

# Progress Report on GIS and Database

## 1. Activity on GIS and Database in the OUTPUT1

The framework on Information Management about service and operation was examined to support the OUTPUT1-6 to organize Customer Service Division, considered with the present situation of services which were obtained through activities in the OUTPUT2 and the OUTPUT3.

### 1.1 Activity in the OUTPUT1-6 to support organization for Customer Service Division

In the Second Year, the activity was carried out to make the present Complaint Service expand, in order to support establishment of the organization of Customer Service.

It is necessary to build the structure to record the procedures and the service contents in the implementation of Customer Service. Complaint Register Ledger operated in MOD provides with conditions as a common form for Service Register Ledger, so that it was examined about the operations and the Record Management on Customer Services. If it is understood relations among service operation, action, record, the updating of resource in relevant divisions, it is possible to realize the image of operations on Customer Service.

#### (1) Review of Customer Service

In order to examine the Concept for operation on Management Information and the business flow for service implementation, the activity was carried out to review the present situations about Operation and Record Management on Customer Services in CWASA.

Service counter of complaint in CWASA is receiving the registration of the complaint at three (3) complaint centers in MOD1/2 and CWASA web page. There are four (4) categories in the complaint about a leakage, a shortage of water, a water contamination and inform of illegal connection, and these complaints are managed by Complaint Register Ledger about the registration data, service record data, maintenance data and activation data of the service. However, it was confirmed through the activity in the OUTPUT2 that complaint records in SALES DIVISION and COMMERCIAL DIVISION were individually managed by each division, so that there was no common form to record services.

Beside the business was computerized about issue of water bill from meter reading and bill collection by upgrade of the Billing System, the operation of documents cannot yet be slipped out from analog system which was conducted by the man-power work and the paper work. The system development was not realized to improve the Record Management on Customer Service.

In order to manage the service records in SALES DIVISION and COMMERCIAL DIVISION, it is applicable to use the Complaint Registration Ledger which is operated by MOD Complaint Centers. The Ledger is very simple form and provides with necessary items to record operation as follows:

- Registration record in complaint about a time, a complainer, a place, a contact address, a request of service

- Service record about a type of service, a person in charge, a date of the work completion  
Service record is managed by a work order in each division.
- Activation record in service about a date of the activation and signatures of persons in charge

## (2) Customer Service and operation

In order to integrate the content of service which each division carries out in CWASA, the framework of Information Management was analyzed on the whole customer service, based on the relations about the procedure in each service, action of service, and resources. Relations among SALES DIVISION, COMMERCIAL DIVISION, and MOD Complaint Centers are summarized to arrange as shown in Figure 1.1.1.

It was understood that the procedure and the service record in Complaint Registration Ledger at MOD becomes a general work flow on Customer Service which is fixated in CWASA. However there is no work structure to record in the operations managing the application services, the meter inspection service, the Revenue Collection service, and the other services.

If the service kinds and service items in SALES DIVISION and COMMERCIAL DIVISION are arranged with additions of four (4) items handed in MOD Complaint Centers, the records on Customer Service is considerable to examine categories and items shown in Table 1.1.1.

The details of the categories will be re-examined in the activity of the Third Year.

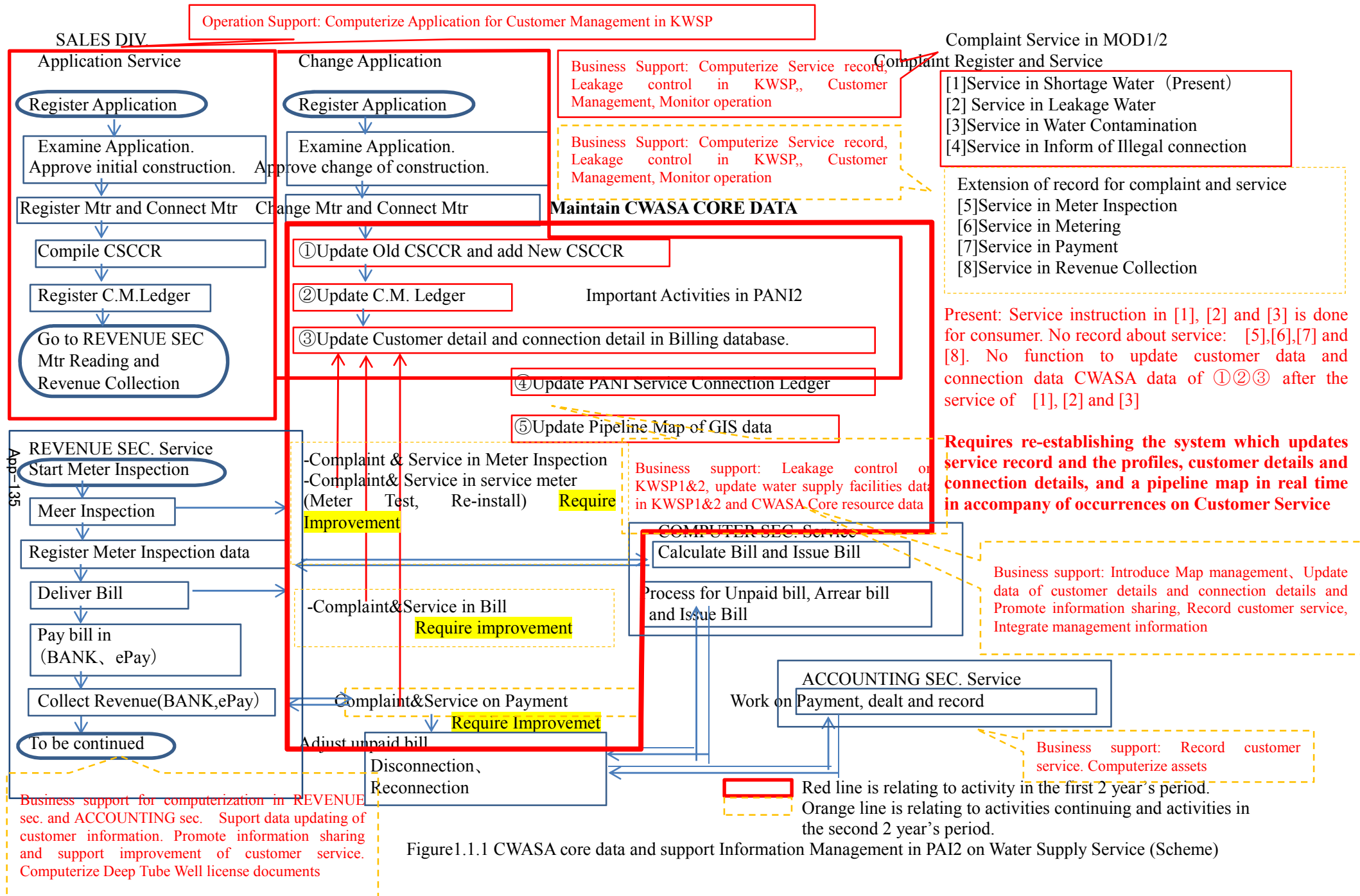


Figure1.1.1 CWASA core data and support Information Management in PAI2 on Water Supply Service (Scheme)

Table1.1 Matrix of Complaint and Service Category

Responsible Section and Management Form	Service category	Service item	Action of service taken at present
Complaint Register Ledger at Complaint Center in MOD1/MOD2	Service Connection	No water	W.O for Plumber
		Leakage Water	
	Distribution Main	Contamination of water	W.O for Local Contractor
		illegal connection	
Water Selling	Water Selling Service	W.O. for Water Works in MOD2	
Complaint in Commercial Division	Metering Services	Meter reading	W.O for Meter Reader, Computer Section
		Service in LIC	W.O. for Pubic Relation
		Meter function	W.O. for Meter Test to Consumer, Meter reader, work shop in MOD
		Stolen Meter	W.O. for Meter Inspector, Computer Section Accounting
	Bill Services	Delivery	W.O. for Meter Inspector
		Bill charge	W.O. for Meter Inspector with Computer Section
		Bill charge on Water Selling	W.O. for Water Works with Computer Section and Accounting
		Bill charge on Public and LIC	W.O.in Revenue with Computer Section Accounting
		Arrear	W.O for Revenue to Regularize bill against Consumer with Computer Section
		Bill adjustment and re-issue Bill	W.O.in Revenue with Computer Section
		Cut Off	W.O. in Revenue
		Re-Connection	W.O. in Revenue
	Payment Services	Money Transaction	W.O for Accounting with Computer Section
		Bank deposit	W.O for Accounting with Computer Section
		ePay	W.O for Accounting with Computer Section
Customer relation	Public services	Water Supply in LIC	Public Relation
		Complaint on construction	Public Relation
		Other complaint	Public Relation

W.O : Work Order , LIC: Low Income Community

(3) Improvement of the Record Management on Customer Service

In order to arrange relations of operations and actions on Customer Services, the activity to standardize steps in the business consisting of a registration of service, a decision of service, a service execution and the record of service, updating of service record, updating of resources on services, updating of CWASA core data and data sharing of updated information, a service completion and a report to consumer. So, it is necessary to set rules in the operation as follows:

- In order to unify the registration on Customer Service, a service counter shall be set to be a gateway between a customer and CWASA.
- In order to manage service records in the one (1) form in each division, the Service Registration Ledger shall be utilized to manage services as a common form.

- In order to manage a record of service execution in the responsible division, a reference number to be issued is managed in the Service Register Ledger. The operation record is individually managed by the extension of this reference number.
- Each resource data shall be updated at the end of the service and updated information shall be shared with relevant sections.
- CWASA core data shall be updated collectively in the core unit of Information Management, and the updating data shall be shared with relevant sections in real time.

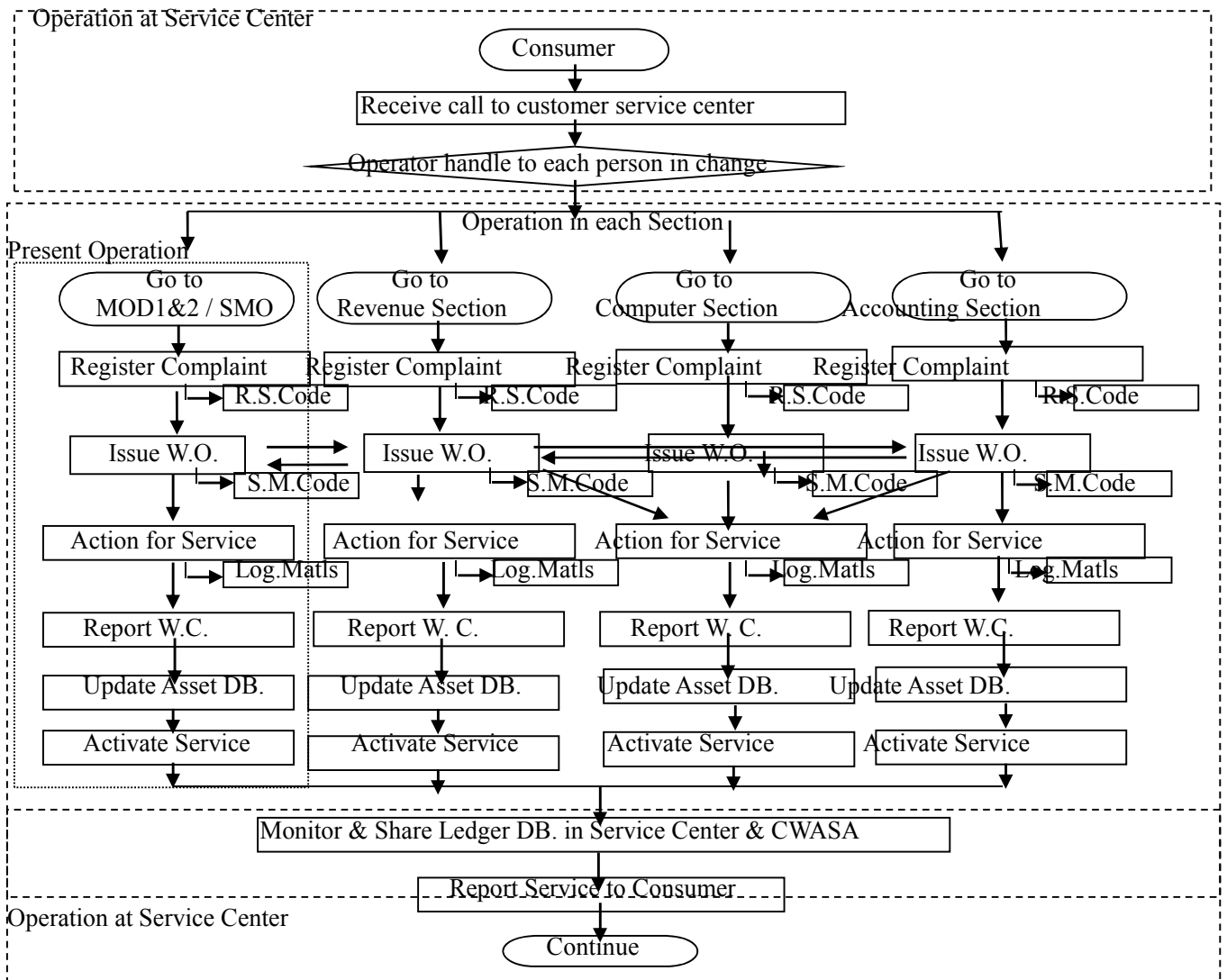
#### (4) Procedures and records on Customer Service

In order to prepare program about the procedures on Customer Service, the procedures on Customer Service with references of the procedures on Complaint Register in MOD, were examined to carry out steps as follow:

- Step1: The service counter at Service Center receives a request of service, and the counter handles the request to a responsible division.
- Step2: A responsible division registers the service request in the Service Registration Ledger and the service will be started to take action with records.
- Step2.1: A responsible division issues a Service Code to carry out the service.
- Step2.2: A responsible division issues a Work Order Form with preparations of relevant materials for field operation to a person in charge of the operation..
- Step3: A person in charge carries out the service.
- Step3.1: A person in charge carries out the service and records contents of the service.
- Step3.2: A person in charge reports the work completion to a responsible division with materials of service records.
- Step3.3: A responsible division updates resources about Customer data, Water supply data and map data.
- Step3.4: A responsible division records contents of service execution and activation of the work completion in Service Register Ledger.
- Step4: A responsible division reports the work completion to Customer Service Center and submits materials of service records to Information Management Unit in CWASA.
- Step5: Information Management Unit in CWASA updates core data. The updated information is disclosed to relevant divisions and the latest data shall be shared with divisions on the network.
- Step6: Customer Service Center reports the service completion to a customer and activates the service completion in the Service Register Ledger.

The concept of operation on service records among Service Center and relevant divisions is shown in Figure1.1.2.

The Service Register Ledger is an aggregate of reference files to record contents of service in each operation. The present Complaint Register Ledger will be possible to utilize for a master file to record overall services by adding service category and service items in the form. Furthermore, this master file will be applied for the monitoring of operations on services.



Service center & CWASA monitor a real time operation on customer service  
W.O.: Work Order, R.S.C.: Registration Service Code, S.M.C.: Service Maintenance Code,  
W.C.: Work Completion, Log.Mats: Logging materials  
Figure1.1.2 Work procedures on Customer Service in CWASA(Draft)

The work steps to concretely update resource data in the services are examined through verifications of water supply data in KSA with CWASA core data e in the activity of the OUTUT3-2, and the work manual will be prepared to support the services in the Third Year.

## 1.1 Survey of PC environment

### (1) Survey of PC equipment

In order to understand the situation of PC equipment to be diffused on the business in each division in CWASA except COMMERCIAL DIVISION and MOD2 WATER WORKS which were assisted by CWSISP, the survey of PC equipment was carried out by the On Job Training in GIS counterparts.

The target for systems development to support operation in each section is to examine, based on the actual condition of the Information Management in CWASA.

The GIS counterpart visited each section for the survey, and they asked a person in charge about items about: Objective of use for PC equipment, hardware, software, staff arrangement, awareness for system and management, awareness to ICT and the expectation, setting environment(power supply, network) and others.

The survey results are shown in Table 1.2.1. Items were arranged about PC(quantity), a multi-function printer(quantity), a printer (quantity), a copy machine (quantity), a scanner (quantity), a use of network, a power supply and problem, UPS (quantity), software, software support, PC staff (person), use of e-mail, and others.

The diffusion of PC equipment in CWASA business was too much behind, so that modernization of business does not progress easily. The situation is as follows:

- There is the situation that numbers of PC equipment are not distributed to execute daily business except SECRATARIATE、COMMERCIAL DIVISION and DESIGN DIVISION.
- The section which uses PC for the work is limited to SECRATARIATE, COMPUTER SECTION, and DESIGN DIVISION.
- Printer is distributed in each section, but the division that copy machine is distributed is limited in a few division.  
Documents are treated with the paper form in handwriting and the copy, the printed paper form, and the handwritten paper form. This indicates that the business had been carried out without necessity of PC in the business.
- The diffusion of electronical files in the business is behind because of no distribution about multi-function printer and scanner.
- The network environment is limited in personnel in COMPUTER SECTION, ACCOUNTING SECTION and partial personal concerned to the administration of CWASA, and there is no plan to expand a network setting into other sections.

- Although the problem of a power supply and the backup of the power supply are recovered by use of UPS, it is not easy to maintain the broken equipment of UPS and PC easily. There is no experience in staffs who can restore the system of SCADA according to trouble caused by the power failure etc.
- The use of software is mainly limited in preparations of test document and a spreadsheet in the business, so that it is obvious to use PC for logistics.
- The section to be installed by special package software is COMPUTER SECTION, ACCOUNTING SECTION in the COMMERCIAL DIVISION, DESIGN DIVISION, and also MOHARA WTP and KALURGHAT IRP&BST which Mini SCADA system was installed.
- There is no maintenance about software and hardware.
- The personnel who can work the business with use of PC are limited in those whose positions are over the Assistant Engineer who graduate university and computer operators in diploma level. And there are many personnel who cannot operate a keyboard, too.
- The E-mail in business is limited in private use. It is not a level to use an E-mail for operating notification or internal communication.
- The personnel's stance against the rationalization in their business is too passive to imagine a picture to realize modernization of their business with system support.
- There is a few personal who can draw the concrete image about operation and management in the system.

It is obvious that the diffusion of PC is not advanced in the divisions where are required to rationalize business at all. It is easily judged that there is a biggest issue about the diffusion of PC and capacity building in the business.

The office environment using PC in the daily business is so far from the realities that a frame work is not prepared to deal with an input of PC equipment and rationalization of business.

The personnel more level than Sub Assistant Engineer is possible to operate PC, but there is a few of personnel who can use PC in the business.

Most of personal who work with use of PC is for the personal oriented use and the business is carried out by a personal's effort.

It is assumed that there are some problems about security, compliance and system loss caused by inadequate access when to install a system.

## (2) Status-quo and issue in the task on ICT

In order to arrange the rationalization of business and the increase in efficiency of operation in the ICT installation in CWASA, based on survey results of PC environment, the status-quo and the issue in each task on ICT operation were considered as follows:

- 1 :Establishment of a CWASA Local Area Network (LAN);  
At present, the plan for the system development is not clear to build LAN in each division of CWASA, except for COMPUTERSECTION and ACCOUNTING SECTION. In order to push forward to rationalize business conducted by a system development, CWASA shall continue activities of PANI2 and CWSISP, and quires the planning to build LAN through application developments for business support in each division.



- 2: Establishment of CWASA WAN: with zone offices and relevant divisions  
The systems to be able to respond to WAN(Wide Area Network) in CWASA are the Billing System, Accounting System and a Water Works System supporting the water sales by the water tank vehicle in MOD2. KWSP has constructed optical fiber cables along pipelines and the SCADA System will be planned to install to conduct for overall operations about Water Productions and Water Distributions into KSA, but the plan is not clear to facilitate to construct WAN to integrate LAN in each division and to install network servers at present.
- 3: Establishment of a CWASA Intranet(Share information, Integrate information, rationalize finance)  
It is clear about the development plan for intranet maintenance forwarding to the Information Infrastructure Maintenance in CWASA. Under the present situation, it is necessary for CWASA to start taking action to develop system development and network maintenance in each division before intranet will be installed.
- 4: Adoption of emails as the prime form of internal communication  
In the present environment about system and network and the using situation of E-mail in personal, it is not realistic to use E-mail to transfer internal information in CWASA. Considered with the present situation which there is a few personnel who can work independently, the personnel who need an E-mail on business will be limited in personals on duty of Information Management and personals whose level is a graduate level of university.  
And, it is further more limited about the personnel who are working with people in the outside by an E-mail. It is recommended that introduction of an E-mail shall be limited in the uses only for the notification of official business and the communication protocols among divisions. It is required to train the rule of the use about the E-mail in business and the rule of operation including educations of security and morals to personnel. A loss on human being and a loss of operating efficiency shall be required to avoid.
- 5: Improved document management and storage in digital archives  
In the present equipment allocation, multi-function printer and a scanner are not installed in the section which is required for electronical file. Without carrying out preparations of the guideline for computerizing of a document, terms of work and the staff education, it cannot be expected to increase efficiency on the business by electronic media.
- 6: Integration of various data related to water supply service  
Integration of various data related to water supply service in KSA is conducted through activities of the OUTPUT2 and the OUTPUT3. Data item is Service Application data in SALES DIVISION, computerize data about Deep Tube Well license application, the records on water supply services, the records of Customer Service, updating data of customer detail and connection detail in the service, and updating data of CWASA core data in REVENUE SECTION and COMPUTER SECTION, and GIS data and relating data in PANI2. Present activity is located in a stage to conduct computerization of business and initial data maintenance of resources in each division. The continuation of the system development is requires to realize integrations of relevant data.
- 7: Computerization of key business tasks  
Computerization of key business tasks is considered as follows:

- Coding of water consumption data and issue of customer's billing  
The business is supported by the Billing System. Experimental introduction of a handheld device for Meter Inspection will be planned from the activity of the Third Year of PANI2, and the efficiency of business will be improved to increase.
- Accounting  
The bill charge collection in the Billing System is supported by the payments of the bank on-line system and the payments of the credit of a prepaid system. Moreover, the Billing System provides with the on-line service in which a customer can access payment record and record of demand from the outside.
- GIS based customer database and record keeping  
The frame work maintain for GIS based customer database and the record keeping was arranged through updating of customer data and GIS data in KSA.
- Facility design and modeling  
The data of the facility design and the modeling data in KSA are taken into the Facility Management for KWSP1 and KWSP2. GIS data and the attribute data for Facility Management will be maintained by edit of As-built drawings data in KWSP1 and KWSP2.  
The data about facility details, design details and a hydro water modelling will be linked to database of Facility Management.
- Asset management  
In order to promote the paperless in the business in each section, it is indispensable to perform developments of a database and a system to support for the Record Management of paper documents toward the peerless in the business.  
There are mixed situations combined by conventional analog management, paper documents, and electronic files in the present asset management. It will take many times to understand complicated relations and actual conditions in the system development for asset management. The only one solution towards asset-management is to ensure implementation about computerization of documents in the administrative task and application development on database.
- HR management  
In the management on the administrations, the time control is carried out to record overtime time in the work of the staffs, but the management tools such a time record table and the work diary is not introduced to record a manning hour, a manning number and contents of the activity in the business. It is guessed that it is not enough to maintain the management forms for the personnel management in each division.  
There is an issue in the future to introduce the time management tool against the personal and to maintain the forms for the personal management, in order to improve the personal management.
- Inventory Control  
Computerization of inventory record about materials required for O&M in STORE DEVISION is supported through the activity in PANI2. Accompanied with constructions of Water Service facilities in KWSP1 and KWSP2, new materials will be introduced in the Inventory Control. The Inventory Control

is relating to rationalization of the procurement business, so that it is required to develop the supporting system continuously.

- 8: On-line account information and bill payment

On-line account information and bill payment were realized by the upgrade of the Billing System in CWSISP.

- 9: Facility operations used by the SCADA system to be introduced under KWSP-1/2

The facility operation used by the SCADA system to be introduced by KWSP-1/2 will be started after the end of PANI2. Since KWSP1 will start to supply water from the middle of 2016, the facility operations used by the SCADA system will be examined while the monitoring of water distribution will be carried out in the activity of the OUTPUT3-4.

- 10: Security and operation management on ICT

It is quite important to maintain policy of operation and regulations about security and operation management in operation of ICT. There are various of issued on the operations about the network operation and access of data, maintenances of system, software and hardware, the data maintenance and the backup of data, the measure against a virus infection and so on.

In order to maintain the ICT system, it is necessary to maintain those regulations and to strengthen training of the personnel including morals education. In the systems development on Information Management, it is important to educate the personnel who can respond to system operation.

- 11: Computer use protocol of protocol and operation management

The data operation through network and communication of data access is realized by the Billing System and the Accounting System in CWASA. Although a LAN is partially installed in the headquarters building of CWASA, the use of network is limited to access of the Internet or to access personal E-mail, so that there is no correspondence to use computer protocol.

The databases for Water Supply Management, Customer Management and Facility Management which are maintained by PANI2 will be connected to the CWASA network in the near future, so that data access will be possible from system on the network. In the system development, it is urgent tasks to build the application in each station and the application shall be connected to the network of CWASA in the process of development, and it will be realized to use protocols on network.

- 12Staff training.

It is not clear about the plan for human resource development on Information Management in CWASA. At present, the personnel training on GIS and a database is only limited in the activity of PANI2, and it is not clear to secure another staff in the future. In the activity of the Third Year, the personnel training will be started to support operations of a system ad a database against a few of staffs in SALES DIVISION and REVENUE SECTION. There is still one of critical issues to secure and to educate personals who can take charge of operation of system and the database.

## 1.2 Relation of operation and resource

The relationships between database maintained by PANI and resources in the operation of each section of CWASA was arranged In order to grope the operation of the supporting system on Information Management in CWASA.

The resource in each section is relating to data access to refer, to search, and to update, and updating of resources in the business, so that it is necessary to establish the mechanism to update data and to standardize operation as business. Objective for development of a database and a system has a role which supports the standardized task.

System development is directly related to the updating of resource in the database operation, and this becomes a concept for developments of database and system in each section.

The database relation between operation and a resource including PANI in the present CWASA is shown in Figure1.3.1. Based on results of PC equipment survey, database relation will be fed back to the design of the database and system which support the business improvement in CWASA.

The conceptual work for system maintenance in each section will be prepared.in the activity of the Third Year.

Table1.2.1 Result of PC equipment survey

Division/ Section	PC: (No)	MF Ptr (No)	Ptr (No)	Copy (No)	Scan ner (No)	Net work	PS	UPS (No)	SW	Utility SW	SW Support for	Staffs on PC (Prs)	Staffs require CD (Prs)	Email facility	Problem on System
Sales Division	1		1	1		NP	Pro ble m	0	MS Office	NA	Logistics	3	2	NP	No support service. Require System
Secretariat	6	1	1		Possi ble	LAN	NP	4	MS Office	NA	Logistics	5	2	Personal	
Procurement Division	2	1	1	1		NP	NP	1	MS Office	NA	Logistics	1	No need	Personal	Require HW, Network
Design Division	5		2			LAN	NP	4	MS Office	CAD	Logistics, Mapping	4		Personal:	Require HW, SW, Network
CD1	1		1			NA	NP	1	MS Office	NA	Logistics			Personal	Require HW, Network
CD2	1		1			NA	NP	1	MS Office	NA	Logistics	0			Require HW, SW, Network
MOD1	2		2	1 N.F.		LAN Slow	Pro ble m	1 Low capac ity	MS Office	NA	Logistics	4		Personal	Problem of Power supply in Dry season. Required standby HW, Generator
MOD2	4		3			NP	NP	4	MS Office	NA	Logistics	3	1	Personal	Require HW, Network
Mohara WTP	2		2	1		NP	Pro ble m		MS Office	SCADA	Logistics, Automato n			Personal	Recovery SCADA system Require HW, Network
Kalurghat IRP&Bst	3		2		1 NF	NP	NP	2	MS Office	SCADA	Logistics, Automatio n		1	Personal	Recovery SCADA system Require HW, Network

CD: Construction Division, Mohara WTP: Mohara Water Treatment Plant, Kalurghat IRP&Bst: Kalurghat Iron Removal Plant and Booster Station

MF: Multi-Function, Ptr: Printer, NF: No Function, NP: No Problem, SW: Software, Logi: Logistics, PS: Power Supply, CD: Capacity Building, Prs:Persons

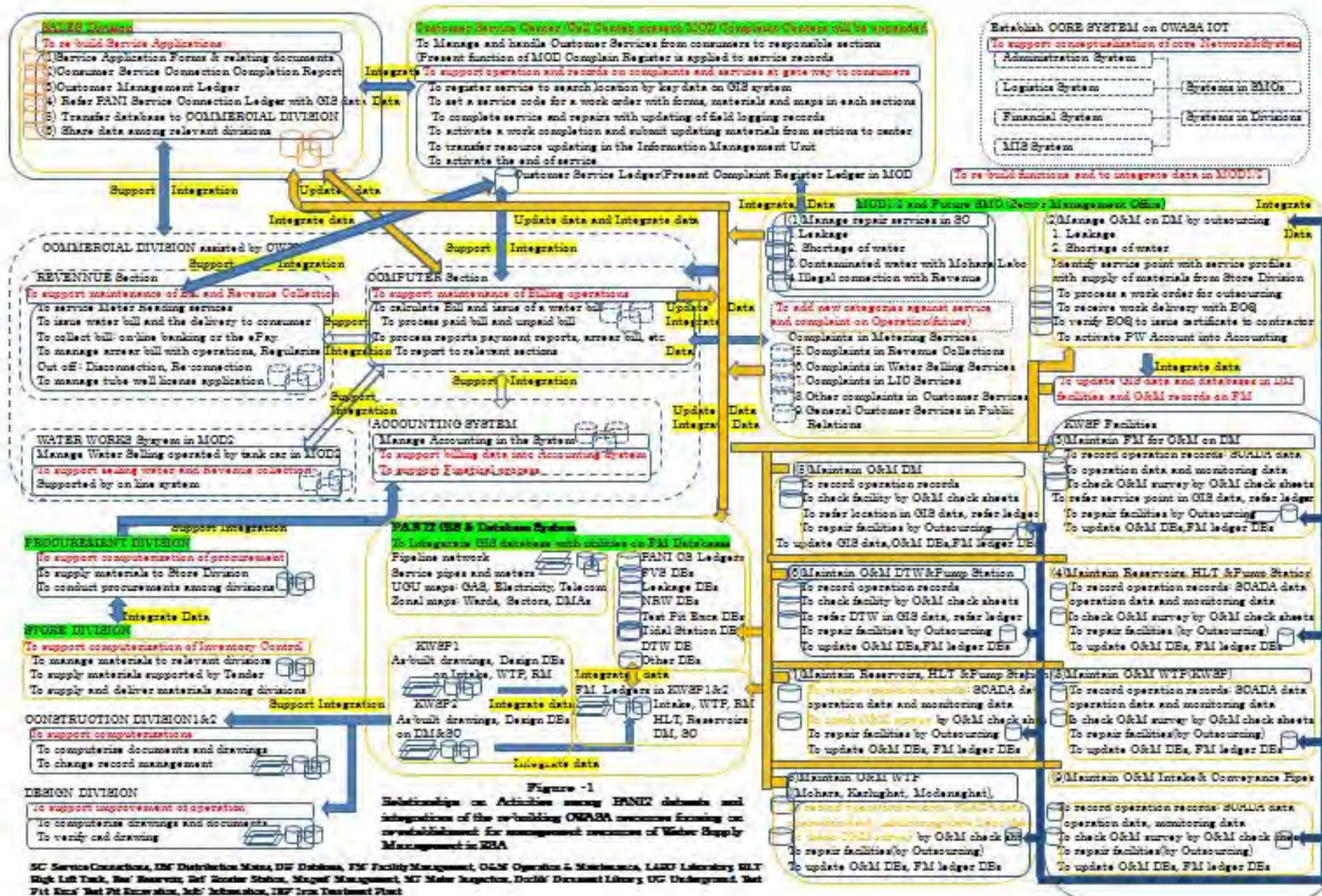


Figure1.3.1 Database relation between operation and a resource in CWASA

## 2. Activity on GIS and database in the OUTPUT2

### 2.1 Activity in the OUTPUT2-3 to support the measures to improve water bill collecting efficient

#### (1) Progress of the activity

There was no progress in the Second Year which supported Japanese Exert, in order to supply maps about visualization of the meter inspection data, data analysis of a meter inspection route and others by using GIS data and Customer data.

#### (2) Issue in the activity

Since the issues of resources between PANI water supply data in KSA and all records of CWASA Billing data were arranged through the activity in the OUTUT3-2, the activity on GIS and database was able to support activities such as production of map for Customer Services, evaluation of road accessibilities on meter inspection, and cross tabulation and distribution map in the planning..

The activity on GIS and database to support improvement of the service efficiency on the meter inspection service was considered as follows:

- Introduce a distance indicator in the route map on meter inspection

In order to reduce a time to reach to the building of consumers in the meter inspection, the next distance indicators are introduced as follows:

- A distance indicator to the building from a benchmark such as road circle and remarkable points on roads
- A distance indicator to the building of consumers from the start node on a distribution line such as Secondary pipe and Tertiary pipe

Since there are many buildings with similar appearances which are mixed by collective housings and the individual buildings in the site, the distance indicator makes it easy to identify a pinpoint location in consumer.

- Automation of meter reading data

Since the automation of the inspection is considered to introduce experimentally a handheld terminal by PANI2, it also will be the issue to install the meter inspection terminal with data communications which a bill can be issued in real time and the customization of the software in the terminal.

The operation on bill collection is drastically improved by the automation of this process and the working system will be established without independency on personnel. Also the transparency of business will be collateralized.

- Unification of management unit on services

In order to avoid confusions of the management units between Facility Management and Service Management in CWASA, it is necessary to unify the management area for Customer Service on the areas of

the Distribution Water Service Block.

Since the Distribution Water Management in KSA is designed by Sectors and DMAs where were delineated by WARD boundaries, the unification of the management unit will make it easy to manage business in CWASA.

Currently, PANI2 is compiling the as-built drawing map of Conveyance pipes and transmission pipes in KWSP1 and the design drawing of Distribution Water Pipeline Network in KWSP2, so that it is possible to support the activity to examine the inspection area and the inspection route in KSA. It is expecting that GIS will support the activity in the Third Year.

## 2.2 Activity in the OUTPUT2-4 to accelerate the Digitization of Accounting System and Bill Collecting System

### (1) Progress of the activity

In the second Year, it was checked again about the required items in the Accounting System and the Billing system which system were installed by assistance of CWSISP of the World Bank as follows:

- Item required to computerize in new accounting system

Since there was an old system which CWASA had been operated before a new software package had been installed by CWSISP, there are items required to computerize the reporting data in the old system.

Data management of new Accounting software was designed to exchange data among software through text data, and it is not easy for user to develop application because of a limitation on license against customization of software.

Therefore, staffs are required to provide with practical capacities to computerize reports and documents, to edit coding data and to operate data between relevant divisions and Accounting section. If the staff provides with the practical capacity to operate a system, the staff can deal with the computerization to encode the financial statements and the reports into the Accounting System easily.

- Item required to computerize in the meter inspection work

Operations in the Billing system which had been upgraded by CWSISP are fully computerized except steps of a visual meter reading of a meter gage and the logging record in the paper form, and also a step to encode the data entry in Computer Section as follows.

- Management for data entry of the meter reading data
- Management of tariff calculation and issue of water bill
- Management of payment charged by Bank account or ePay service and revenue collection
- Management of arrear bill in the delay of payment
- Management of operational procedures and report making



Data entry form for meter reading is being used to record the logging data by a blank form printed in the System.

Since the Water Sales System on the Water Tank Vehicle in MOD2 Water Works are also developed by the Billing System, all business were supported by the system, so that it was not necessary to computerize the operation

- Item required to computerize between Accounting system and Billing system  
Data tables and report data in the Billing system were directly supplied to Account system by database tables, so that it seems that there are items required to computerize between systems as follows:
  - Documents which were not correspond to computerization on any other business except Bill collection.
  - Documents to balance accounting with relevant divisions in the procurement.
  - Documents to balance accounting in outsourcing and etc.
  
- Other items required to computerize  
Other items required to computerize were as same as those in OUTPUT2-5 directly relating to Customer details and Service Connection details about meter detail and connection status, and there are items having been managed by paper forms as follows:
  - Document files used by the REVENUE Supervisors  
It is required for the section to computerize about 60,000 documents which data are being filed about customer data, Service Connection data, service record data on meter reading and revenue collection and complaint record data, which data has been managed by the Revenue Supervisors.  
Those documents are being used to refer profiles of customer information and Service Connection information on services.
  - Documents of service record and the form for bill invoice  
Meter replacement records about stolen meters and mal function meters are managed by paper ledger of CWASA Stock Register Ledgers in REVENUE SECTION and the table for bill invoice was not founded in the Billing System, so that those documents are required to computerize papers.  
It seems to be required to computerize forms on Meter Testing in the activity of the OUTPUT 3-1 and the Demand Note for bill invoice which table was not founded in the Billing System.  
PANI2 is preparing for this database to support the Record Management on Meter Test. Those documents are required to be managed with synchronizations of records data among maintenance services, inventory control of meter, meter testing and repair.
  - Forms in arrear and unpaid and disconnection and re-connection and forms for bill invoice  
Tables relating to arrear of water bill and un-paid water bill were founded in the Billing system, but there is no computerizations about forms for procedures in those operations and forms which are recorded due to service execution for disconnection and reconnection on water supply services, so that computerization of forms are required, including that for bill invoice which table.
  - Data updating records changed accompanying with water supply services

Initial installation records in service application in SALWS DIVISION are supported to computerize through the activity in the OUTPUT2-5 of PANI2, but there is no computerization about documents relating to Customer data, Service Connection data and changes of profiles in the REVENUE SECTION after water supply service had been started.

Those records are bundled and managed to a document file, so that unless this change can be recorded in database, it would be difficult to update the CWASA core data.

## (2) Issue of the activity

Issue and improvement which became clear by the activity in the Second Year are as follows:

- Improve data quality and arrange customer number

In order to issue customer ID number in the customer services in CWASA, faults about customer name and customer address which data had been caused by human mistakes in the initial entry of database were corrected through the activity of OUTPUT3-2. Sorting of customer data in each area is not performed in the present customer database, and also query to be search data by the name and an address are not functioned by reasons of the faults in the data entry, so that operability of a system is inefficient.

It is the main reason because the data had never cleaned by same criterions about the title and a name in customer name, a house number, the road number, the road name, the area name and city name in the customer address data, and the essential mistakes in these data was never corrected in the upgrade of the system by CWSISP. It is expected that a customer's search and the procedure of service will become efficient by data correction and introduction of the Customer Number.

- Issue on the unit in a system

Although the inch system and the metric system are intermingled about treatments of the units in the Billing System, tariff is designed to calculate by two units. Therefore, it was confirmed that there was no problem on the operation.

However, the unit is intermingled about units showing about pipe diameter and water consumptions and those in the printing in the database form and the bill. It is recommended that the technical standard in the activity 3 shall be revised by CWASA, CWASA makes the unit system shifted to the metric system and the system shall be corrected until the water supply service of KWSP2 will be started.

- Issue between the Billing system and PANI database

As the problem about absence of the area code in the Billing system was eliminated by the activities until the Second Year, critical fault was solved with PANI databases. There is no custom to update data every day in the data management of the present CWASA.

In the activity of the Second Year, it was examined about profile records to manage a new data and an old data, and the formulation of mechanism to update relevant data in the center unit on Information Management in the activities of the OUTPUT1-6 and the OUTPUT3-2.

The method managing old and new data is as follows:

- Updating data in PANI GIS database shall be updated as a latest active data.
- About data which is required to update in PANI databases and CWASA core databases, a new data for updating data shall be added as active data and the updated data shall be changed as inactive data.

This rule will be applied the updating of databases in the activity of the Third Year.

- Issue about join the Billing system and relevant resources

As same as the activity in the above mentioned, it is considering to join relevant databases in the data items in the Billing system.

The Billing System is able to join databases of PANI through Account Number, and also, a map management of the Billing System is able to manage with PANI GIS databases.

Correspondences about join database in the activity of PANI2 is considering as follows:

- Join resources in SALES DIVISION: Service application forms and relating data, Consumer Service Connection Completion Report, Customer Management Ledger, those updating data caused by changes on application and the services
- Join resources in REVENUE SECTION:: Deep tube well license application and relating data, the record data about procedures and relating data in water supply services and updating data of those services and profile data for updating
- Join the record data of service implementation on Customer Service:
- Installation of GIS system into operations on Customer Services: business assistance for Geographic Information

Accompanying with promoting of computerization of documents in the activity of OUTPUT2 in CWASA, a system and a database will be joined mutually together.

Although the PANI system is not connected to LAN on WASA currently, parallel data access is be able to realize by a change of a network setup in CWASA.

### 2.3 Activity in the OUTUT2.5 to support expand customer database and digitize assets management

#### (1) Progress of the activity

The activity in the Second Year continued to develop database and system for computerization on of assets relating to Customer Services in SALES DIVISION, REVENUE SECTION and MOD, which data would be required for Customer Management and Distribution Water Supply Management in KSA.

- Support of computerization of documents in SALES DIVISION

In order to support computerizations of service application forms and relating data, all forms shown in Table2.5.1 which are used in the division, were designed in the database and the Record Management System was prepared to support operations as follows;

- Service Application Forms and relating forms,

- Consumer Service Connection Completion Report
- Customer Management Ledgers
- Monthly Report of Sales Operation

The first meeting about computerization of Service Application forms and relating data on customer services was held with persons concerned in SALES DIVISION, persons involved on Information Management and GIS counterparts in PANI2 in November, 2015. PANI2 have started the activity which takes their opinion into development of the system.

Service Application forms and relating data in KSA are altogether computerized according to implementation of KWSP2.

- Support of computerization of documents in REVENUE SECTION

Although the services on Revenue Collection in REVENUE SECTION is supported by the Billing System in COMPUTER SECTION, it is not possible to expect the efficient water supply services in KSA, unless these service records will not be computerized about the records of the procedures, updating records of customer data and Service Connection data and those profiles records on each service. Even if the Billing System is working, there is no prospect that huge of asset documents buried in the database of the system would be computerized.

Through the computerization in SALES DIVISION in the previous item, it became clear about the outlook maintaining the procedure of a Service application and initial data on Customer Management. But unless it would not computerized about the record of the procedure on service execution, record of data updating and record of those profiles in the services, the data updating system of relevant resources would not established on Customer Service in KSA.

The mechanism of data updating for CWASA core data were arranged through the activity of verification of PANI data with CWASA resources in the activity of the OUTPUT3-2. Since a Japanese expert on meter inspection and revenue collection started activities for improvement of the business, the activity on GIS and database supported to computerize documents in REVENUE SECTION as follows:

- Documents for the procedures on disconnection and re-connection
- Stock register ledger of water meter recording meter replacement services about stolen meters and mal-function meters

In the support of computerization of the business record in REVENUE SECTION., the forms shown in Table 2.5.1 were prepared to maintain database and system in MSACCESS by the activity in the Second Year. Furthermore, the activity of the OUTPUT2-6 about computerization for the Deep Tube Well license information will be expanded in the activity of the Third Year.

In order to join each database on services in KSA, the activity will be implemented to support integration of computerized database in each operation. Service Application forms and relating data in KSA are altogether computerized according to implementation of KWSP2.

- Support of computerization of Complaint Registration on Customer Service

In the First Year, the computerization was supported by preparations of database and forms in MSACCESS were created from the Complaint Register Ledger which MOD manages, but there was no progress relating to the computerization in the Second Year.

At present, it is examined to make Customer Register Ledger apply for Customer Service Register Ledger, in order to support the activity to introduce Customer Service Section in the activity of the OUTPUT1-6. Complaint Register Ledger in MOD records four (4) items about leakage of water, a shortage of water, water contamination, and complaint of illegal connection. The item of the ledger mainly consists of a registration, a record of the service, an end of service, and a record of termination and the activation, so that the contents are very simple. Therefore, the ledger will be able to apply for the master data to manage service record for multi-purpose use by means of adding service type and Service category and the record of the reference number in each service. Moreover, the record about the complaint about Revenue Collection is not indicated in SALES DIVISION and REVENUE SECTION. Therefore, the service record was managed by the paper file in paper which each division manages. Since what to monitor these complaint and the service records is the monitoring of financial index, so that the activity of computerization about the record forms will be applied to the activity of the OUTPUT1 and that of the OUTPUT3..

In order to maintain the Management Ledger which records the service for the multiple-purpose, the activity in the Third Year, it will be expanded about the database of a Complaint Register Ledger.

Table2.5.1a Computerization and Database Developments on Existing Forms: SALES DIVISION

DIVISION		Existing Daily Report in CWASA
		Daily Report Form
SALES	New Connection	New Connection Application Form
		Demand Note
		Road Cutting Permission Form
		Work Order Form
		Indent Register Form relating to Stock Register, SIR and MRS
		Consumer Service Connection Completion Report
		Customer Management Ledger
		Connection Enlargement
	<i>Demand Note, Same as that in New Connection</i>	
	<i>Road Cutting Permission Form, Same as that in New Connection</i>	
	<i>Work Order Form, Same as that in New Connection</i>	
	Connection Shifting	<i>Indent Register Form relating to Stock Register, SIR and MRS, Same as those in New Connection</i>
		Connection Shifting Application Form
		<i>Demand Note, Same as that in New Connection</i>
		<i>Road Cutting Permission Form, Same as that in New Connection</i>
		<i>Work Order Form, Same as that in New Connection</i>
	Monthly Report Form	<i>Indent Register Form relating to Stock Register, SIR and MRS, Same as those in New Connection</i>

Table2.5.1b Computerization and Database Developments: REVENUE SECTION

DIVISION		Existing Daily Report in CWASA
		Daily Report Form
REVENUE	Tube Well License	Tube Well License Application Form
		<i>Demand Note</i>
		<i>???Work Order Form???</i>
		<i>???Work Completion Form???</i>
		Deep Tube Well License Ledger
	Reconnection	<i>Request letter from consumer</i>
		Demand Note for Re-Connection
		Road Cutting Permission Form
		Work Order Form for Re-Connection relating to Stock Register, SIR and MRS
		Connection /Disconnection Form on Re-Connection
	Meter Testing	Work Order for Meter Replacement issued by CRO
		Demand Note issued by CRO
		Work order of Meter Replacement to Work shop
		Meter Testing Report
		Meter Testing Record Ledger
		Meter Certification Form
		Updating form of meter aspect relating to Stock Register, SIR and MRS
		Daily Report of Charging Time

Table2.5.1c Computerization and database developments: MOD

DIVISION			Existing Daily Report in CWASA		
			Daily Report Form		
MOD-1/2	C.. S e r v i c e s & M a i n t e n a n c e	Complain & Maintenance	Complaint and Solution of Receiving no Water and Daily Report of Leakage Repair		
			Record form	Complaint Register Ledger	
		Repair By Out Source	O U T S o u r c i n g	Repair	Work Order for CWASA Plumber relating to Stock Register, SIR and MRS
				Repair	Work Order for Outsourcer relating to Stock Register, SIR and MRS
				By Out	Work Completion Report and As-Built Drawing
				Source	Measurement book relating to Stock Register, SIR and MRS
					Receipt of Work Delivery.
					P.W. Account Form
					Audit Chart
					Work Certification
	Contaminate		Work order form MOD to LABO		
			Water Sampling form from MOD to LABOO		
			Work Completion Report from LABO to MOD		
			Water Analysis Report		
	METER TESTING		Work Order Form issued by CRO		
			Meter Testing Record Ledger		
			Meter Certification Form		
			Meter Testing Report		
Meter Repair		Not clear about form. Memorandum in the notebook or paper document			

- Diffusion of the Record Management computerized

All the forms collected so far were prepared about database tables and database forms on MSACCESS and the debug work of the initial design is still being continued and it is the step to prepare the manuals to GIS counterparts and the activity for the diffusion.

In the activity, the prepared database is introduced to the personnel in each division by GIS counterparts and the project will listen to their opinions, and this will be advanced to the feed-back to the system and the

enlightenment of the system.

## (2) Issue on computerization

The documents in Bengali and English are intermingled on the business of CWASA, but these bilingual documents have brought issues on computerization of documents. Since the Billing System principally is unified and managed with English, the language in the business management shall be unified by the alphabet in English and the number. The issue in computerization is as follows.

- Problem of the bilingual language in business  
The language in business management shall be unified in the alphabet and the number in English.
- Problem in Bengali  
The document in Bengali is set up, as an option of the documents on Customer Service.
- Problem of duplications about the document items  
The present form shall be revised to a new form, since there are some duplicated items in the present form on analog management.
- Problem dealing with human resources for computerization on Information Management
- In order to push forward management by computerization and the system in business, a human resource shall be distributed in each section.
- Problem of PC environment  
Since the equipment allocation to computerization at each section is insufficient, the solution shall be taken about installation of PC equipment, promotion of computerization in business, and the business improvement by PC.

Originally, computerization of the documents and preparation of database are corresponded by self-reliance in the personnel, but there is no capacity to make it hard for each personal in each division to promote the computerization by them own selves.

Computerization of business inclines only toward rationalization of the operation in the Bill collection, and there are few inputs which should be solved by diversification. Moreover, the PC equipment and the staff are not distributed to computerize documents, either.

Although PANI2 will continue support of computerization for business until 2018, in such a situation till 2018, the computerization which makes business improve will not be progressed as long as there are no efforts towards securing of staff, input of a system, execution of the training, and efforts toward a business improvement.

## 2.4 Activity in the OUTPUT2-6 to expand customer database and digitize assets management

### (1) Progress of the activity

In the Second Year, the activity was started to support computerization of the record management relating to the Deep Tube Well License.

In order to support computerization about the business management through meetings with CRO (Chief Revenue Officer), the activity required was confirmed as follows:

- Computerize Deep Tube Well License application form  
To prepare database of the application form supplied by electronic file in order to improve service efficiency
- Prepare database of the Deep Tube Well license file  
To support database conversion from MSEXCEL file in Bengali, in order to build a supporting system
- Advice computerization in REVENUE SECTION  
To advice computerization about which the section oneself is developing calculation sheet such as DEMAND NOTE and others and development of a system.
- Data updating of Deep Tube Well License table  
To support data updating between the Deep Tube Well License table of the Billing system which is not recorded and the management system
- Capacity building of staff  
To support capacity building of staff through activities in the OUTPUT2-4, the OUTPUT2-5 and the OUTPUT2-6

PANI2 received a soft copy of the Bengali data about the Deep Tube Well License Ledger and a sample form of DEMAND Note which is a balance sheet to charge the license fee at the same time when the meeting was started with CRO at the end of January in 2016, and GIS counterpart converted the data file to the database in MSACCESS, and they prepared database form to displays data on the screen. The concredited activity will be carried out from the Third Year.

## (2) Issue of the activity

REVENUE SECTION is conducting database development for the balance sheet to increase efficiency of business by outsourcing of CWASA, but it is demanded about the adviser who advices for implementation for proper development. and also, they cannot produce electronic file by themselves to search the paper documents about 60,000 files which are hold in the section, and to refer the records from document files. Therefore, it is required to build capacity building in the staffs to make it realize concretely.

### **2.5 Activity in the OUTPUT2-7 to assist CWASA to increase water supply quantity for low-income users**

After the JOCV volunteer who was dispatched to CWASA for the water supply support in Low Income area in KSA from April in 2015 in the Second Year, there was no request to support activity so that the activity was over in the First Year.



### 3. Activity on GIS and database in the OUTPUT3

#### 3.1. Activity in the OUTPUT3-1 to support Meter Testing

##### (1) Progress in the activity

There was no progress of the activity to support system in the Second Year, because of the delay of facilitation of Meter Testing equipment.

The Meter Testing equipment was scheduled to install in the procurement of PANI2 in February, 2016. However, the security issue inside of Bangladesh from October in 2015 has not been improved yet and the facilitation of the equipment and initial training to personnel were not carried out at the beginning of March in 2016.

The job of the Meter Testing belongs one of the metering services in REVENUE SECTION, and the service job is started by the issue of a Work Order Form from a CRO (Chief Revenue Officer), based on the request from a consumer,, or the report from a Meter Inspector as shown in Figure3.1.1.

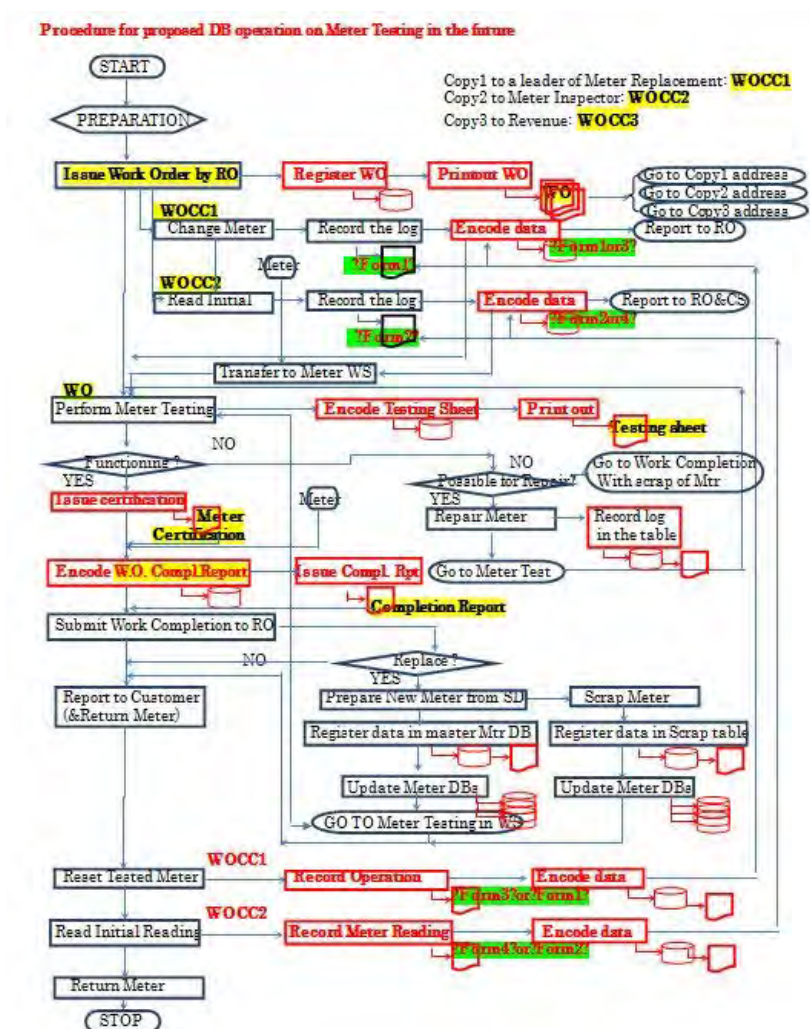


Figure3.1.1 Flow chat of meter testing (present procedure and add future options including a step of meter repair, a procedure to scrap a mal function meter and a step to stock procedure of a new meter)

The activity in the Second Year was scheduled to revise the work procedure, management forms and the database about testing records as follows:

- Forms for the Meter Testing procedures: Work Order Form and Work Completion Report
- Form for the meter handling: Meter collection with Meter Reading and Meter Re-installation with Meter Reading
- Revision to the new Testing record forms: form in the Testing System, Meter Testing Management Ledger and Meter Certification form
- Treatment of mal function meter and the records: Repair record of mal function meter and re-used record of a repaired meter, a procedure to scrap a mal function meter and a registration of a new meter for re-installation
- Integration of a new Meter Testing record with the Meter Management Ledger

This activity is relating to the business improvement and the computerization of forms in the activity of the OUTPUT2 and the business improvement of the Inventory Control in the activity of the OUTPUT3.

## (2) Issue of the activity

The issue in the Third Year will be to make relevant data linked mutually and to make those databases integrate in the supporting system as follows:

- Service Meter Management Ledger data
- Repair record data in the meter
- Inventory Control data
- Consumer Service Connection Completion Report and Customer Management Ledger
- The records in the Customer Service and
- Other data

There is the next issue to discuss the record management relating to the meter repairing, accompanying with new Testing Machine.

## 3.2 Activity in the OUTPUT3-2 to maintain pipeline network map

### 3.2.1 Verification of the customer data of KSA, and water supply data

In order to check the unknown Account number about 4,200 records in the Customer data about 31,000 records which were surveyed in KSA, the data was verified by references of Account Number with three (3) core data which it was important on Customer Management in CWASA.

Core data for the verification was as follows:

- Customer table in the Billing database: customer details and connection details  
The only CWASA database about 57,000 records is managed by COMPUTER SECTION.
- Consumer Service Connection Completion Report

This data has been managed by documents about 18,000 records since 2001 in SALES DIVISION. The data before 2001 has been managed by the binder documents files in REVENUE SECTION, so that it was quite too hard to chase the data.

- Customer Management Ledger

This data has been managed about 21,600 records since 2001 in the management ledger at SALES DIVISION. The Customer Management Ledger before 2001 had been managed by REVENUE SECTION but the ledger was already discarded, so that it did not exist.

The check of the unknown Account number is limited in man-power search from the paper files scattered in each section.

In order to arrange such resources with indefinite conditions, it is necessary to collect deferent in the one place, to verify the updating status of data and to compile data forwarding to the re-maintenance of resources.

There is the only database which the Billing system manages all records about customer details and connection details. Therefore, the data verification in KSA was taken to check data as follows:

- Refer the Account Number in the Billing database and verify the screening of the data.
- Refer the Account Number in the Consumer Service Connection Completion Report and verify the screening of the data. Also apply same process with the Billing data.
- Refer the Account Number in the Consumer Management Ledger and verify the screening of the data. Also apply same processes with the Billing data and the Consumer Service Connection Completion Report.
- Arrange the Account Number among four (4) screened resources  
The data not to be screen in each resource is updated by using the Billing data.  
The absent data not to be registered in each resource is updated by adding a new data by using the Billing data.

The work flow of data verification is shown in Figure3.2.1.1 in the next chapter and this flow is a part of steps to produce the virtual core data in CWASA. The verification result of PANI data was not a good result, but it was able to examine the frame work which all records of CWASA core data will be updated with PANI data.

Updating of the unknown Account Number was decided to conduct by the activity for the re-maintenance of resources as follows:

- The unknown Account data in KSA shall be updated through activities on Leakage Control of KWSP1, the project implementation of KWSP2 and daily operations on Water Supply service, and all CWASA Core data shall be updated.
- The data which CWSISP of the World Bank maintains out of KSA shall be updated by using the CWASA core data in PANI.
- The system to update CWASA core data shall be established in the core unit of Information Management in CWASA and the negative chain about past failures shall be cut off in the data management.

### 3.2.2 Re-building of CWASA core data for Customer Service

Based on data verification results, the virtual data providing with all records was produced, in order to re-maintain the indispensable core data on Water Supply Service in KSA about Customer Management Ledger, Consumer Service Connection Completion Report, PANI Service Connection Ledger, and the customer detail and the connection details in the Billing database. The work flow about data verification and production of the virtual data is also shown in Figure3.2.1.1 as well as the activity in the previous sub chapter.

In order to re-build all records data, the following steps were added in the work flow in the previous sub-chapter.

- The record data to be screened among four (4) resources is kept in the data as an original data in the activity of the previous sub-chapter.
- The data in each resource which the Account Number doesn't exist in the whole customer list is prepared to a new virtual record by customer detail and connection details in the Billing data and the data will be joined in each core data.
- Four (4) core data shall be updated in real time through updating events on CWASA daily operations, leakage control, the project implementation of the KWSP1/2 in KSA.

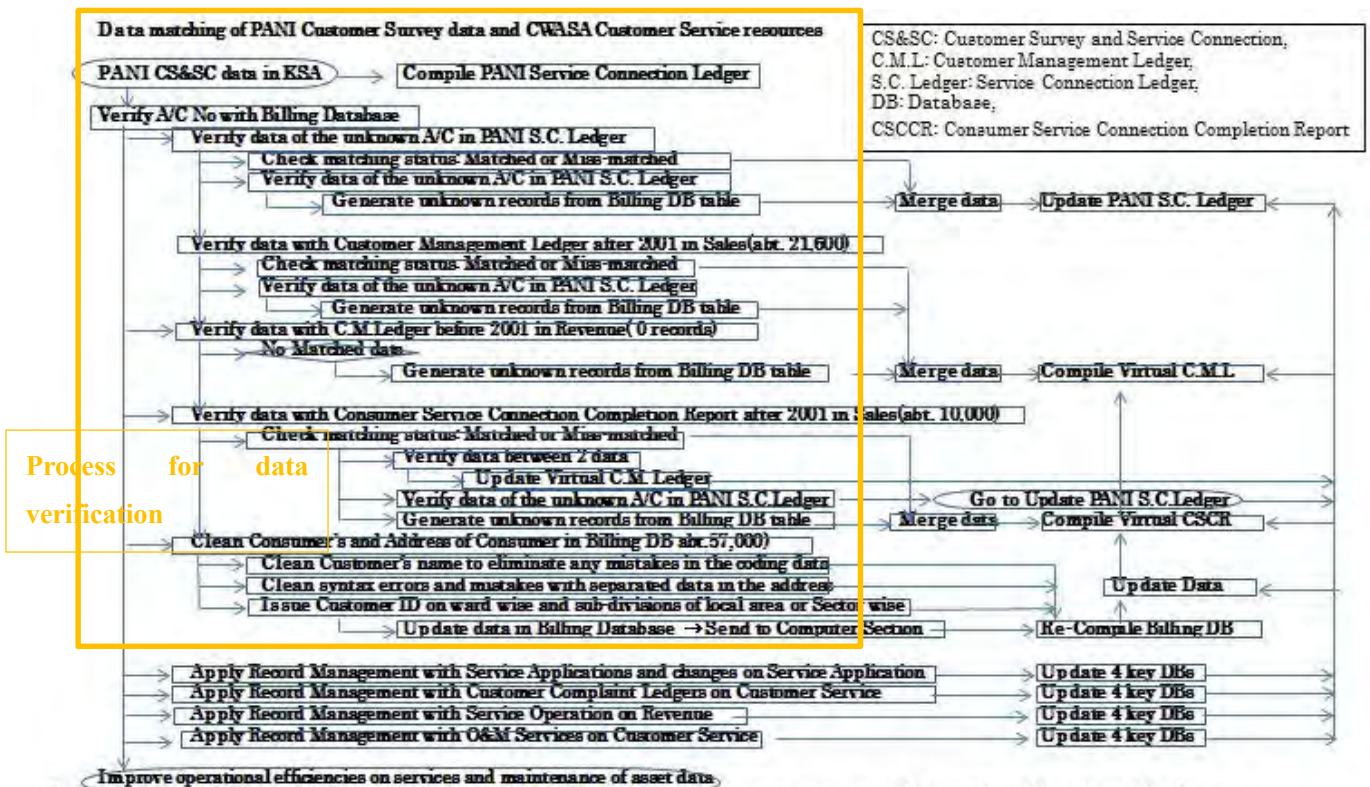


Figure3.2.1.1 Work flow about data verification and production of virtual core data

In the activities before, the Project has ever stood face to face against CWASA resources with lack of the data reliabilities caused by human errors and confusions of the data. The activity in the Second Year was able to solve essential problems in data and also to arrange the master data forwarding to the re-maintenance of CWASA core

data.

In the activity of Third Year, the guideline for the Information Management which supports maintenance for each CWSA core data on the service implementation will be prepared, in order to establish the operating system conducted by GIS counterparts.

### 3.2.3 Correction of customer name and the address in the Billing database

In order to issue a Customer Number from the Billing database, the work which corrects human errors about a customer name and the address was carried out by GIS counterpart as a daily work.

There are huge errors which were encoded as an initial data about a customer name and the address in the Billing database which COMPUTER SECTION manages.

The Customer ID number cannot be issued by the present Customer data. The data shall be required to correct human errors about mistakes of spelling, syntax errors in the character line, and test strings without rules.

These data make the system operability inefficient because the results are used to confuse in the data query to search a customer name or area name and the sorting of the data. Furthermore, if a name of a consumer and the address in the bill are inadequate, the customer satisfaction is never improved against CWASA. The fault of data is never corrected through daily work. Although the Billing system was upgraded by the CWSISP, the essential problem in the data was never solved yet.

Then, the editing work to clean the data about customer name and the address was carried out to improve data quality and operating efficiency, and also to support the issue of the Customer number, as a duty in GIS counterparts,

The correction record is shown in Table 3.2.2. It took about 3.5 months to complete the work As a result, it became possible to process the query to search a customer name and an address and the sorting of a customer name in each area

In the activity of the third Year, PANI will supply this corrected data into COMPUTER SECTION. It is expecting to solve confusions of CWASA data itself by the data cleaning.

Table3.2.3.1 Activity record of data cleaning

Counterpart and local staff	Content of activity
Mr. Saiful(Counterpart1)	Correct syntax error, correct spelling mistakes and correct a customer name: No.1 to No.40,000). Correct an address from(No.1 to No.31,000)
Mrs. Sweety(Counterpart 2)	Correct a customer name(No.46,501 to No.53,642)
Mrs. Taslima(Counterpart 3)	Correct an address(No 39,001 to No.46,500)
Local staff	Correct a customer name(No.40,001 to No.53,642) Correct an address (No.31,623 to No.39,000)

### 3.2.4 Re-maintain database on Distribution Water Pipeline Network

In order to correct faults of the facility data on Distribution Water Pipeline Network which data had been surveyed in KSA, the activity was done to arrange survey data and relating files.

There are facilities relating to distribution pipe lines about 4,718 points consisting of 3,317 records in Model Area and 1,401 records in KSA. It was necessary to correct the data about survey points, GPS positioning points and photo file names, in order to supply data to KWSP2, since faults on data quality and the relating files not to be arranged were found in the past survey data. There are still some photo files which are not able to arrange, but the data cleaning was over.

### 3.2.5 Maintain Deep Tube Well database

There was no progress about updating of Deep Tube Well database which had been maintained in PANI1.

### 3.2.6 Test Pit Excavation data

#### (1) Re-design of Test Pit Excavation Database

Since the fault was found in the database of the Record Management of Test Pit Excavation which the local staff had prepared in PANI1, the database was re-designed. Since summary table of the survey had been prepared by the activity of PANI1, the form of summary table and the form to display cross section drawing and photo files were added in the present database. This work was carried out and the activity of the Test Pit Excavation was over.

#### (2) Arrangement of Test Excavation data in KWSP1

It was carried out to import Test Pit Excavation data about 900 points into the database, which data was surveyed by the C2 component about distribution lines in KWSP1.

GIS counterpart prepared cross check of the Test Pit Point and a name of the point name, list of the data and a PDF file survey form. Currently, they are checking Test Pit Excavation site in the As-built drawings handed over by KWSP1, in order to produce GIS data.

### 3.2.7 Preparation of initial GIS data for Facility Management in the C2 package of KWSP1

In order to produce utility maps for Facility Management in KSA from as-built drawings in the C2 package of the KWSP1, the activity to maintain GIS data was started with GIS counterparts from February in 2016.

Facility data is maintained by data editing and attribute editing about:

- Conveyance pipes and attached facilities from Water Intake to Water Treatment Plant
- Two (2) Transmission Pipelines and the attached facilities from Water Treatment Plant to Reservoirs

The work process to produce GIS data from as-built drawing is as follows:

- Step1: Prepare table about list of facility, facility detail, a location of facility, a reference number of the facility an etc.

- Step2: Check reference numbers about facilities and As-Built drawing and arrange the relations in the table of the Step1.
- Step3: Check a control point name and the map coordinate values and arrange a control point data.
- Step4: Convert data form CAD data of As-built drawing to GIS data and edit GIS data.
- Step5: Transform map ordinates used by the control point data in Step3 and GIS data in Step4.
- Step6: Join data in Step1 and data in Step2 with attribute data of GIS data in Step5.

Since CAD data was compiled on unique local coordinates, CAD data cannot be prepared by data importing easily, so that it is necessary to transform map coordinates, to encode attribute's data and to edit the data. The work time is estimated about three (3) months to six (6) months for them to edit GIS under the present capacity in GIS counterparts.

As-built drawings in the other packages in the KWSP1 are not yet supplied to PANI2 at March in 2016. The bidding of the KWSP2 was finished and the new construction will be started towards establishment of the Distribution Water Pipeline Network and water supply facilities in KSA. Accompanying with progresses of KWSP2, as-built drawing in each package will be supplied to the Project, and initial GIS database and Facility Management databases will be maintained to support Facility Management in CWASA. Therefore, the activity to supports GIS counterparts will be continued after the Third Year.

### 3.2.8 Assistance of Customer Survey out of KSA

Since CWASA requested the technical assistance of the customer survey to PANI in the project to maintain Distribution Water Pipeline Network which CWSISP of the World Bank is carrying out in the area out of KSA. The activity was carried out to supply to CWASA about the field verification survey form and a soft copy of maps required for the survey. When a person in charge of CWSISP in CWASA and an Italian consultant called up the meeting to discuss GIS data in September, 2015, the informal request to cooperate the survey was heard from them.

Corresponded to the formal request from CWASA in November, 2015, the Project started preparation of the database for field verification survey and the document about the outline of the data entry. The project situations inside of CWSISP were not involved about such as procurement of satellite imagery and GIS equipment and so on, from the outside, it was decided that PANI supplied the soft copy of graphic data about maps required for the survey against the CWASA side.

One set of materials was already supplied to CWSISP. Customer data and Connection data out of KSA will be updated in the latest status when CWSISP will complete the survey. It is expected that al customer data and Service Connection data in the CWASA service coverage area will be updated certainly through this activity support.

### 3.3. Activity in the OUTPUT3-3 to support NRW Monitoring in KSA

#### (1) Progress of the activity

In the Second Year, the re-training of GIS data processing and cross tabulation was carried out to let GIS counterpart execute the NRW monitoring.

In the activity of the First Year, the guideline about the NRW monitoring on GIS was prepared to counterparts as shown in Figure 3.3.1 and the training exercise was instructed about cross tabulation of water consumptions data and bill data in ZONE3 area to four (4) GIS counterparts. However, nobody could achieve any result by themselves which practices had been instructed since PANI1.

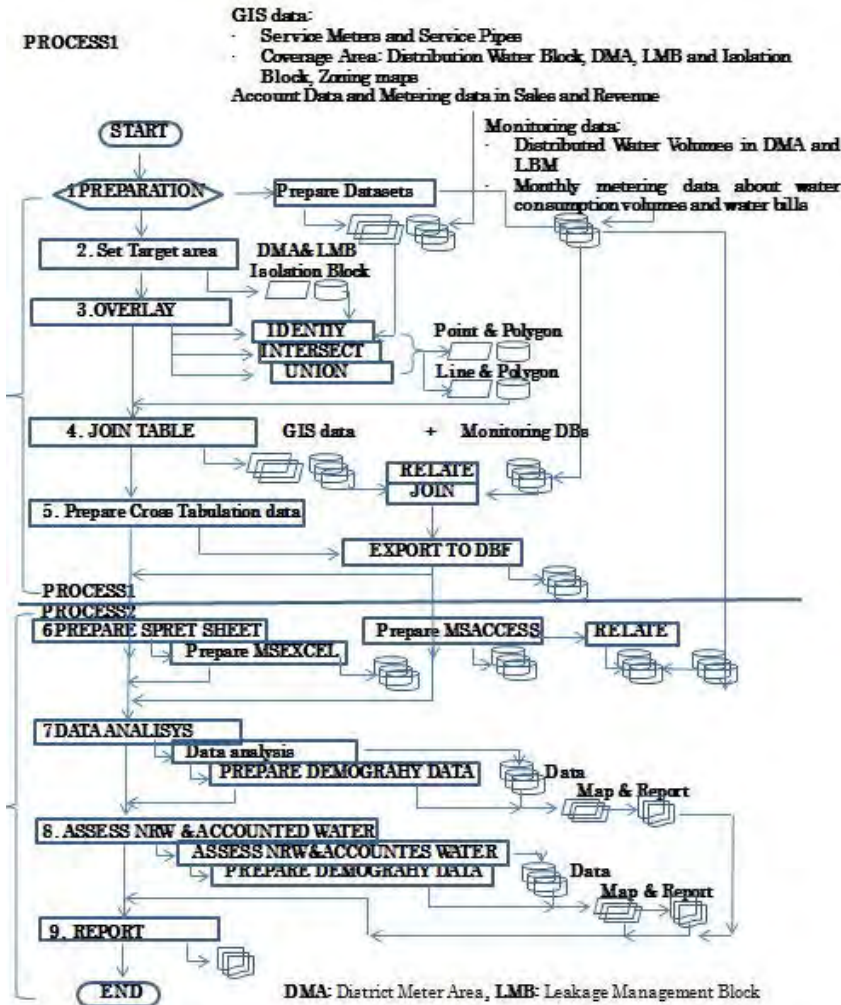


Figure3.3.1 Work flow in the NRW monitoring on Information Management

Since in the present situation, GIS counterpart will not be able to carry out the NRW monitoring in KSA in the Third Year, the follow-up of the training had to be repeated by them again in the second Year. In activity of PANI2, it is not expected that the counterpart forgets contents of the instruction. Counterparts who were lack of awareness on their duties and passive altitude cannot get any result. One (1) counterpart who was concentrated to train was seceded from a duty on GIS counterpart. If the counterpart practically understands basics of GIS and acknowledge of database, the NRW monitoring can be processed by anybody easily. In order to let GIS



counterparts execute the NRW monitoring which had been trained since PANI1, the next operations were repeatedly forced to carry out on their duties.

- Overlay processing on GIS data and editing of tabular data
- Preparation of annual master database on the Billing data: Re-calculate water consumption and water bill and compiling of annual master data
- Cross tabulation in the leakage management block: Join of databases and cross tabulation
- Preparation of material of calculation result and the reporting

## (2) Result of counterpart

Three (3) counterparts could submit the first results shown in Figure3.3.2 as follows:

- Result of cross tabulation of 2013 data at five (5) pilot areas in PANI1
- Result of cross tabulation of 2014 data in ZONE3 area where service meter had been replaced by PANI1

Although there are some differences of personal skills about graphs and tables in their results, it will be expected for them to fixate the operation with improvement of their self-confidences through the activity to the future. This activity supports to the NRW monitoring in the leakage management block divided in ten (10) Sectors and DMAs in KSA. Through activity, the operation to support the monitoring of water consumption in the NRW management was transferred to GIS counterparts.

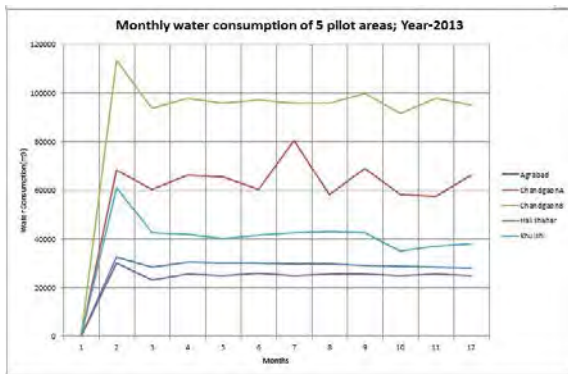


Figure3.3.2a Monthly water consumptions in 2013 at pilot areas

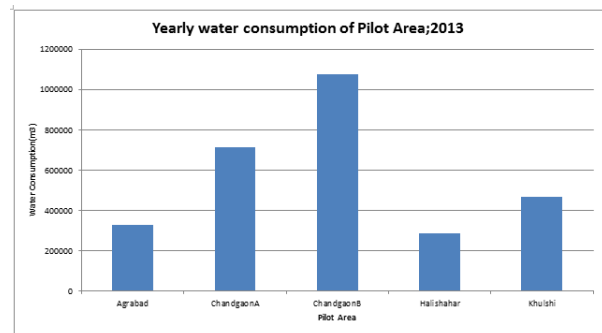


Figure3.3.2b Annual water consumptions in 2013 at pilot areas

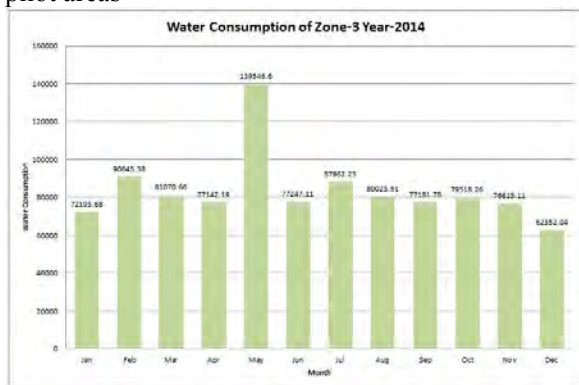


Figure3.3.2 c Monthly water consumptions in 2013 at ZONE3 area

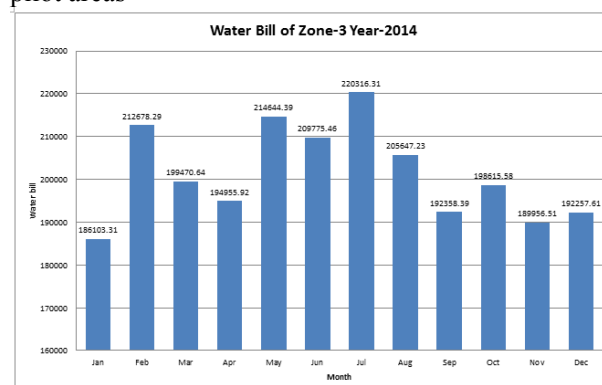


Figure3.3.2d Monthly water bill in 2013 at ZONE3 area

Figure3.3.2 First output of cross tabulation in the NRW monitoring in GIS counterpart

### (3) Task and duty in counterpart

In order to arrange daily job on GIS and database, descriptions about task and duties which a GIS counterpart should take charge of were added to the guideline of the NRW monitoring.

In the activity of the Second period, the work about GIS and a database is instructed to GIS counterparts as follows:

- Data maintenance of utility map of GIS data and Facility Management Ledger based on as-built drawing of KWSP1 and design data of KWSP2
- Data updating on leakage control in KWSP1 and KWSP2 and data updating of CWASA core data
- Data updating on customer services(Service Application, Meter Inspection and Revenue Collection, Customer Complaint) and data updating of CWASA core data
- Supports of operation and data updating in relevant divisions (SAES DIVIION、REVENUE SECTION、COMPUTER SECTION、CUSSTOMER SERVICE DIVISION, MOD, SMO)

GIS counterpart shall be required to understand their own roles and their own duties, since not only maintenance of CWASA GIS data but also the NRW monitoring become their daily jobs in GIS counterpart.

(4) Issue of the activity

Since the jobs on GIS operation might be concentrated to three (3) GIS counterparts from the activity in the Third Year, it is an issue for themselves to cut off chain of past failures.

The water distribution in KWSP1 will be planned to start from the middle of 2016, the measure of Leakage Control and the monitoring of the leakage in KSA will be started. There (3) GIS counterparts shall be required to continue the monitoring activity to tie up with activities of an expert on Leakage Control in KSA.

3.4. Activity in the OUTPUT3-4 to support planning of management and operation on Water Distribution

(1) Progress of the activity

Through the activity about data verifications in the OUTPUT3-2, a frame work of Information Management in the management and operation on Water Distribution was examined about data maintenance, monitoring of operation, updating of resources, operation style of data management about decentralization or centralization and others.

In the activity of the Second Year, the following were considered to support the planning.

- About operation of PANI database

Considering the present capacity on Information Management, the decentralized process cannot be dealt with to update pipeline map of GIS data and facility data, and also CWASA core data, so that there is a high risk to make data quality confused. Therefore, two (2) steps of database operations in consideration of the term to build capability in personals shall be planned as follows:

- The first step: Centralized management of data in CWASA headquarters and the capacity building in personnel for two (2) years

In order to establish database management system, the period to build capacity on Information Management in the staff will be set up for two (2) years and the database will be maintained in the unit of Information Management at CWASA headquarters with Human Resource development.

The data access in Sector Management Office shall be limited only for reference of data, and the office shall submit the updating data to CWASA headquarters. CWASA headquarters carries out the overall updating of the data, and transfers the updated data to relevant divisions.

- The second step: Decentralize the data management to Sector Management Office and strengthen capacity in personnel for two (2) years

In order to decentralize the database management system to Sector Management Office, the term will be set up about two (2) years to fixate capability on Information Management for personnel, and the operation and management on database will be transferred from CWASA headquarters.

Information handled in a Sector Management Office shall be disclosed in real time to CWASA headquarters and relevant divisions through a network. In the real situation on Information Management, there are lacks of awareness against data quality and data management among operators in system, so that

personnel themselves are inducing confusions of data in human being. System cannot be managed unless operator follows a rule like traffic conditions. It is recommended to plan the decartelized operation for database management, considered with the transition period for human resource development.

- Configuration of system installation

The design of the system to be installed in a Sector Management Office will be supported by the preparation of the proposal in the activity of the Third Year, based on the plan conducted by a Japanese expert on institutional improvement.

- Human Resource assignment on Information Management

The design of Human Resource assignment on Information Management in a Sector Management Office will be supported to prepare the proposal in the activity of the Third Year, based on the plan conducted by a Japanese expert on institutional improvement.

- Preparation of Performance Indicator in a Sector Management Office

The preparation of Performance Indicator in a Sector Management Office will be supported to prepare the proposal in the Third Year, based on the plan conducted by a Japanese expert on institutional improvement.

(2) Preparation of a management tool

A management tool to support the planning is as follows:

- O&M Check Sheet for Facility Management

In order to support the Record Management about Distribution Water Pipeline Network facilities on the KWSP and Water Supply facilities in KSA, the O&M check sheet database shown in Table 3.4.1 which a Japanese expert on pipe engineering prepared was designed in the First Year. There was no change in the design in the Second Year.

Table3.4.1 List of Facility Management Ledger and O&M Check Sheet

Category of Facility	Item of Facility Management Ledger	Item of Check Sheet on O&M
Water Productions and Water Distributions	Facility Info	
	DTW Pumps Info	Check Sheet A2: DTW Pumps
	Reservoir Info	
Water Distributions	Pipeline Info	Check Sheet B: Main Pipes for: - Conveyance Pipes, - Transmission Pipes - Primary Pipes, - Secondary Pipes and - Tertiary Pipes
	Culvert Info	Check Sheet F: Aqueduct Bridge Pipes
	High Elevated Tanks	Check Sheet H: High Elevated Tanks
	Valve Info	Check Sheet C Valves including - Gateway Valves, - Butterfly Valves, - Air Release Valves(Check Sheet D) - Wash Out Valves(Check Sheet E) - Fire Hydrants( Check Sheet G)
	Adjustment Valve Info	Check Sheet D: Air Release Valves
	Air Release Valve Info	Check Sheet E Wash Out Valves
	Fire Hydrant Info	Check Sheet G Fire Hydrants
	Reducer Info	
	Flow Meter Info	Check Sheet I: Meters
Service Connections	Water Supply Equipment Info	
	Service Pipe Info	Check Sheet B2 Service Pipes
	Domestic meter Info including Commercial Meters and Industrial Meters	Check Sheet Service Meters Meter maintaining tables on Repair Service, Meter Test, Meter Repairs with profiles
	Water Tap Info	
	Water Tank Storage Info	

- Support the Record Management on Operation and Management

Through activity until the Second Year, computerization about the management forms for operation monitoring sheets has been supported in MOHARA WTP, KARLUGHAT Iron Removal Plant and MOD. Accompanying with construction of the new facilities in KWSP1 and KWSP2 in the future, those management forms will be required to revise forms and to prepare new management forms.

Referred to the computerization of management forms in the activities on the OUTPUT1 and the OUTPUT2, the activity will be supported to prepare the reporting of the operation records and the monitoring in the MIS in the Sector Management Office.

(3) Issue of the activity

Since there is a difference between blocks on Sector and DMA for Distribution Water Management and service area for Revenue Collection and Customer Management in the Sector Management Office, there are some issues in the Operation and the Management in the business as follows:

- Unify a service area on Customer Management with a Distribution Water block  
The area code of WARD is introduced in the conventional Customer Service in CWASA, but data management is confused because the area cannot take consistency with a water supply block.  
By consistency between a customer service area and a water supply block, it is possible to realize integration of Water Supply Management and Customer Management about Facility Management, Distribution Water Management, NRW monitoring, Customer Services about Meter Inspection, Bill collection, Application service and services in the branch office and etc.

- Set Service office on Customer Service and decentralize services  
It is recommended to set data management conducted by a centralized management system in the present situation that the Management and Information are confused. But it is requested to start a setting of a service office on Customer Service and the decentralization of services from the stage when Water Supply Service of KWSP2 will be started in KSA.

Taken into consideration of a setting of service office on Customer Service in a Sector Management Office is, it is required to reformulate the plan of staff allocation and capability building about Operation and Management on Information as follows:

- Support for Customer Service
- Support for Meter reading service and Revenue Collection
- Support for O&M on Distribution Water Pipeline Facilities
- Support for O&M on Service Connection Facilities

Moreover, the automation data of SCADA system which installation will be planned for Water Production and Distribution Water by KWSP1/2 will be issue for a new data management, too.

The overall operation about Distribution Water Management using the SCADA automation data will be scheduled to start after 2018.

### 3.5. Activity in the OUTPUT3-5 to support training of plumbing

#### (1) Progress of the activity

Training was supported to instruct the guideline for logging record for a leakage survey form in MSEXCE which were designed by the activity in the First Year.

The guideline in English was prepared by using the specification documents of database when to have designed the database. The training text in Bengali was prepared by a GIS counterpart. The counterpart carried out the lecture by using this text against the trainees at June in 2015. After that, there was no request to modify the form design form from the Leakage Survey Team shown in Figure3.5.1, so that the activity support was over.

Leakage Repair Order Sheet

Meter Replacement Data Sheet

Figure 3.5.1 Management form for &M service: Work Order form, Leakage Survey form, Work Completion Form (2) Issue of the activity

Although leakage survey form is designed as a multi-purpose logging form for repair work in customer service, there are some issues on database management as follows:

- Introduction of quantity about time and cost  
There is no item to record a repairing time and a manning quantity of the job in the survey form, so that it is necessary to provide with a cash flow of the job with addition of those items in the form.
- Correspondence to the standard form on Customer Service  
The survey form can correspond to a multiple-purpose use, but it is an issue to apply to the standard form in CWASA.
- Integration of leakage survey form and Customer Service data  
There are issues about data references among pipeline data in the survey form about Customer data, Service Connection data, the Billing data and Customer Services data, so that it is necessary to advance integrations among data.
- Generate Facility ID data in the survey form  
The survey form doesn't provide with reference table of Facility ID, so that it is necessary to generate the Facility ID number on pipelines in the KWSP1&2 in the form and to advance integration of data with Facility Management data and Operation and Maintenance data.

### 3.6. Activity in the OPUTPUT3-6 to revise operation manuals and training support

#### (1) Progress of the activity

In the Second Year, the search menu shown in Figure 3.6.1 was added in the MSACCESS system for the O&M manual library which was designed by the activity of the First Year, in order to support query function to display records of the manuals according to a filter of a category and text entry.

The documents to be registered in the system such as manual documents in PANI2 and the operation training manuals in KWSP1 are not supplied to a GIS team yet. The debugging of the O&M Library system and the bug fix of functions were postponed in the activity in the Third Year. In particular, the category and the items in the manuals shown in Tables 3.6.1 will not be able to be arranged, unless real manuals will be collected.

Soft copies in MS EXCEL about the training list and training texts in CWASA personnel were supplied by a Japanese expert at the beginning of March in 2016. The training record table and documents will be generated in the system through the activity in the Third Year.

In order to transfer the system to GIS counterpart, the following activity was instructed to one (1) counterpart.

- Preparation of documents about database specification and operations manual
- Debug of system and a bug fix of the faults during the preparation of operation manual
- Preparation of Bengali operation manual and preparation for materials to diffuse the system

The bug report of the system and the English document were not submitted by a counterpart yet at the end of the activity in the Second Year.

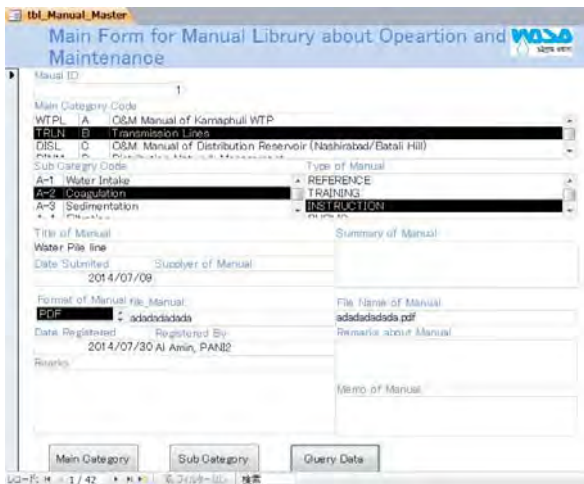
#### (2) Issue of the activity

There is no issue in the preparation of the system. In the activity of the Third Year, real documents will be processed in the system and the system will be transferred to the counterpart. Main activity will be as follows:

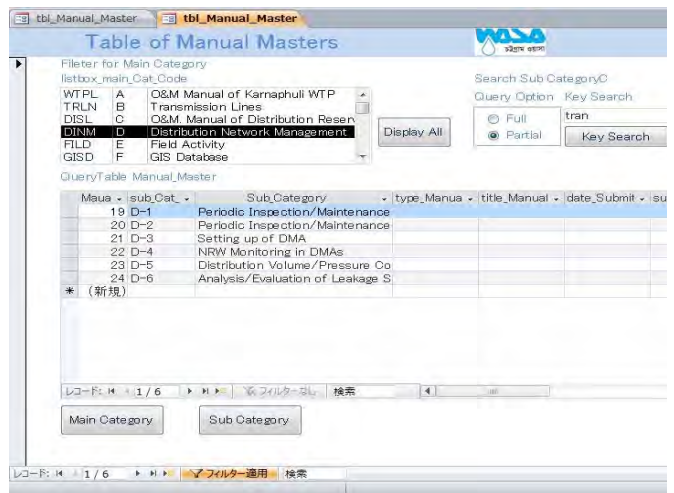
- Register document in the system
- Re-examine category of manual library
- Revise database design
- Examine additional function
- Debugging of query function and other modules

In order to test database operation in the network, the operability of the system will be checked by the installation of the server software of open source. The activity will be transferred to GIS counterpart and the Project will conduct corrections of problems and the follow-up to support the counterpart.





Data entry menu of document library



Search menu: Display support of libraries in each category and that of document searched by conditioned Query

Figure3.6.1 System of O&M manual libraries on MSACCESS

Table 3.6.1 Category of O&M Manual library

Main Category	Sub_Category	Main Category	Sub_Category
<b>A: O&amp;M Manual of Karnaphuli WTP</b>	<b>A-1</b> Water Intake	<b>E: Field Activity</b>	<b>E-1</b> Periodic Inspection/Maintenance of Bulk Flow Meter & Pressure Gauge in Service Block
	<b>A-2</b> Coagulation		<b>E-2</b> Periodic Inspection/Maintenance of Fire Hydrant
	<b>A-3</b> Sedimentation		<b>E-3</b> Leak Detection Survey/Reporting
	<b>A-4</b> Filtration		<b>E-4</b> Leakage Repair Work/Reporting
	<b>A-5</b> Disinfection		<b>E-5</b> Service Connection Installation/Reporting
	<b>A-6</b> Chemical Injection (other than Coagulation)		<b>E-6</b> Water Meter Replacement/Installation & Reporting
	<b>A-7</b> Transmission	<b>F: GIS Database</b>	<b>F-1</b> Customer Database with Map linked with Accounting System
	<b>A-8</b> Standby Generator		<b>F-2</b> Distribution Network Database with Historical Record on Extension and Leakage Repair Work
	<b>A-9</b> Periodic Maintenance Procedure/Reporting including Recording of Historical Data		<b>F-3</b> Water Meter Database with Replacement Schedule Control
	<b>A-10</b> Inventory Control of Consumable Goods/Spare Parts		<b>F-4</b> Deep Well Database
	<b>A-11</b> Water Production/Treatment Record		<b>F-5</b> Customer Claim Database w/Action Record
	<b>A-12</b> SCADA O&M Manual	<b>G: Water Meter Testing laboratory</b>	<b>G-1</b> Testing Procedure/Reporting with Database
<b>B: Transmission Lines</b>	<b>B-1</b> Periodic Inspection of Pipelines and Surge Tank	<b>H: Warehouse Inventory Control</b>	<b>G-2</b> Water Meter Storage/Handling with Database
	<b>B-2</b> Water Diversion Operation to Modunaghat WTP		<b>H-1</b> Service Connection Plumbing Materials & Fittings
<b>C: O&amp;M. Manual of Distribution Reservoir (Nashirabad/Batali Hill)</b>	<b>C-1</b> To be Prepared by K-1/2	<b>I: MIS Report Production/Distri</b>	<b>H-2</b> Distribution Pipe & Fittings
	<b>C-2</b> Reservoir Structure		<b>H-3</b> Electrical Equipment
	<b>C-3</b> Control Valve		<b>I-1</b> Preparation of MIS Report/Distribution
	<b>C-4</b> Transmission Pump and Electrical Facilities		
<b>D: Distribution Network Management</b>	<b>D-1</b> Periodic Inspection/Maintenance of Reservoir		
	<b>D-2</b> Periodic Inspection/Maintenance of Pumps and Relevant Electrical Facilities		
	<b>D-3</b> Setting up of DMA		
	<b>D-4</b> NRW Monitoring in DMAs		
	<b>D-5</b> Distribution Volume/Pressure Control in DMA/Service Block		
	<b>D-6</b> Analysis/Evaluation of Leakage Survey Result		

### 3.7. Activity in the OUTPUT3-10 to improve the Inventory Control and logistics management

#### (1) Progress of the activity

There is no progress not much about the activity in the Second Year. It was checked that the business of the inventory control in STORE DIVISION was carried out by the work flow of the business shown in Figure 3.7.1 in the First Year.

There are stock materials which managed in the five (5) Stock Yards in STORE DIVISION. The stock record supplied materials is controlled about the records and the quantities by the balance sheet in the paper format, so

called BINCARD. According to a softcopy of stock lists about 5,499 items in MSEXCEL which was collected in the First Year, the latest quantity in each material is recorded in the sheet. But it was not collected to get the softcopy about the profiles of stocks.

In the stock of materials, materials are supplied to STORE DIVISION by procurement done by CWASA. It is said that the forms relating from the procedure of a bid to inspection of the delivery are managed by MSWORD files. so that it is guessed that the inventory control system needs to deal with computerization of the forms in the procurement. CWASA organizes a joint committee which persons concerned in the inside call up, in order to supply materials to STORE DIVISION according to the governmental guideline. But there is no computerization about the procedures in the procurement and the records to stock materials in the Inventory Control in the present yet. Judged from the present conditions about PC equipment and staffs in PROCUREMENT DEPARTMENT and STORE DIVISION, the businesses are not supported by the system.

The supply management of materials is carried out between the division and relevant divisions by two (2) forms which are MRS: MATERIAL RETURN TO STORE. Form and SIR: STORE ISSUE REQUISITION form.

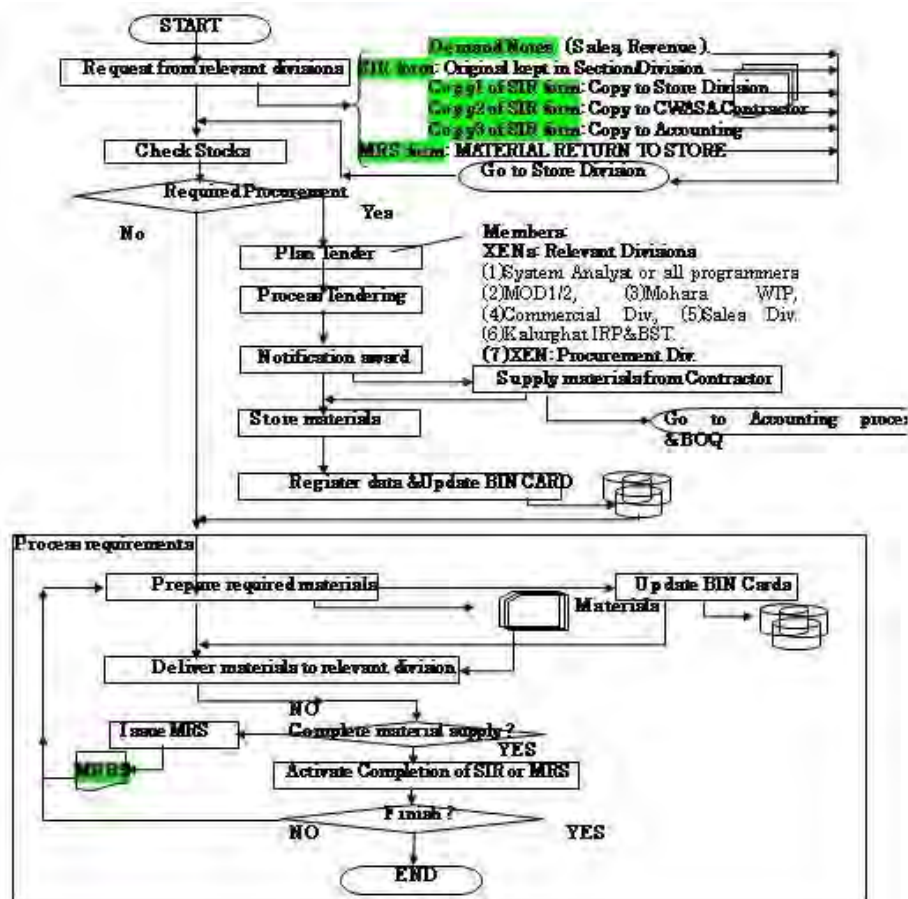


Figure3.7.1 Work Procedure of Inventory Control in Store Division  
 SIR form: STORE ISSUE REQUISITION, MRS form: MATERIAL RETURN TO STORE

In order to support the records of the stock record and the supply record and also the records of quantity in the master data by using a master data of the BINCARD and two (2) forms with relevant divisions about inventory control, the system to support the operation is being prepared by database in MSACCESS.

### (3) Screening of materials

Screening of materials about 5,499 items as the category is shown in Table 3.7.1 was requested to GIS counterpart in the First Year, but there was a situation for them not to have submitted the result even in the Second Year. It is because a counterpart in charge was resigned from GIS and counterparts were few experiences on water supply engineering. Thus, the screening was requested to persons concerned in the Leakage Team in PANI2, and the result will be submitted in the beginning of the Third Year. Corresponding to this result, a filter function to screen material records and a query function will be added on the supporting system in the Third Year.

Table3.7.1Category for screening of material

Main Category	Sub category	Type of material	Managed by Serial No
Water Production	Water Intake	Main parts, Spare parts, Consumers, Others	Yes/No
	WTP	Main parts, Spare parts, Consumers, Others	Yes/No
	DTW	Main parts, Spare parts, Consumers, Others	Yes/No
	Pump Station	Main parts, Spare parts, Consumers, Others	Yes/No
Distribution Main	Conveyance Pipe	Main parts, Spare parts, Consumers, Others	Yes/No
	Distribution Main	Main parts, Spare parts, Consumers, Others	Yes/No
	Distribution line	Main parts, Spare parts, Consumers, Others	Yes/No
Service Connection	Service Pipe	Main parts, Spare parts, Consumers, Others	Yes/No
	Service Meter	Main parts, Spare parts, Consumers, Others	Yes/No

### (4) Issue of the activity

There are issues on the system development in the preset as follows:

- Addition of a filtering function

In order to support the filtering between the master table of materials and BINCARDs, the filtering function and query function will be added on the System.

- Support computerization of the stock records in the procurement record

This issues is relating to the activities in the OUTUT2-4 about computerization of assets and those activities will support computerizations of the Record Management about the procurement procedures,

With reference to the exiting forms related to the store of the supply in the procurement, it will be to support standardization of the forms about the procedure and the records to prepare the template files of forms.

It will be examined to add the function to support the registration of the stored data about materials in the master tables in the system.

- Review of the supply forms in the system

It will be improved to conduct the operation for the supply records in the system, with the review of the supply forms.

Therefore, the activity will be conducted to carry out to improve those issues in the Third Year,

### 3.8. Activity in the OUTPUT3-11 to support plan of technical standards for CWASA and the revise

#### (1) Progress of the activity

The progress in the Second Year is as follows:

- Preparation of Geographic feature catalog

The water supply facilities which will be maintained with the KWSP1 and the KWSP2 is let be a new standard, and the draft table of the Geographic Feature Catalog shown in Table3.8.1 from the activity of the First Year was continuously arranged to advance systematization about the geographic feature code on Information Management based on making these facilities structured along with the stream order of the water distribution from water intake to water supply.

In the Second Year, the Project was corresponding to the trends against the activity on Geographic Information in the project side in the CWSISP of the World Bank out of KSA. Geographic Information except a few of items in CWSISP is involved in the geographic feature catalog in PANI2 and the data composition is more simple, so that there will be no problem when to integrate both data.

Facilities constructed byKWSP1 and KWSP2 will be maintained about mapping data and Geographic information data by the design build drawings and the as-built drawings in the facility.

The water supply facilities including to the existing pipeline facilities in CWASA will be arranged with systematization. It is that what to prepare the catalog of Geographic Information standard is what to deal with to avoid those confusions.

The geographic feature catalog is prepared for the documentation which specifies the quality of Geographic Information data according to the Geographic Information standard (ISTC/211).

The Geographic feature catalog in PANI2 will be established to forward the end of the Project in 2018.

- Preparation of the draft terms and work

Through the activity of the OUTPUT3inthe Second Year, the flame work was arranged about the objective of the maintenance in each resource, routine task in GIS counterpart, the work step and the contents in the implementation.

- The draft terms of work on GIS and database in Facility Management

The work of the maintenance on Information Management for Water Supply facility was arranged about updating of pipeline map and customer data, and that of CWASA core data in the data verification process in the OUTPUT3-2. Those activities will become daily tasks and duties in GIS counterpart.

In order to prepare documentation of the tasks and the contents of the routine works in each resource of the section, the draft terms of work for each objective will be prepared in the activity of the Third Year.

The work of the maintenance on Information Management for Distribution Water Pipeline Network facility, about which is mainly relating to conveyance pipes and distribution lines in the KWSP is to support the implementation of the record management about the check data with the O&M Check sheet and the repaired data and updating of facility data with the updating profiles.

Those activities will become daily tasks and duties in GIS counterpart. In order to prepare documentation of the task and the contents of the routine works of the section, the draft terms of work will be prepared in the activity of the Third Year.

➤ Preparation of the draft terms of work on GIS and database for NRW Management

There is no progress in the Second Year. The contents of the work using GIS and database were arranged about data processing and cross tabulation of data which support the NRW monitoring, through activity of the OUTPUT3 in the Second Year.

In order to standardize this work as a routine work, the draft terms of work about GIS and database in the NRW Management will be prepared in the Third Year.

● Version up about existing terms of work on GIS

There is no progress in the Second Year. In order to revise the draft terms of work on GIS maintained in PANI1, the activity to add contents of the supporting works maintained through activities in the OUTPUT3 will be started from in the Third Year.

● Diffusion and support

There is no progress in the Second Year. The support to diffuse the terms of work cannot disregard restrictions in counterparts, and it is not easy for all members to understand their own works and their duties in daily operation.

The follow-up had been conducted to make the target centralize into counterparts patiently. The diffusion of the terms of work to counterparts will be conducted to carry out by the policy change which the subject of the activity will be switched from the project to GIS counterparts.

There are many limitations of business operations in the present staff about the personnel's stability, adaptability, the capability itself, and business, self-sustainability and the shortage of the personnel and the self-sustainability on GIS operation might be difficult.

(2) Correspondences to CWSISP

In the Second Year, it was happened to deal with the correspondence against the trend of the project side about the standard of geographic information in the outside of KSA in the project for the maintenance of Distribution Water Pipeline Network on existing pipes which CWSISP of the World Bank was carrying out.

Through the project director of CWASA, the PANI2 was dealing with in each time about comments against their tender document for the local contract, comments against the progress report, comments against the GIS data specification and requirement against the meeting, a request of the facilitation of PANI against customer survey in the outside of KSA and etc. Especially, the correspondence to Geographic Information data was dealt as follows:

- Request of the review against the Geographic Information data specification(from the end of March to the beginning of April in 2015)  
The comments were dealt by the reviews of the delivered document of data specification with persons concerned in the KWSP.
- Comments against the progress report (June, 2015)  
The comments were dealt with, since the review of Geographic Information in the progress report was requested to PANI2.
- Meetings against one (1) standard of Geographic Information in CWASA(September, 2015, 2 meetings)  
Two (2) meetings were dealt with them about the confirmation about the definition of Geographic Information data and the confirmation against one (1) standard which CWASA demanded, and the correspondence of PANI until 2018.  
With a person in charge of the Italian consultant, it was confirmed that there was no problem in data maintenance between both sides by the indication of data specification.  
It was requested to support the customer survey in the outside of KSA and the preparation was dealt with for them.
- The request of the support for Customer Survey out of KSA (after November in 2015)  
Received the official request from CWASA, the facilitation of the customer survey out of KSA was dealt with provision of the survey form, outline for the record, database and map data.

Confusions of data can be avoided by preparation of Geographic feature catalog. Geographic Information except a few of items in CWSISP is involved in the Geographic feature catalog in PANI2. Mapping data and Geographic information data in the KWSP will be maintained with systematized categories based on the design build drawings and as-built drawings in KWSP1/2. There are rather essential problems caused by shortage of capacity in a person in charge, absence of document about specification in data production (inside of the project) and conventional custom not to disclose data.

Table3.8.1a Table of Geographic Feature Catalog(draft): Categories on Water Supply Facilities: Rising Main (1/3)

Main Categories	Sub Categories	Category	Geographic feature/GIS Design Code	G.F. Code	
01 Conveyance Pipes	00		00	A main category of facilities relating to Raising Main including Water Production, Water treatment	010000
	10 Water Intake	Intake Point	00	General/Unknown Water Intake facilities	011000
			10	Intake point	011010
			11	Attachments at Intake point	011011
			19	Other facilities at Intake point	011019
		Buildings	20	General Buildings at Water Intake	011020
			21	Pump Station	011021
			22	Electrical Building	011022
			23	Sub-Station	011023
			24	Office Building	011024
			25	Guard House	011025
			26	Fuel Tank	011026
			29	Other buildings relating to attachments at buildings of Intake facilities	011029
			90	Other facilities relating to attachments in Water Intake	011090
	20 DTW	DTW	00	General/Unknown DTW facilities	012000
			10	DTW	012010
			19	Other attachments at DTW facilities	012019
		Buildings	20	General/Unknown Buildings at DTW	012020
			21	Main buildings	012020
			22	Generator House	012022
			23	Guard House	012020
			29	Other buildings relating to attachments at building of DTW	012029
	20 DTW	Pump Stations	30	General/Unknown Buildings at DTP	012030
			31	Pump Stations	012031
			39	Other facilities relating to attachments at Pump stations in DTW	012039
		90	Other facilities relating to attachments at DTW	012090	
	30 WTP	WTP	00	General/Unknown WTP facilities	013000
			10	WTP	013010
			11	Pre-sedimentation	013011
			12	Clarifier	013012
			13	Filter	013013
			14	Filtered Clear Well	013014
			15	Sludge Lagoon	013015
			16	Filter Drain Tank	013016
			17	Aerator	013017
			18	Sedimentation Tank	013018
			19	Clear Water Well	013019
			20	Desilting Basin	013020
			29	Other facilities relating to attachments at WTP facility	013029
		Buildings	30	General/Unknown Buildings at WTP	013030
			31	Chemical Building	013031
			32	Administration Building	013032
			33	Chlorine Building	013033
34			Ware House	013034	
35			Electrical Building	013035	
36			Sub Station	013036	
37	Guard House	013037			
38	Generator House	013038			
39	Sludge Tank	013039			

Table3.8.1b Table of Geographic Feature Catalog(draft): Categories on Water Supply Facilities: Rising Main (2/3)

Main	Sub	Category	Geographic feature & Mapping feature		G.F.	
Categories	Categories		Code		Code	
		Buildings	49	Other buildings relating to attachments at buildings at WTP	013049	
		Pumps	50	General/Unknown Pump facilities	013050	
			51	Pumps	013051	
			52	Pump house	013052	
			59	Others facilities relating to attachments at facility of Pumps in WTP	013059	
		Others facilities	90	Others facilities relating to attachments at WTP	013090	
	40 Service Reservoirs			00	General/Unknown Service Reservoir Facilities	014000
			Reservoirs	10	Reservoirs	014010
				11	Attachment at Reservoir	014011
				19	Others facilities relating to attachments at facility of Reservoirs	014019
		Buildings	20	Buildings	014020	
			21	Electrical House	014021	
			22	Sub-Station	014022	
			23	Guard House	014023	
			29	Other buildings relating to attachments at buildings of Reservoir	014029	
		Others	90	Others facilities relating to attachments at Reservoirs	014090	
	50 Booster Stations			00	General/Unknown Booster Station facilities	015000
		Booster Stations	10	Facilities of Booster Station	015010	
		Buildings	20	Buildings at Booster Station	015020	
		Others	90	Other facilities relating to attachments at Booster Station	015090	
	60 High Storage Water Tank	H.S.W. Tank Buildings		00	General/Unknown High Storage Water Tank facilities	016000
				10	Facility of High Storage Water Tank	016010
			20	Buildings	016020	
			22	Elevated Tank	016020	
			22	Bowser Station	016022	
			29	Other Buildings relating to attachments at building of High Water Storage Tank	016023	
		Others	90	Other facilities relating to attachments at High Water Storage Tank	016090	
	70 Conveyance Pipes			00	General/Unknown Conveyance Pipe Lines facilities	017000
		Conveyance Pipe Lines		10	Conveyance Pipe Lines (from Intake to WTP)	017010
				19	Other pipes	017019
			Fittings	20	General/Unknown of Fittings	017020
		21		Joint	017021	
		22		Bend 11.25	017022	
		23		Band 22.5	017023	
		24		Bend 45	017024	
		25		Bend 90	017025	
		26		Bend 135	017026	
		29		Other fittings on Conveyance Pipes	017029	
		Control Valves		30	General/Unknown Control Valves	017030
				31	Air Release Valves	017031
				32	Gate Valve	017032
				33	Butterfly Valve	017033
	34		Cone Valve	017034		



Table3.8.1c Table of Geographic Feature Catalog (draft): Categories on Water Supply Facilities: Rising Main (3/3)

Main Categories	Sub Categories	Category	Geographic feature &		G.F. Code
			Code		
		Control Valves	35	Pressure Reducing Valve	017035
			36	Pressure Gauge	017036
			39	Other valves and attachments at Control Valves	017039
		Washouts	40	Washouts	017040
		Thrust Block	50	Thrust Block	017050
		Others	90	Other facilities relating to attachments on Rising Main Pipes	017090

Table3.8.1d Table of Geographic Feature Catalog (draft): Categories on Water Supply Facilities: Distribution Main (1/2)

Main Categories	Sub Categories	Category	Geographic feature		G.F. Code
			Code		
02 Water Distribution	00	00		General/Unknown Water Distribution Facilities	020000
			00	General/Unknown Distribution Main facilities	021000
	10 Distribution Main Pipes	Transmission Pipes	10	Transmission Pipeline from WTP to Nashirabad / Battali Hill	021010
			20	Distribution Pipelines	021020
			30	Loop over	021030
			90	Other facilities relating to attachments at Main Pipes	021090
			00	General/Unknown Fittings on Water Distribution Facilities	022000
	20 Fittings	Bend	10	Bend	022010
			11	Bend 11.25	022011
			12	Band 22.5	022012
			13	Bend 45	022013
			14	Bend 90	022014
			<del>15</del>	<del>Bend 135</del>	<del>022015</del>
			16	S-Bend	022016
			19	Other facilities relating to attachments at Bend	022019
		20	Tees	022020	
		30	End Cap	022030	
		40	Reducer	022040	
		50	Thrust Block	022050	
		60	Flange Adapter	022060	
	90	Other fittings relating to attachments of Fittings	022090		
	30 Valves		00	General/Unknown Valves on Distribution lines	023000
		Air Release Valve	10	Air Release Valve	023010
		Gate Valve	20	Gate Valve	023020
		Butterfly Valve	30	Butterfly Valve	023030
		Cone Valve	40	Cone Valve	023040
		Pressure Reducing Valve	50	Pressure Reducing Valve	023050
		Fire Hydrant	60	Fire Hydrant	023060
		Washout	70	Washout	023070
		Pressure Gauge	80	Pressure Gauge	023080
		Others	90	Other facilities relating to Valves	023090

Table3.8.1e Table of Geographic Feature Catalog(draft):Categories on Water Supply Facilities: Distribution Main (2/2)

Main Categories	Sub Categories	Category	Geographic feature		G.F. Code	
			Code			
02 Water Distribution	40 Water Distribution Controls		00	General/Unknown Water Distribution Controls facilities	02400	
		District Meters	10	Bulk meters: District Meters	024010	
		Bulk Meters	20	Bulk meters: LMB Meters	024020	
		Others	90	Other facilities relating to Water Distribution Control	024090	
	50 Reservoirs	Reservoirs		00	General/Unknown Reservoirs Facilities	025000
				10	Reservoirs	025010
				11	Pre-sedimentation basin	025011
				12	Reservoirs	025012
			19	Others facilities relating to attachments at facility of Reservoirs	025019	
		Buildings		20	General/Unknown Buildings	025020
				21	Electrical House	025021
				22	Sub-Station	025022
				23	Elevated Tank	025023
				24	Guard House	025024
			29	Other buildings relating to attachments at buildings of Reservoir	025029	
		Others	90	Others facilities relating to attachments at Reservoirs	025090	
	60 Over Head Tanks			00	General/Unknown Over Head Tanks facilities	026000
		Over Head Tank		10	Over Head Tank	026010
		Guard House		20	Guard House	026020
		Other		90	Other facilities relating to Overhead Tanks	026090
	70 Pump stations			00	General/Unknown Pump Stations facilities	027000
		Pump Station		10	Pump Station	027010
		Generator House		20	Generator House	027020
		Guard House		30	Guard House	027030
		Other		90	Other facilities relating to Pump Stations on Distribution Pipes	027090
	80 Culverts and Water Pipe			00	General/Unknown Culvert facilities	028000
		Culvert		10	Culvert	028010
		Water Pipe Bridge		20	Water Pipe Bridge	028010
		Other facilities		90	Other facilities relating to Water Pipe Bridge	028090
	90 Others			00	Other facilities belonging on Water Distribution facilities	029000

Table3.8.1f Table of Geographic Feature Catalog(draft): Categories on Water Supply Facilities: Service Connection

Main Categories	Sub Categories	Category	Geographic feature		G.F. Code
			Code		
03 Service Connection				General/Unknown Water supply facilities on Service Connections	030000
	10 Service meters		00	General/Unknown Service meters	031000
		Domestic meters	10	Domestic meters	031010
		Commercial meters	20	Commercial meters	031020
		Industrial meters	30	Industrial meters	031030
		Institution meters	40	Institution meters	031040
		Others	90	Other meters relating to attachments on Service pipes	031090
	20 Service pipes		00	General/Unknown	032000
		10Service pipes	10	Service pipes	032010
		90Other	90		032090
	30 Valves		00	General/Unknown Valves on Service Connections	033000
		Gate Valve	10	Gate Valve	033010
		Stop Valve	20	Stop Valve	033020
		Check Valve	30	Check Valve	033030
		Other	90	Other valves relating to attachments on Service pipes	033090
	40 Fittings		00	General/Unknown Fittings on Service Connections	034000
		Saddle	10	Saddle	034010
		Taps	20	Taps: Not provided to map	034020
		<i>Short piece</i>	31	<i>Short piece: Not provided to map</i>	<i>034031</i>
		<i>S-Nipple</i>	32	<i>S-Nipple: Not provided to map</i>	<i>034032</i>
		<i>Socket</i>	33	<i>Socket: Not provided to map</i>	<i>034033</i>
		<i>Elbow</i>	34	<i>Elbow: Not provided to map</i>	<i>034034</i>
		<i>Teflon Tap</i>	35	<i>Teflon Tap: Not provided to map</i>	<i>034035</i>
		<i>U-Socket</i>	36	<i>U-Socket: Not provided to map</i>	<i>034036</i>
		<i>H-Nipple</i>	37	<i>H-Nipple: Not provided to map</i>	<i>034037</i>
		<i>Reducer</i>	38	<i>Reducer: Not provided to map</i>	<i>034038</i>
		<i>Tee-Socket</i>	39	<i>Tee-Socket: Not provided to map</i>	<i>034039</i>
		Others	90	Other facilities relating to attachments of Fittings on Service Connection	034090
	50 Attachment		00	General/Unknown Attachment facilities relating to Service Connections	035000
		Sanction pump	10	Sanction pump	035010
		Overhead tanks	20	Overhead tanks	035020
		Lifting Pump	30	Lifting Pump	035030
		Underground Water Storage Tank	40	Underground Water Storage( Not possible to map)	035040
		Others	90	Other facilities relating to attachment on Service Connections	035090
	90 Others		00	Other facilities relating to attachments on Service Connection	039000

Table3.8.1gTable of Geographic Feature Catalog(draft): Categories on Water Supply Facilities: Coverage Area

Main	Sub	Category	Geographic feature		G.F.
Categories	Categories		Code		Code
04 Service Coverage areas				Service Coverage areas operated by CWASA	040000
				Water Supply Service Coverage areas	041000
	10 Water Supply Service Coverage areas	KSA S.C.Areas	10	Service Coverage Areas to be re-constructed by Japanese Economic Cooperation.	041010
		Other S.C.Areas	20	Other Service Coverage Areas out of the KSA area	041020
		Others	90	Other meters on Service Connection	041090
	20 Water Distribution Blocks			Water Distribution Blocks	042000
		Water Distribution Blocks	10	Management units to manage controls of Water Distribution and Operation and Maintenance on Facility Management which is assisted by the KSWP2 Project to establish water supply distribution pipeline networks by Japanese Economic Corporation	042010
		DMA	20	District Meter Areas to manage water distribution controls and monitoring, and Leakage control on NRW Management	042020
		LMB	30	Leakage Management Blocks is an area to manage and to monitor water distribution controls, monitoring, and Leakage Control on Water Distribution and NRW Management	042030
		Service Areas	40	Service areas to maintain facilities for O&M on Water Distribution facilities	042040
	Water Distribution Blocks	Route maps on O&M	50	Route maps on O&M for daily and periodically maintenance	042050
		Zoning maps	60	Zoning maps declined by PANI on Wards wide with consideration of CWASA existing pipeline networks for KSWP1 and KWSP2	042060
		Other area	90	Other Service Coverage areas	043090
	30 Service Coverage		00	Service Coverages	043000
		Sector maps	10	Management units to manage Customer management in Sales and Commercial and customer Services on Ward wise	043010
		Service Areas	20	Service areas to support Operation and management on Customer Services and Customer relation managements	043020
		Service Areas for metering services	30	Service areas to support Operation and management on Customer Services and Customer relation managements	043030
		Route maps on metering services	40	Route maps to support daily activity on Service maps for metering services	043040
		Other areas	90	Other Service Coverage areas	043090
	90 Other areas		00	Other areas relating to management in CWASA operation and business management	049000

## 4. Technology transfer to GIS counterpart

### 4.1 Assignment of counterpart

#### (1) Assignment of counterpart

GIS counterpart in the Second Year became three (3) persons from June, 2015, because of a defection of one (1) person. It was because the working status was not suitable in daily activities.

### 4.2 Technology transfer to counterpart

PANI2 was always requesting to GIS counterpart to master the work through daily activity as follow:

- Updating of GIS data on Service Connection which was mastered in PANI1
- Master of the guideline on Information Management in the NRW Management
- Cross tabulation of the monitoring data in the NRW Management
- Master of basic skill of a database design

Three (3) GIS counterparts have been assigned in PANI since PANI1, but they haven't reached to the ability to become independent as an engineer of GIS and a database. Technology transfer in PANI2 is not assumed for counterparts to forget the contents which they had instructed. Moreover, although a report, a communication, and a consultation which were required for operating achievement have been repeatedly taught to them through daily activity, unless PANI2 forced to request for the report, they do not report their daily activity or their monthly activity independently. The custom not following a rule seems to be social custom.

In order to eliminate psychological dependence of the counterpart from November, 2014, the working system had been switched from the instruction style to the task force style. After it took one (1) year, they were able to correspond to a report against a request.

In the activity of PANI2, the OJT for mastering the fundamental skill of GIS has been instructed to them about updating of pipeline network maps in KSA. This is because the updating of GIS data in the activity becomes their daily work. However, whenever tasks were given to counterparts, the situation they could not their own results had been repeated, so that it wasted huge of times to support their follow up for in their operation exercises. Particularly, GIS counterparts were requested to submit the result of cross tabulation about water consumptions in each area unit for the support of NRW monitoring, which exercise had been instructed from PANI1, but it continued that they could not have achieved any output. It was because they couldn't process the calculation program for monthly data from the Billing data process by themselves.

The follow-up for the calculation process and the tabulation had been repeated in such situations, and they could submit the first output in February, 2016 and it was confirmed that they processed the tabulation for the monitoring by themselves.

In the activity of PANI2, the basic skill of the database design to computerize documents had been instructed to the counterpart from the First Year and one (1) counterpart who could not understand database exercise easily begun to

understand the basics after it passed more than one (1) year after the training-started. Although the counterpart could not be assigned in the preparation of documentation about a database and a system in the previous activities, PANI2 was able to input them in the activity of the Third Year. The present capacity about the activity of GIS counterpart in the Second Year is shown in Table 4.2.1.

### 4.3 Change policy for technology transfer

The operation in PANI2 will be made mandatory as the duty of the personnel from the Third Year.

Although counterparts used to sit on the office desk and only performed the on demand work, they will be forced to achieve all the works on GIS and database in PANI2 from the activity of the Third Year. In the Third Year, the work system of the counterparts will change from the OJT work of the On Demanded style to the real work of the Task Demand style.

Table4.2.1a Present capacity and assessment in GIS counterpart

Item	C/P 1	C/P 2	C/P 3
Duty time and working time in 2015	Arrival time: averagely before 9am	Arrival time: averagely 10am	Arrival time: 10am to 10:30 am
	Duty time: 7 hours	Duty time: 6hours	Duty time: 5:30 to 6:00 hours in time recorder
	Working time: 7 hours	Working time: 6 hours	Working time: 4:00 to 4:30 hours(averagely absence for 1 hour to 1:30 hours in the office
The above in 2016	Same as the above	Same as the above	Arrival time improved before 10 am. Duty time and working time were improved about 6:00 hours
Working altitude and reporting ability(in 2015)	Work altitude: Average and passive	Work altitude: Average and passive	Work altitude: Average and passive
	Sustainability: Average. Possible to be independent. Need to revise trend of personal oriented altitude.	Sustainability: Moderate. Possible to be independent. Possible to evaluate daily efforts	Sustainability: Difficult. Hard to be independent by shortage of understanding because of language. Requires recovery of self-consciousness.
	Report, Communicate and Consult: Possible to perform properly. It was too passive to be week about the impact. Not possible to report without request.	Report, Communicate and Consult: Not possible to perform properly. It was so passive that action and report were able to do, if required. It was a few active reports, but it will be possible to recovery by self-consciousness.	Report, Communicate and Consult: Not possible to perform properly. It was so passive that it was silent if not required and it was no active report
The above in 2016	Same as the above.	Action became active because of self-consciousness in database design.	Altitude was improved by having advanced understanding of database basics, which was switched by Bengali instruction.

Table4.2.1b Present capacity and assessment in GIS counterpart

Item	C/P 1	C/P 2	C/P 3
Documentation capacity (in 2015)	Documentation in English: Averaged.	Documentation in English: Averaged, Speed of understanding is a bit slow, but	Documentation in English: Not practical.

		effort and altitude were evaluation-able.	
	Documentation for manual: Averagely provided.	Documentation for manual: Indefinitely provided. Contents mastering was possible to explain.	Documentation for manual: Not provide. It was not easy to understand and to explain.
The above in 2016	Same as the above	Provided self-consciousness in the work, documentation in English was being challenged.	Advanced understood of work in Bengali, documentation capability was also improved by enlightenment from other personnel.
Understanding of work (in 2015)	Averaged	Averaged. Possible to be independent about mastered things. Capacity is maintained by self-effort.	Not averaged. Hard to fixate training contents. Not confirmed about self-effort
The above in 2016	Same as the above	Activity became active.	The work was understood by follow up in Bengali.
Understanding and action against work order (in 2015)	Averaged Output could be done but action was late and it was lazy to report it.	Averagely. Mastered things were ensured to do it.	Not averaged. Dependency to a third person was too strong to be active action.
The above in 2016	Same as the above	Same as the above. The ensured activity was checked.	Advanced understanding of work, activity was changed with self-consciousness.
GIS capacity in 2015	Data editing and data updating: Average. Tending to avoid real work was strong.	Data editing and data updating: Averaged.	Data editing and data updating: Averaged.
	Data analysis and tabulation: operation is possible, but past training was forgotten and it wasted a time. Practical operation requesting to administrator was required.	Data analysis and tabulation: operation is possible by continuation of training, but past training was forgotten and it wasted a time. Self-independent is possible by repeated exercises.	Data analysis and tabulation: Past training was forgotten and it wasted a time. Self-independent was aimed by fixation of repeated exercises and continuous training.
The above in 2016	Operational instruction was done but practical work was not able to do.	Operation was understood experientially so that fixation was advanced unexpectedly.	Operation was understood experientially but gaps about knowledge and action was not filled by oneself.

Table4.2.1c Present capacity and assessment in GIS counterpart

Item	C/P 1	C/P 2	C/P 3
Database design capacity in 2015	Design capacity: Averaged. It took time to prepare concrete output.	Design capacity: Understanding on basic level was advances. Self-effort was evaluated. It is possible to strengthen capacity through real work.	Design capacity: Basic level was not understood. Self-effort was not confirmed. It was hard to build capacity. Suitability as operator was taken care.
The above in 2016	Same as the above. It was no awareness about administrator.	Independent ambitious was confirmed by action by improvement of understanding.	Basic understanding of the design was started because of the trigger off in other staff.
Practical capacity of operation in 2015	It was averaged as SAE. Operation of Database and GIS was more than averaged. Design capacity and development capacity was week. Practical experience was required.	It was averaged as SAE. Operation of Database and GIS was averaged. Design capacity and development capacity was week. Practical experience was required in the future	It was not averaged as SAE. Suitability was operator but the operation of Database and GIS is more than averaged. Design capacity and development capacity were issues to the future.
The above in 2016	Same as the above	It was confirmed to provide with practical capacity by efforts unexpectedly.	It was confirmed to provide with practical capacity in the routine works unexpectedly.
Management capacity of work in 2015	Work experience was provided before joined CWASA but work performance was averaged.	Practical work was experienced in PANI but work performance was not in definitive.	Practical work was experienced in PANI but work performance was passive and small.
The above in 2016	Same as the above. It was possible to deal with work management and quality control. The leadership and the management capacity to staffs were questionable. Overall management capacity of system and operation were averaged. It was required to perform the practical oriented work.	Same as the above. It was possible to deal with work management and quality control. It was expecting to perform the instruction and the management to genders.	Same as the above. It was possible to deal with work management and quality control. It was expecting to improve capacity to the future by continuations of follow-up with patience.



# Photos on PANI-2 Activities



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	JICA representative along with CWASA's Managing Director.
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	The Audiences
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	CWASA's Managing Director delivered his speech.
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	JICA Representative Delivered his speech on different kinds of project.
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	JICA Representative Presented
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	JICA Representative Presented
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	The team leader Hiroyama san of PANI-2 described all things related to all projec of CWASA.
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	Mr. David presented the Overview and Implementation status of
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	The Audience Giving pose for Photo shoot during break time.
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	JOCV Nishida San delivered a beautiful presentation on Community Development
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	CWASA's MD and JICA representative did exercise with Chol chol along JICA overseas Volunteer.
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	Seminar on 'On-Going water supply project of CWASA'
Description	All PANI members
Venue	Hotel Agrabad Chittagong
Date Taken	2015/Sep/12 (Sat)



Photo Title	workshop for CWASA personnel
Description	PANI Team Leader Hiroyama San starting the workshop by Briefing the Moto of workshop.
Venue	CWASA Conference Room
Date Taken	2015/Sep/13 (Sun)



Photo Title	workshop for CWASA personnel
Description	The Audiences
Venue	CWASA Conference Room
Date Taken	2015/Sep/13 (Sun)



Photo Title	workshop for CWASA personnel
Description	CWASA's Assistant Engineer Ms. Keya delivered her presentation on Leakage control and NRW of Fukuoka Japan.
Venue	CWASA Conference Room
Date Taken	2015/Sep/13 (Sun)



Photo Title	workshop for CWASA personnel
Description	CWASA's Assistant Engineer Ms. Saima delivered her presentation on Leakage control and NRW of Fukuoka Japan.
Venue	CWASA Conference Room
Date Taken	2015/Sep/13 (Sun)



Photo Title	workshop for CWASA personnel
Description	Mrs Wa Wa from MCWD disseminated the knowledge of
Venue	CWASA Conference Room
Date Taken	2015/Sep/13 (Sun)



Photo Title	workshop for CWASA personnel
Description	Mr. Noel also disseminated their(Philippines) water supply
Venue	CWASA Conference Room
Date Taken	2015/Sep/13 (Sun)



Photo Title	Device Operation Training
Description	Basic lecture on Device operation
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Listening Rod operation training on service connection
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Leak detector operation training
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	lecture on leak detector
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Leakage detection training
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	leakage detecting by using leak detector
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Metal pipe locator operation training
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Metal pipe locating by using metal pipe locator
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Lecture on Ultrasonic Flow meter
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Fixing sensors on PVC pipe
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Data entry on ultrasonic flow meter
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Device Operation Training
Description	Measuring flow by ultrasonic flow meter
Venue	CWASA Training Center
Date Taken	2016/Jan/01 (Fri)



Photo Title	Certificate award Ceremony
Description	MD sir and DMD's along with PANI team leader and others
Venue	
Date Taken	2016/Jan/01 (Fri)



Photo Title	Certificate award Ceremony
Description	MD sir and DMD's along with PANI team leader and others
Venue	
Date Taken	2016/Jan/01 (Fri)



Photo Title	Certificate award Ceremony
Description	MD sir was the chief guest in certificate giving ceremony
Venue	
Date Taken	2016/Jan/01 (Fri)



Photo Title	Certificate award Ceremony
Description	MD sir Distributed the certificates among the CWASA staffs.
Venue	
Date Taken	2016/Jan/01 (Fri)



Photo Title	Certificate award Ceremony
Description	MD sir Distributed the certificates among the CWASA staffs.
Venue	
Date Taken	2016/Jan/01 (Fri)



Photo Title	Certificate award Ceremony
Description	MD sir Distributed the certificates among the CWASA staffs.
Venue	
Date Taken	2016/Jan/01 (Fri)



Photo Title	Corporate Management Workshop
Description	JICA Expert Mr. Oniki San started his presentation on how to manage the Check sheet.
Venue	CWASA Conference Room
Date Taken	2015/Sep/14 (Mon)



Photo Title	Corporate Management Workshop
Description	Supervision Engineer Mr. Mondal presented on water Distribution facilities.
Venue	CWASA Conference Room
Date Taken	2015/Sep/14 (Mon)



Photo Title	Corporate Management Workshop
Description	CWASA Sub Assistant Engineer Mr. Shahidul presented on Water distribution facilities.
Venue	CWASA Conference Room
Date Taken	2015/Sep/14 (Mon)



Photo Title	Corporate Management Workshop
Description	CWASA Sub Assistant Engineer Mr. Shahidul presented on Water distribution facilities.
Venue	CWASA Conference Room
Date Taken	2015/Sep/14 (Mon)



Photo Title	Corporate Management Workshop
Description	Supervision Engineer Mr. Mondal presented, location of air valve.
Venue	CWASA Conference Room
Date Taken	2015/Sep/14 (Mon)



Photo Title	Corporate Management Workshop
Description	Providing certificate to CWASA trainee after completion of workshop.
Venue	CWASA Conference Room
Date Taken	2015/Sep/14 (Mon)





Photo Title	Corporate Management Workshop
Description	Mondal San showed the free body diagram of Gate valve.
Venue	CWASA Conference Room
Date Taken	2016/Jan/03 (Sun)

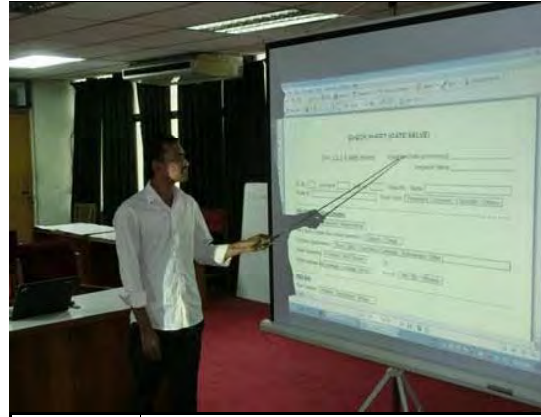


Photo Title	Corporate Management Workshop
Description	One of CWASA's trainee practiced Presentation
Venue	CWASA Conference Room
Date Taken	2016/Jan/03 (Sun)



Photo Title	Corporate Management Workshop
Description	One of CWASA's trainee practiced Presentation
Venue	CWASA Conference Room
Date Taken	2016/Jan/03 (Sun)



Photo Title	Corporate Management Workshop
Description	One of CWASA's trainee practiced Presentation
Venue	CWASA Conference Room
Date Taken	2016/Jan/03 (Sun)



Photo Title	Corporate Management Workshop
Description	Mr. Afser was doing his presentation
Venue	CWASA Conference Room
Date Taken	2016/Jan/03 (Sun)



Photo Title	Corporate Management Workshop
Description	Discussion time
Venue	CWASA Conference Room
Date Taken	2016/Jan/03 (Sun)



Photo Title	Construction of service line and meter reading
Description	Supervision Engineer Mondal San oriented this program
Venue	CWASA conference room
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of service line and meter reading
Description	Supervision Engineer Mondal san started presentation
Venue	CWASA conference room
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of service line and meter reading
Description	Supervision Engineer Mondal san continued his presentation
Venue	CWASA conference room
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of service line and meter reading
Description	The last phase of Supervision Engineer Mondal san's presentation
Venue	CWASA conference room
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of Service pipe and Meter Reading
Description	Supervision Engineer Mondal Presented on awarness of meter
Venue	CWASA Conference room.
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of Service pipe and Meter Reading
Description	CWASA plumber practiced the presentation in review session.
Venue	CWASA Conference room.
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of Service pipe and Meter Reading
Description	CWASA plumber practiced the presentation in review session.
Venue	CWASA Conference room.
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of Service pipe and Meter Reading
Description	The Audiences
Venue	CWASA Conference room.
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of Service pipe and Meter Reading
Description	Supervision Engineer Mondal Presented on awarness of meter installation
Venue	CWASA Conference room.
Date Taken	2016/Jan/01 (Fri)



Photo Title	Construction of Service pipe and Meter Reading
Description	Supervision Engineer Mondal was giving some directions on how to present
Venue	CWASA Conference room.
Date Taken	2016/Jan/01 (Fri)



Photo Title	Overseas Training in MCWD
Description	Kick of meeting at MCWD office.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/13 (Wed)



Photo Title	Overseas Training in MCWD
Description	Presentation of MCWD outline.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/13 (Wed)



Photo Title	Overseas Training in MCWD
Description	Overview of water supply management.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/13 (Wed)



Photo Title	Overseas Training in MCWD
Description	Lecture of water quality, water safety plan.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/13 (Wed)



Photo Title	Overseas Training in MCWD
Description	Presentation of water production.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/13 (Wed)



Photo Title	Overseas Training in MCWD
Description	Presentation of service connection and disconnection.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/14 (Thu)



Photo Title	Overseas Training in MCWD
Description	MCWD inventory store visiting.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/15 (Fri)



Photo Title	Overseas Training in MCWD
Description	MCWD water meter testing facility.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/15 (Fri)



Photo Title	Overseas Training in MCWD
Description	Visiting Monterrazas reservoir.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/15 (Fri)



Photo Title	Overseas Training in MCWD
Description	MCWD water quality testing laboratory.
Venue	Cebu City, Philippines
Date Taken	2016/Apr/15 (Fri)



Photo Title	Overseas Training in MCWD
Description	Report to JICA regarding technical subject.
Venue	JICA Bangladesh Office
Date Taken	2016/Apr/18 (Mon)



Photo Title	Overseas Training in MCWD
Description	Report to JICA regarding financial subject.
Venue	JICA Bangladesh Office
Date Taken	2016/Apr/18 (Mon)