for the contract; stop cocks are missing or faulty; and meters' in-flow and out-flow pipes are corroded. The waterworks, taking those cases over from contractor, make repair and meter-replacement works to normalize them. Removed meters are repaired by changing faulty parts, tested and reused.

Apart from the irregularities, about 4,000 cases are problems of reading, caused by construction of structure on meter boxes or blocking spaces on meter boxes. Since 1948, the waterworks has relocated a number of meter boxes, or replaced them with the remote reading type.

(2) Selection of Meter Type

The source of income for waterworks is water tariff which is charged on meter's reading. In selecting the type of meters, meters' characteristics shall be considered and an appropriate type shall be selected. Even for appropriate types of meters, if it is undersized for consumption and instantaneous flow, malfunctions including failure of measurement may occur. If it is oversized, on the contrary, the measurement may become inaccurate because of too-low flow. Selection of meters' size, therefore, needs careful consideration.

Of various types of meters, the waterworks use four types as shown in TableS.7.3.2: straight-line inferential, dual-pipe inferential, vertical axial (Woltman) flow and horizontal axial flow (Woltman), considering accuracy, performance, durability, economy and aspects of maintenance. All of them are wet types.

The size of meters is selected based on the planned maximum daily demand, except in the cases where it is directly connected or instantaneous large flow is applied with a 25 mm and below meter. TableS.7.3.2 is a guideline of selection.

Table S.7.3.2 Selection of Type and Size of Meter

Size (mm)	Type	Max. Daily Demand (m^3/d)	Regulated Max. Hourly Flow (m^3/h)	Range of Suitable Demand (m^3/h)
13	Straight line, inferential	6.0	1.0	
20	Dual-pipe, inferential	12.0	1.5	
25	Dual-pipe, inferential	15.0	2.0	
40	Vertical, axial flow	48.0	8.0	
50	-	120.0	25.0	
75	-	240.0	40.0	1.00
100	-	360.0	60.0	1.60
150	-	720.0	120.0	4.020
200	Horizontal, axial flow	1,500.0	250.0	40200
250	-	2,100.0	350.0	60300
300	-	2,700.0	450.0	90400

In selecting the size of meters for 25 mm and below and meters directly connected to distribution pipes, the number of water taps simultaneously used is limited as shown in Table S7.3.3.

TableS.7.3.3 Meter Size and Simultaneously Used Taps' Number

Meter Size	Number of 13 mm taps
13 mm	1-4
20 mm	5-13
25 mm	14

For a water tap larger than 13 mm, it is converted to an equivalent number of 13 mm size taps, concidering the discharge. The number to be converted is listed in Table S.7.3.4.

TableS.7.3.4 Conversion of Large Tap to 13 mm Size Tap

Taps	Equivalent Number of 13 mm Size Tap
13 mm tap	1
20 mm tap	5.5
25 mm tap	11
Toilet flush valve	16

(3) Setting the Meter

The location of a meter is very important as it affects the workings for meter reading and meter-replacement after completion of the ruled service period. The waterworks specifies the following matters regarding the location of meter and method of installation work:

- setting at the side of the private property from the boundary of public roads and private properties;
- setting meter horizontally and lower than water taps in elevation;
- setting at a location convenient for reading and replacement;
- setting at a clean and dry location where dirt or wastewater does not soil the meter;
- setting in accordance with the flow direction mark so that water will not flow to the opposite direction.

But finding a location satisfying all of the above conditions is not practically easy, as land space is fully utilized in urban areas.

Relating to above mentioned, the meter settlement example is illustrated in Figure S.7.3.1.

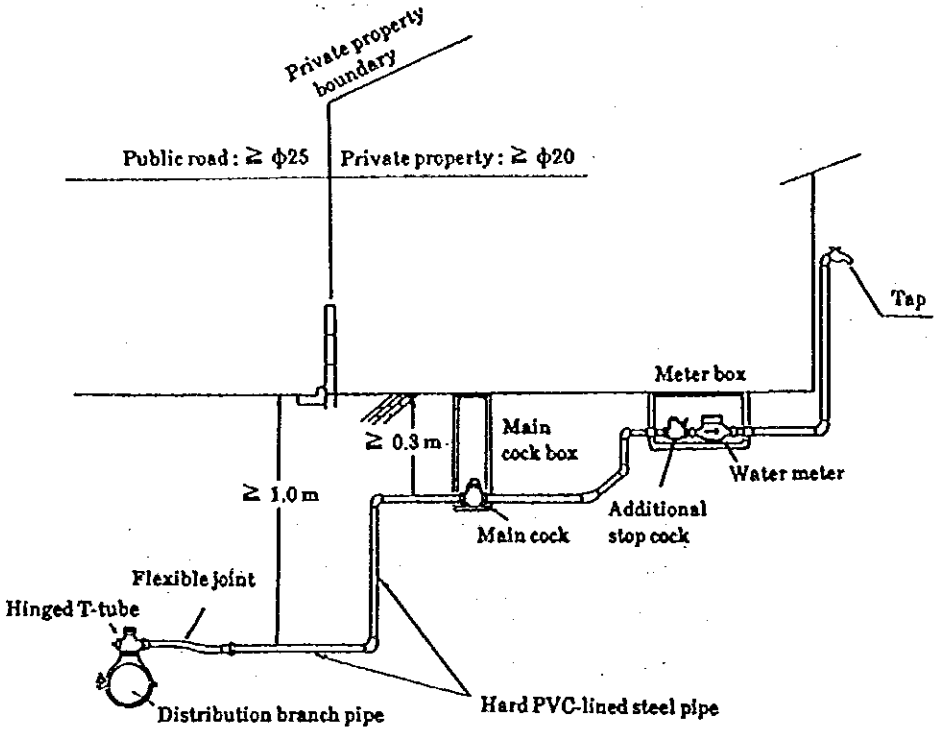


Figure S.7.3.1 Meter Settlement

Along with the above-mentioned proposal, a flow of tariff collection is presented in Figure S.7.3.2, which is the same one as Tashkent. Because this is the same explanation as in the chapter 7.3, please refer to chapter 7.3.

S.8.5 Computer Aided Tariff Collection System

S.8.5.1 Proposed Tariff Collection Procedure

The Study Team hold the seminar dedicated to the effective tariff collection procedure at Tashkent Vodokanal and Chirchik Vodokanal. In this section we attach the minute of Chirchik seminar (documents: see Chapter 7).

(1) Minute of Seminar at Chirchik Vodokanal

Date: 2 December, 1999

Place: Chirchik "Suvokova" (Vodokanal)

Attended on the part of "Suvokova": Mr. T.Abdullayev/Director
Mr. U.Yuldashev/Deputy Director
Mr. B.Norbayev/Head of Sales Dept.
and the staff of "Suvokova"

on the part of JICA: Explainer: Mrs. N.Yano, Mr. Y.Chikamatsu
Mr . K.Yoshino, Mr. A.Kabasawa, Mr. A.Shimizu
Interpreter: Miss. N.Okabayashi
Minutes: Mrs. Irina

AGENDA:

Seminar dedicated to the effective tariff collection procedure using computer system in Japan.

1) Opening Address.

Mr. Abdullayev explained the principles of the tariff collection procedure in the water supply system of Japan. Payment for water in Japan depends upon the volume of water consumed. Water meters are installed in the streets near the houses. The water meter reading is taken by inspectors with the help of handy terminals. 75% of users in Japan make settlements through their bank accounts. After withdrawing money from the accounts, the bank informs the Water Supply Bureau. Water reservoirs are installed in high land, and water flows by gravitation, which excludes leakage. Water pipes are made of corrosion-proof metal with good insulation.

2) The Substance of the Presentation

Mrs. Yano explains the substance of this seminar, she wishes the seminar should help improvement of business procedure and be a part of information transfer.

3) Outline of Japanese System

4) Tariff Collection System

5) The Different Points

Mrs. Yano and Mr. Chikamatsu explain.

6) Question and Answer

After the end of main part of the seminar, some time was dedicated to questions and answers. The following questions and answers were arisen after the slide show:

i) How do you stop water supply to users if necessary?

Specialists can cut water off for each user individually.

ii) Where are water maters installed for apartment users?

A water meter is installed in each flat, and also a common water meter is installed in each general unit.

iii) How can you determine the volume of water consumed if a water meter is out of order?

Water meters in Japan are of high quality, and seldom break. However, in such cases it is very easy to detect excess water consumption in comparison to the previous reading.

iv) How do you trace overdue payments?

All data of water meters reading are stored in the computer, and there exists a 3-month period for users to make payment. In case of non-payment, the user receives notifications three times and the inspector visits him and tries to convince to pay.

v) Are there different tariffs for different layers of population (e. g. low income families)?

It depends on each local municipality. There are such privileges in Tokyo, but not in some cities.

vi) How can the inspectors in Japan move from one object to another?

Inspectors can use city public transport, or bicycles, or an official car. Each inspector is responsible for a certain district, serving both the population and enterprises.

vii) What does the salary of the inspector depend on?

All kinds of services in the water supply system are distributed between different companies in Japan, and each of them has their own system of payment to inspectors. Generally the payment depends on the number of users.

7) Closing Address

Mr. Abdullayev thanked the Japanese Study Team for their interesting seminar.

S.8.5.2 Master Plans and Feasibility Analysis

(1) Estimated Costs

Table S.8.5.1 Initial Cost Estimates (Unit: US Dollar)

REQUIREMENTS ANALYSIS	Unit Cost	Quantity	Unit	Total
Expatriate Staff Fee	15,000	20	ManMonths	300,000
Expatriate Staff Fares, Accommodations	30,000	3	people	90,000
Local Staff Fee	5,000	40	ManMonths	200,000
Contingency			20%	118,000
TOTAL				708,000
DETAILED DESIGN	Unit Cost	Quantity	Unit	Total
Expatriate Staff Fee	15,000	15	ManMonths	225,000
Expatriate Staff Fares, Accommodations	30,000	2	people	60,000
Local Staff Fee	5,000	50	ManMonths	250,000
Contingency			20%	107,000
TOTAL				642,000
PROCUREMENT	Unit Cost	Quantity	Unit	Total
Database Servers	10,000	2		20,000
Computer Terminals (PC)	1,500	10		15,000
Computer Terminals (Meter Reading)	3,000	10		30,000
Fundamental Software				30,000
High Speed Line Printers	3,000	2		6,000
LAN Equipment				3,000
Security Equipment				3,000
Contingency			20%	21,400
TOTAL				128,400
DEVELOPMENT AND TESTING	Unit Cost	Quantity	Unit	Total
Conversion to Russian Languages	(Refer to Tashkent)			
Local Staff Fee (see Table Mandays)	5,000	25	ManMonths	125,000
Contingency			20%	25,000
TOTAL				150,000
TRANSITION ARRANGEMENTS & TRAIN	Unit Cost	Quantity	Unit	Total
Training for Systems Administrator (Local)	3,000	5	People	15,000
Training for Systems Users (Internal)				-
Contingency			20%	3,000
TOTAL				18,000
TOTAL				1,646,400

Table S.8.5.2 Mandays for Development and Testing

Display		Complexit	Volume	Man Day
Menu	Initial Menu			1
	Confirm User-ID & Password	++		5
	Customer Management Sub-Menu			1
	Meter Reading Sub-Menu			1
	Billing & Payment Sub-Menu			1
	Debtor Control Sub-Menu			1
	Summary Sub-Menu			1
	Additional Features			2
	Security & Backup Sub-Menu			1
Customer Manageme	Register New User (I=Industry)		+	4
	Register New User (C=Communal)		+	4
	Register New User (H=House)		+	4
	Register New User (A=Apartment)		+	4
	Search Customer	+		5
	Browse, Print, Update & Delete User's Information (I)	+	+	8
	Browse, Print, Update & Delete User's Information (C)	+	+	8
	Browse, Print, Update & Delete User's Information (H)	+	+	8
	Browse, Print, Update & Delete User's Information (A)	+	+	8
Meter Reading	Register New Meter		+	5
	Browse, Print, Update & Delete Meter Information	+		5
	Register New Controller		+	5
	Browse, Print, Update & Delete Controller Information	+		5
	Browse, Print & Update Standard Tariff Table	++	+	10
	Register, Browse, Print, Update & Delete Conditions on Ta	+		5
	Browse & Print Meter Reading Schedule	+		5
	Input Meter Reading	+		5
	Browse, Print, Update & Delete Meter Reading	+	+	10
Billing & Payment	Calculate Tariff	++		8
	Print Bills (Payment Orders)			2
	Reprint Bills (Payment Orders)			2
	Register New Financial Institution			2
	Browse, Print, Update & Delete Financial Institution	+		5
	Input Payment Information	+		5
	Browse, Print, Update & Delete Payment Information		+	5
Debtor Control	Query Debtors	++	+	10
	Browse & Print Age Analysis	+	+	8
	Input Reminding & Suspension Information	+		5
Summary	Statistics of Customer	+		5
	Statistics of Installed Meter	+		5
	Statistics of Billing	+		5
	Statistics of Payment	+		5
	Statistics of Unpaid Tariff	+		5
	Statistics of Miscellaneous Information		+	5
Interfaces With Bank	Receive Information From Bank (Diskette)	++	++	15
	Perform Data Validation	++		8
	Update Payment Information & Logging	+	+	8
	Return Information To Bank (Diskette)	++	+	10

Display		Complexit	Volume	Man Day
Interfaces With Hand-held PC	Download Data To Hand-held PC	++	++	15
	Upload Data From Hand-held PC	++	++	15
	Perform Data Validation	++		8
Security & Backup	Register New Operator		+	5
	Browse, Update & Delete Operator		+	5
	Register New Master Files	+	+++	20
	Browse, Print, Update & Delete Master Files	+	+++	20
	Perform Backup			2
	Perform Recovery	+		5
SUBTOTAL				**340**
	Customer List			5
	Customer Details			5
	Meter List			5
	Billing Details			5
	Payment Details			5
	Unpaid Tariff Details			5
	Other Documents			5
SUBTOTAL				**35**

Data Transition	Customer & Meter	+++		20
(Excluding Operators	Billing & Payment	+++		20
SUBTOTAL				**40**

Programming SUBTOTAL				**415**

Test By System Users				**83**

TOTAL(ManDays)				**498**
TOTAL(ManMonths)				**24.9**

(2) Expected Benefits

1) Current Situation

Table S.8.5.3 Current Situation

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
	The Number of User	case	403	184	9,338	36,414	46,339
	Total; Industry, Communal, and House	case	9,925				
	The Number of Water Meter	site	403	184	26	43	656
	Total; Industry, Communal, and House	site	10,650	-	-	37,000	
	The Frequency of Meter Reading per Year	time	12	12	4	4	
	The Number of Controller	people	11	-	-	16	27
	The Number of User per One Controller	case	902.27			2,275.88	
	The Calculated Number of Meter Reading Site per Day, per Controller	site	48.41	-	-	0.04	
	The Average Time of Meter Reading per Site	minute	14	-	-	-	
	The Average Time of Visit Outstanding User per User	minute	10	-	-	10	
	The Number of Staff at Vodokanal Office	people	1			1	2
	The Estimated Outstanding Number	case	550	-	-	1,000	?
	The Percentage of Outstanding User	%	0.06	-	-	0.03	?

2) The Estimated Situation in 2004

Table S.8.5.4 The Estimated Situation in 2004

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
	The Number of Water Meter	site	450	200	10,000	700	11,350
	Total: Industry, Communal, and House	site	10,650	-	-		
The Same Situation Except the Number of Meter							
	The Number of Meter Reading Site per Day, per Controller under Every Month Operation	site	48.41	-	-	2.19	
	The Number of Meter Reading Site per Day, per Controller under Every Quarter Operation	site	16.14	-	-	0.73	
Employee Increase with the Increase Proportion of Water Meter							
	The Number of Controller	people	13	-	-	131	144
	The Number of Staff at Vodokanal Office	people	2	-	-	17	19
	Total	people					163

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
The Estimated Situation by Using the Proposed System							
1) Meter Reading							
	The Efficiency by Introduction Hand-held Terminal	%	0.52	0.52	0.60	0.60	
	The Efficiency by Abolition of the Presence	%	0.37	0.37	0.42	0.42	
	The Average of Above	%	0.45	0.45	0.51	0.51	
	The Improved Time of Meter Reading per Site	minute	10	10	8	5	
	The Working Hours for Meter Reading	minute	300	300	300	300	
	The Improved Number of Meter Reading Site per Day, per Controller	site	30	30	38	60	
	The Number of Staff for Meter Reading at Every Month Operation	people	0.75	0.33	13.33	0.58	16.00
	The Number of Staff for Meter Reading at Once 2 Months Operation	people	0.38	0.17	6.67	0.29	10.00
	The Number of Staff for Meter Reading at Once a Quarter Operation	people	0.25	0.11	4.44	0.19	7.00
	The Needed Time of Meter Reading for All Sites	minute	4,500	2,000	80,000	3,500	90,000
	The Number of Staff for Meter Reading at Every Month Operation	people	-	-	-	-	15.00
	The Number of Staff for Meter Reading at Once 2 Months Operation	people	-	-	-	-	8.00
	The Number of Staff for Meter Reading at Once a Quarter Operation	people	-	-	-	-	5.00
	The Time for Arrange or Input the Data	minute	-	-	-	-	
	The Estimated Percentage of Uncorrected Data	%	0.01	0.01	0.03	0.03	
	The Number of Uncorrected Data per Month	site	2.25	1.00	150.00	10.50	
	The Estimated Time of Investigation per Case	minute	30	30	15	15	
	The Total Time of Investigation per Month	minute	68	30	2,250	158	
	The Number of the Staff for Investigation per Month (working hours per day; 7)	people	0.01	0.00	0.27	0.02	1.00

Category	Item	Unit	Industry	Communal	House	Apartment	Total / Ave.
2) Billing							
	The Number of Distributed Bill per Day, per Person	site	200	200	300	200	
	The Number of Staff for Distribution Bill per Month (distribution hours per day; 6)	people	0.02	0.01	0.28	0.03	0.33
	The Time of Processing Payment Order and Going to Bank per Day	minute	-	-	-	-	2.00
	The Time of Processing payment Order and Going to Bank per Month	minute	-	-	-	-	40.00
	The Number of Staff for Processing Payment Order and Going to Bank per Month	people	-	-	-	-	0.29
3) Receipt of Tariff							
	The Time of Going to Bank and Processing Cash-in Data per Day	minute	-	-	-	-	2.00
	The Time of Going to Bank and Processing Cash-in Data per Month	minute	-	-	-	-	40.00
	The Number of Staff for Going to Bank and Processing Cash-in Data per Month	people	-	-	-	-	0.29
	The Percentage of Unmatched Cash-in Data with Account Receivable	%	0.20	0.20	0.40	0.30	
	The Number of Unmatched Cash-in Data per Month	site	90	40	4,000	11,100	
	The Estimated Time of Investigation per Case	minute	5	5	5	5	
	The Total Time of Investigation per Month	minute	450	200	20,000	55,500	
	The Number of the Staff for Investigation per Month (working hours per day; 7)	people	0.05	0.02	2.38	6.61	9.07
4) Outstanding Control							
	The Number of Outstanding User per Month	site	590.18	-	-	1,016.09	1,606.27
	The Needed Time of Visit All Outstanding User per Month	minute	5,901.76	-	-	10,160.93	
	The Number of the Staff for Visit Outstanding Users per Month (visiting hours per day; 5)	people	0.98	-	-	1.69	3.00