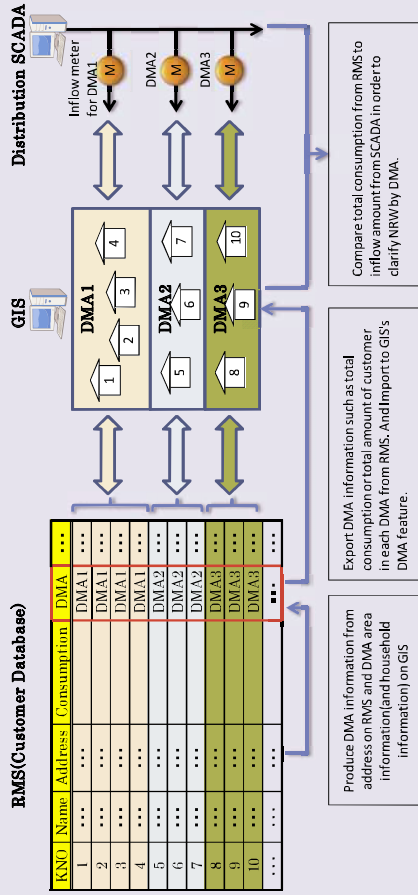


## Development of customer information in each DMA for the NRW management

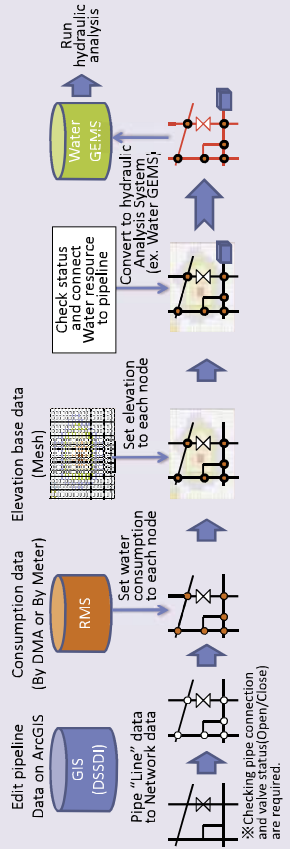


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## Advanced application of GIS system

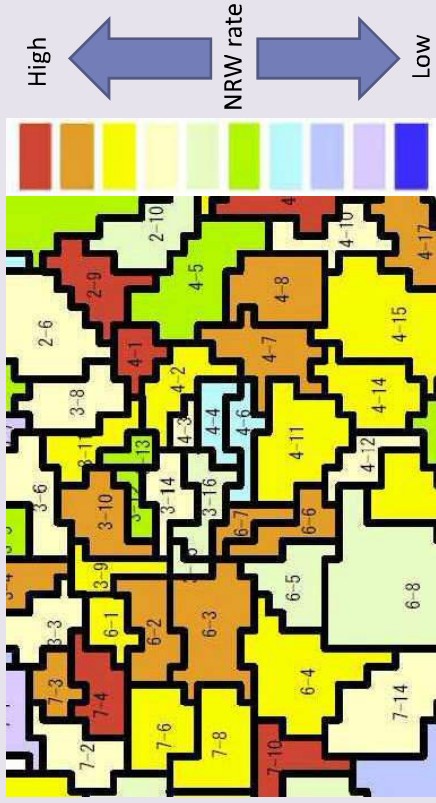
### Development of pipeline network model for hydraulic analysis by using GIS data

- To simulate pressure and water flow distribution, and direction of water flow.
- To optimize newly added pipeline design.
- To control water distribution with Distribution SCADA.



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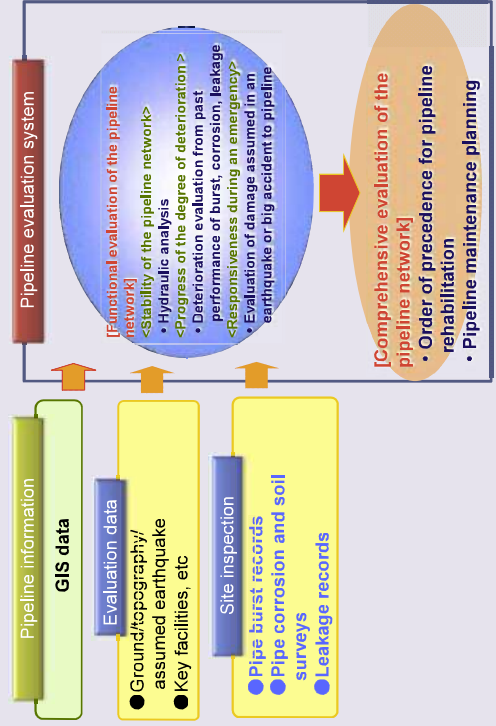
## Example of color code by NRW rate in each DMA



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## Advanced application of GIS system

### Pipeline Evaluation System ( for asset management)

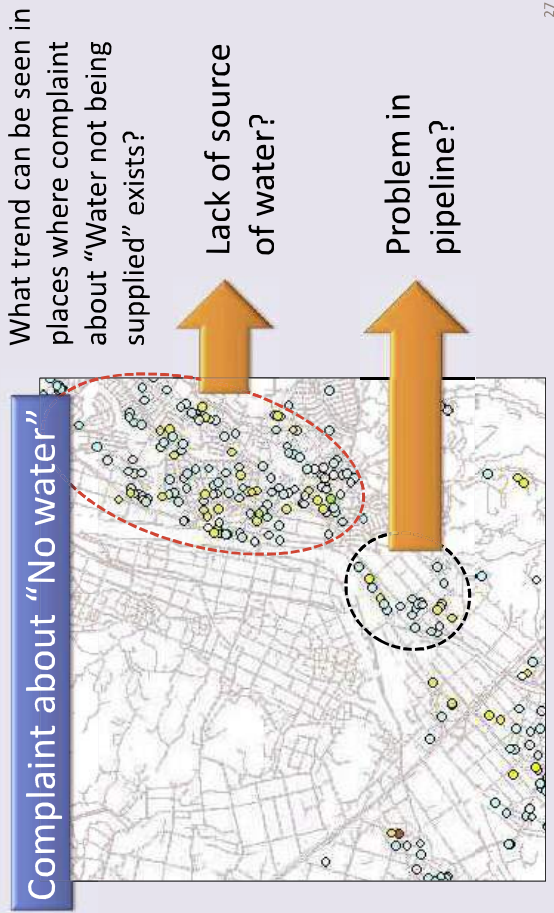


24

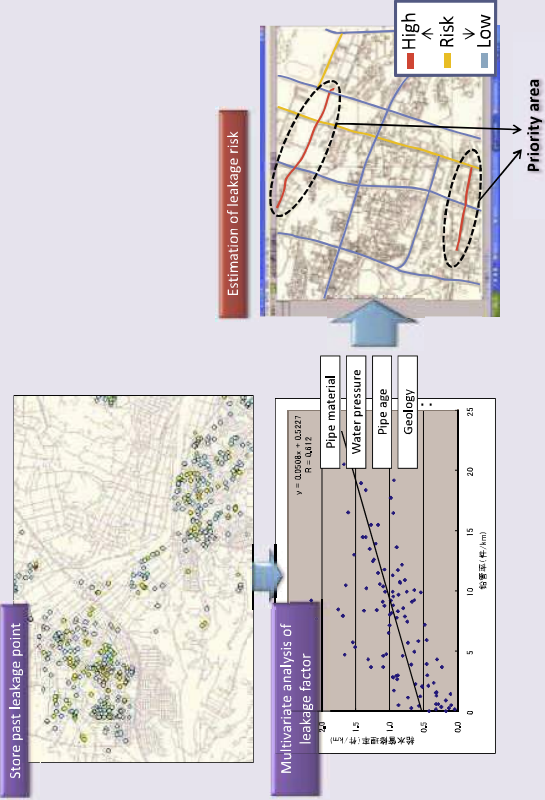
# Advanced application of GIS system

Planning, Designing, Operation & Maintenance and upgrading of service by using GIS

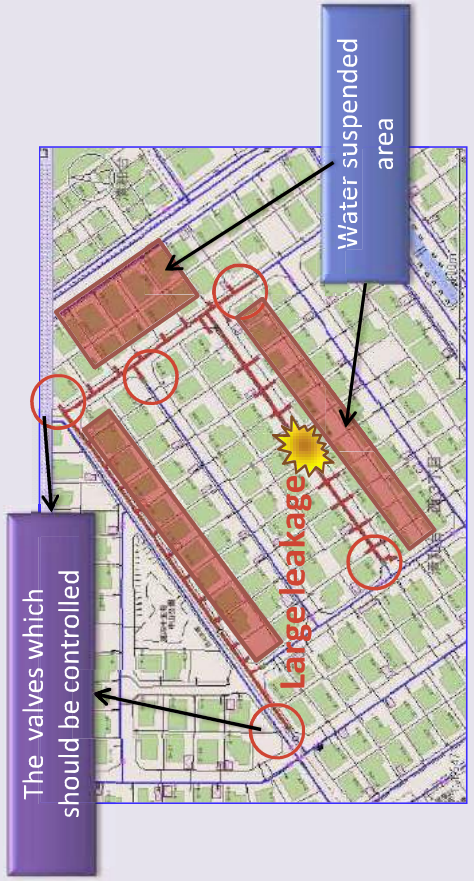
To improve counter measures taken against water shortage



To improve the result of leakage prevention work



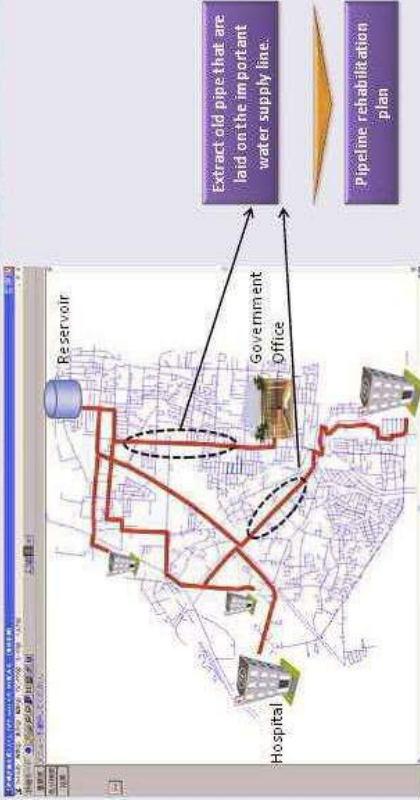
To minimize the influence of water supply suspension & To improve the water supply service quality





## Extract the important pipeline

Extract water routes to the important facilities that should be ensured water supply on a large scale disaster or some accident



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## Asset management (Facility renewal plan) by using GIS

- Development of thematic drawings by GIS
- Development of facility renewal plan

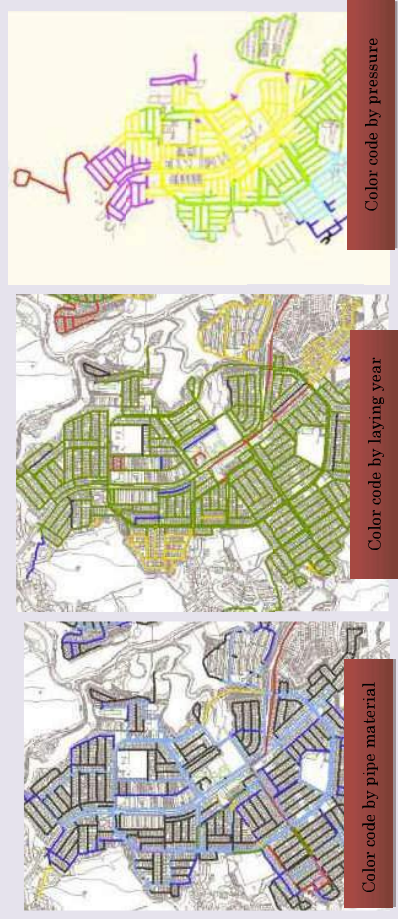
31

## To improve work-efficiency and accuracy of meter reading work by using GIS/RMS



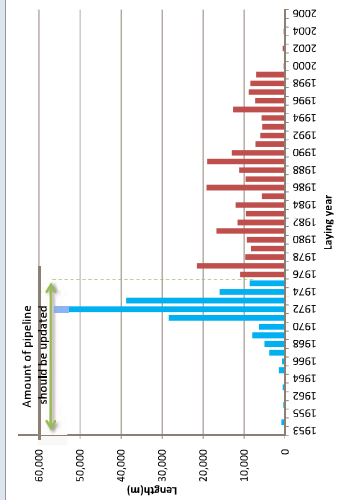
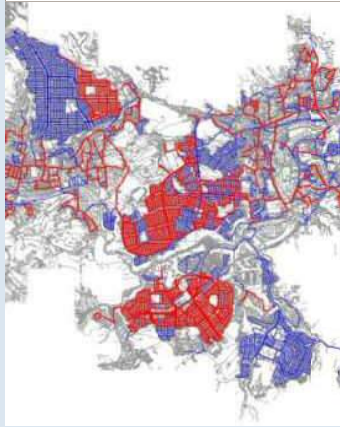
30

## Development of thematic drawings by GIS



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## Development of facility renewal plan



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## Proposed GIS scope for Yen Loan Project

- **Developing of GIS data**
  - DB structure of GIS,
  - WTP/UGR/BPS/TW data, customer information in each DMA,
  - Service pipe information in GIS
- **Introduction of new system**
  - Web-GIS
  - Mobile-GIS
  - GIS filing system
  - Hydraulic analysis system
- **Soft component**
  - external experts to introduce GIS and train DIB staff.

# THANK YOU

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9

# The report on the efforts of daily inspections in Chandrawal WTP

R.D. Yogi, AE (E & M)  
Delhi Jal Board  
Yoichi Yamamoto  
JICA Expert

1

## The Purpose of Daily Inspection

- To Prepare “Asset Management Practice”
- To accumulate records and utilize them for repair and replacement works effectively
- To grasp normal situation and find unusual condition of each equipment quickly
- To establish daily maintenance habit

2

## Daily inspection in Tokyo

### Daily inspection in Tokyo (Overview inspection of pump)



3

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1

## Daily inspection in Tokyo (Check by touching the pump)



5

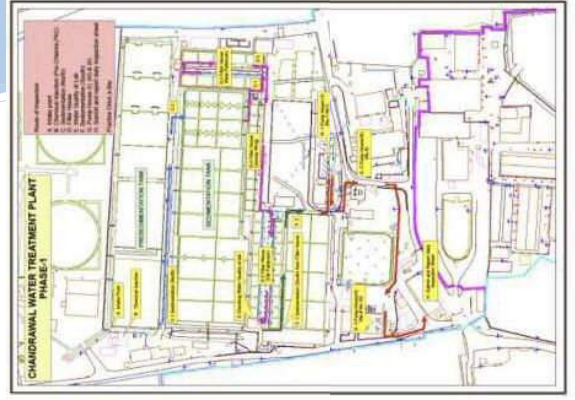
## Daily inspection in *Chandrawal WTP*

6

## The Inspection Route

Prepare daily Inspection Route

- Follow the process of water treatment from receiving well to transmission pump house totally
- Carry out daily maintenance one time a day



7

## Pre-Practice of Daily Inspection

- Conducted 3 times a week of single month of February
- Check the inspection route (if you can see the entire water purification plant, efficient inspection routes etc.)
- Fill out the inspection sheet
- Improvement of inspection sheet (if there is improvement in entry field)

8

2



## Sedimentation basin, check of filtration pond



- Check item
- Water level
  - Foreign matter floating
  - Turbidity

9

## Settling pond, check the attached equipment of filtration pond



- Check item
- Pump, valve, pressure gauge, flow meter, piping, etc.
  - Building, building ancillary facilities, etc.
  - Information collection for the repair planning, etc.

10

## Overview inspection pump



- Check item
- Noise
  - Pressure
  - Water leakage
  - Temperature

11

## Status check of pump



- Check item
- Noise
  - Temperature
  - Discharge pressure
  - Vibration

12 3

## Prepare maintenance sheet

- Record the condition of tank (water level, oil film, suspended solid, etc.)
- Record the condition of equipment (appearance, damage, unusual noise, nasty smell)
- Record the numerical value of thermometer, pressure gauge and flow meter etc.
- Save a sheet and share the result of daily inspection among the maintenance staff

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## Exit after putting a comment on inspection results

- Point
- understanding of the normal state and abnormal state
  - providing information to shift workers (evening workers)
  - report inspection results to the boss

The image shows a detailed maintenance sheet form with various columns for recording inspection data. A red circle highlights a specific section labeled 'Comment' at the bottom right of the form. A red arrow points from the word 'Comment' in the text above to this highlighted section.

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## Benefits of inspection

- Early detection of damage points
- Operation changes to the alternative equipment (avoidance of water treatment plants stop by equipment failure)



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## Findings and Future Challenges

### Findings in the Pre inspection

- Inspection time is about 1 hour
- During inspection, building including civil structures where you think that the danger is also recognized
- Maintenance staff has high inspection consciousness (need of repair, improvement proposals, etc.)

### Future tasks

- Deployment of other water treatment plant (corresponding to a new water treatment plant)
- How to repair and inspection results, and how to reflect the updated plan
- Inspection results based on budget ensure to emergency repairs, etc. (If there is no alternative equipment)
- Technical transfer

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# Prepare Renewal cycle plan

## Purpose

Mechanical and electrical of waterworks facilities are essential and important equipment to supply stable tap water. In order to maintain the function of equipment, the inspection and repair work are executed at all times. But even if repair and exchanging of failure parts are carried out, failure rate might be increased with operating time. And also, it would be difficult to find failure parts and repair technical aspect. As a result, countermeasure might be late and expand the damage.

- To minimize the impact of equipment failure, more effective repair and updating of old waterworks facilities
- By setting the durability period for waterworks facility is kind of measure of more effective and efficient renewal.

Thank you for your attention

Equipment	Name	Japanese standard and experience		CPHEEO Standard	Chandrayal W/P Experienced	DIB Renewal Cycle
		Asset durability period	Renewal Cycle			
ELECTRICAL	Oil Transformer	20	30~40		30~40 New installation No information	
	Dry type transformer	20	30~40			
	Special high voltage	20	25~30			
	High Voltage board	20	25~30			
	Low Voltage board	20	20~25			
	AC uninterruptible power supply	6	15~17		Not in use	
	DC power supply	6	15~17		Not in use	
	Liquid resistor	20	30~40		15~20	
	Main electrical motor	15	30~40		20~25	
	Generator	15			Not in use	
	High voltage cable	20	20~30		Not in use	
	Monitoring board	10	12~20		Not in use	
	Control computer	10	12~20		Not in use	
	Impulseoutput controller	10	12~20		Not in use	
	Flow meter	10	15~25		5~	
PUMP	Intake and conveyance pump	15	30~40	15	No information	
	Injection pump and backwash pump	15	30~45	15	30~	
	Backwash pump	15	35~45	15	60~70	
	Flow meter	17	25~30		10	
	Flasculator	17	25~30		10~15	
MECHANICAL EQUIPMENT	Crane	17	25~40		Not in use	
	Blower /air exhaust ventilator	17	17~20		60~70	
	Chlorine storage	10	as occasion demands		Cylinder type	
	Chlorine injector	10	15~20		Not in use	
	Chlorine removal	10	10~15		New installation	
	Chemical storage (others)	15			No information	
	Chemical injection pump	15	15~20		CIVIL Structure	
	Chemical injection equipment (pipe, valve etc)	15	15~20		50~	
		15	15~20		5~10	

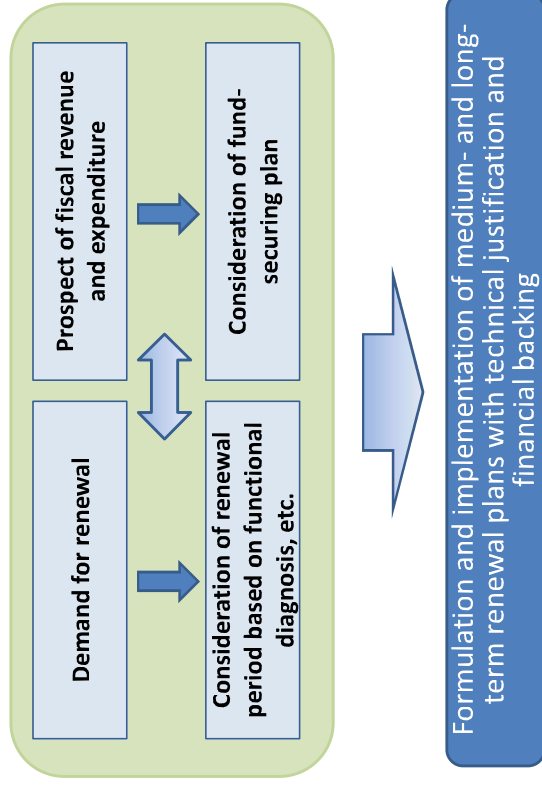
# Contents

## Efforts of Asset Management at the Bureau of Waterworks, Tokyo Metropolitan Government - Database and Renewal Plan -

Tomoyuki Tanimoto  
Director, Water Supply Section  
East Area 1st Branch Office  
Bureau of Waterworks  
Tokyo Metropolitan Government

1

### 1. Purpose of adopting AM

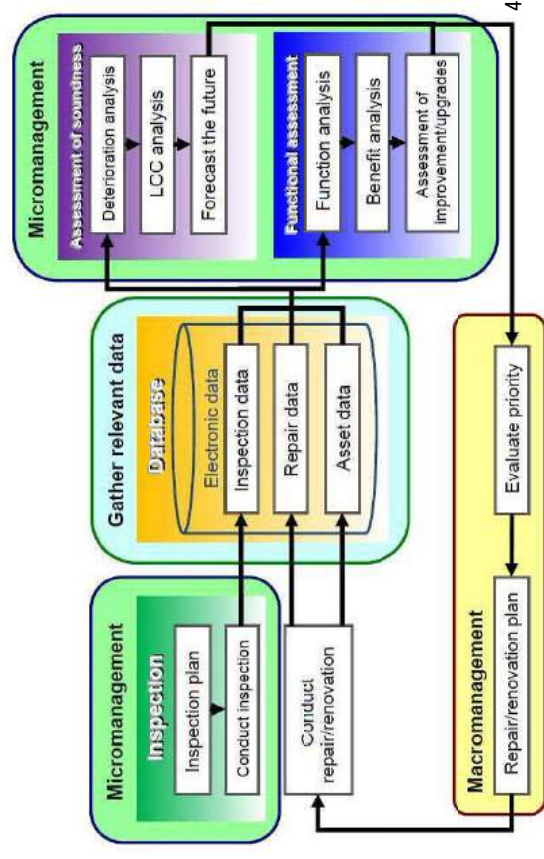


3

1. Overview of asset management
2. Efforts at the Bureau of Waterworks, Tokyo Metropolitan Government
  - (1) Concrete structures
  - (2) Pipelines
3. Three principles necessary for asset management

2

### 1. AM system



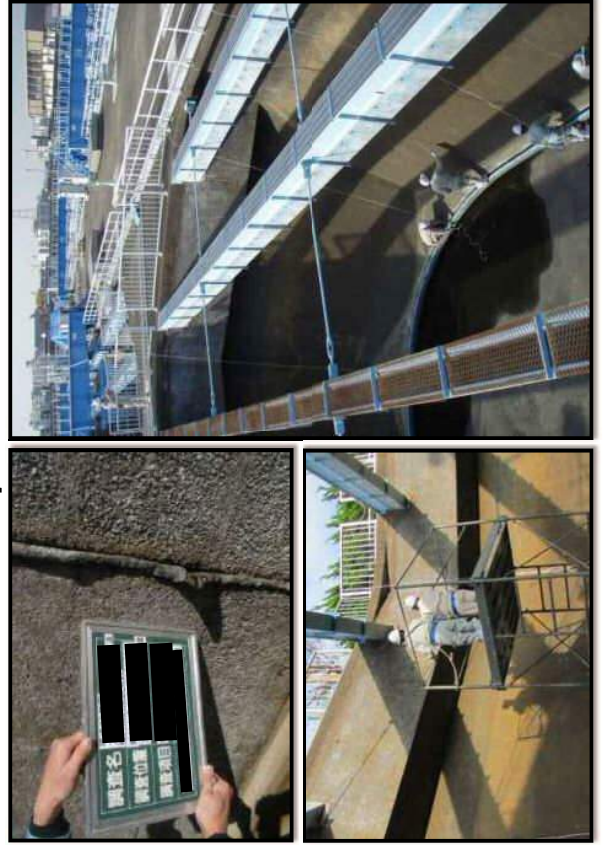
1

## 1. Construction condition of database

Item	Classification in Tokyo	Civil structure (Concrete)	Pipelines	Facilities
Asset ledger	Asset data	○ (Electronic)	○ (Electronic)	○ (Electronic)
Facility ledger		× (Implementation) Digitization	○ (Mapping)	○ (System)
Maintenance and management data	Repair data	△ (Paper) → Digitization	○ (Mapping)	○ (System)
Inspection data	Inspection data	× (Implementation) Digitization	△ (Paper) → Digitization	○ (System)
Diagnosis result		× (Implementation) Digitization	△ (Paper) → Digitization	△ (Pump)
Financial data		—	—	—

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## 2. (1) Implementation status of the inspection



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## 2. (1) Contents of inspection (concrete structure)

Inspection name	Examination method	Inspection items	Criteria
Regular inspection	Detailed examination (Quantitative evaluation) Grasp the deterioration state quantitatively	<ul style="list-style-type: none"> <li>▪ Deterioration state</li> <li>▪ State of joints</li> <li>▪ Neutralization depth</li> <li>▪ Compressive strength</li> </ul>	Evaluate the degree of deterioration on a 5-point scale (A to E)
Intermediate inspection	Simplified examination (Qualitative evaluation) Grasp the deterioration state qualitatively	<ul style="list-style-type: none"> <li>▪ Deterioration state</li> <li>▪ State of joints</li> </ul>	
Simplified inspection	Grasp the number of damaged and leakage points	<ul style="list-style-type: none"> <li>▪ Deterioration state</li> </ul>	

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## 2. (1) Evaluation of inspection results (cracks)

Evaluation value	Criteria	
	Detailed examination (Crack density (Value))	Simplified examination (State)
A	Not exceeding 0.01m/m <sup>2</sup>	No crack
B	0.01 – Not exceeding 0.03m/m <sup>2</sup>	No leakage or free lime
C	0.03 – Not exceeding 0.25m/m <sup>2</sup>	Contains Free lime
D	0.25 – Not exceeding 0.50m/m <sup>2</sup>	Slight leakage
E	0.50m/m <sup>2</sup> or more	Water flowing out of the cracks

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2



## 2. (1) Inspection record (component)

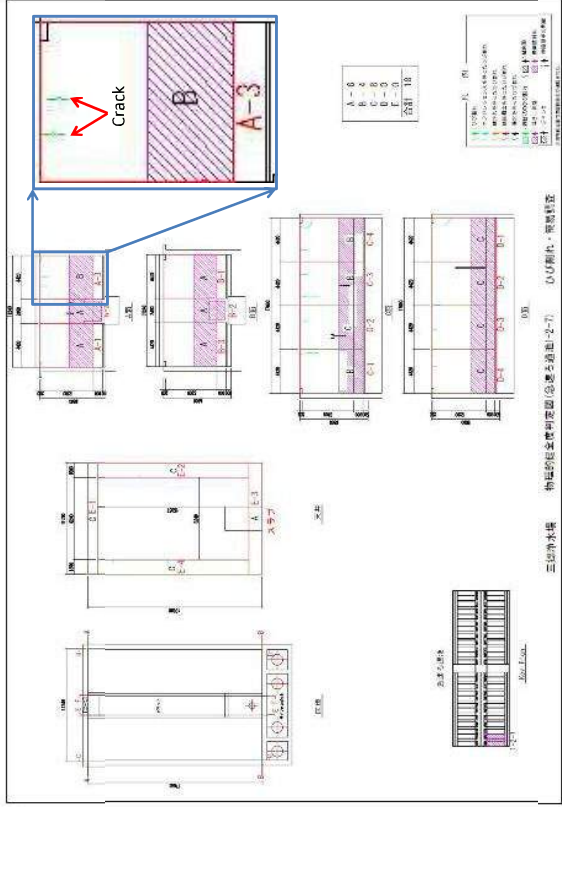
【Enlarged part of recording form】  
Component: Basin, Group-2, №4 Wall surface  
A-side

Details of deformation: 0.2mm-wide x 4600mm-long crack on liquid phase part

Evaluation: C

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## 2. (1) Inspection record (structure)



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## 2. (1) Inspection record (facility)

Evaluation of the facility as a whole

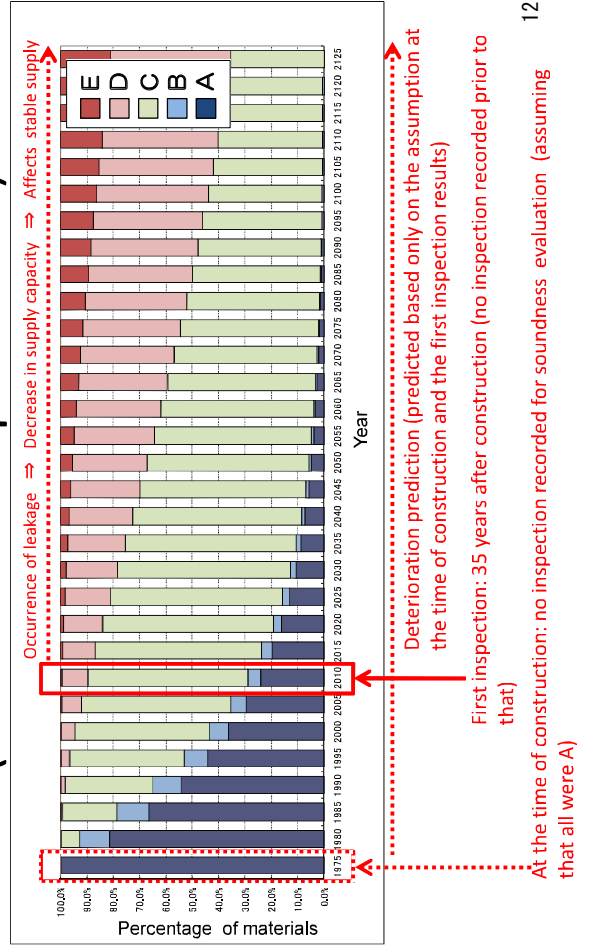
部位	評価区分	割合
A	81 (68.6%)	
B	37 (31.4%)	
C	0 (0%)	
D	0 (0%)	
E	0 (0%)	
合計	118	
評価値	B	

Consideration (example)

- The cracks on the repair mark were caused by the difference in dry shrinkage rates.
- The identified cracks occurred mainly in surface finishing, caused by initial dry shrinkage...

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## 2. (1) Soundness evaluation (deterioration prediction)



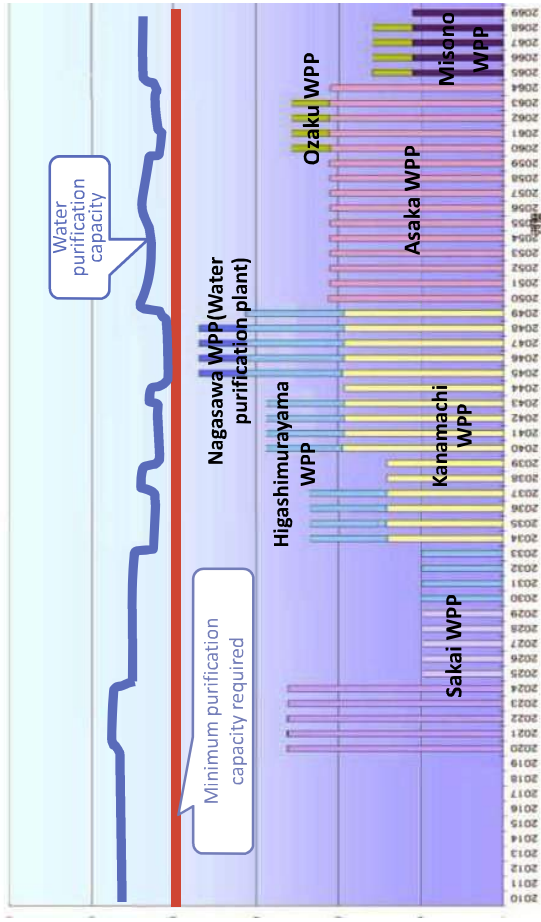
12 3

## 2. (1) Functional evaluation (example)

Classification (example)	Diagnostic item (example)	Grasp of existing functions (example)
Purification performance	Maximum purification amount per day	Actual conditions of capacity deterioration
Total capacity of facilities	Maximum actual purification capacity	
Quality of purified water	Indexes	Actual conditions of current measures against water deterioration, etc.
Operation management	Purification cost	
Operation management	Electric power consumption	Actual conditions of energy efficiency
Earthquake resistance	Earthquake resistance diagnosis results	
		Necessity for earthquake-resistant measures

13

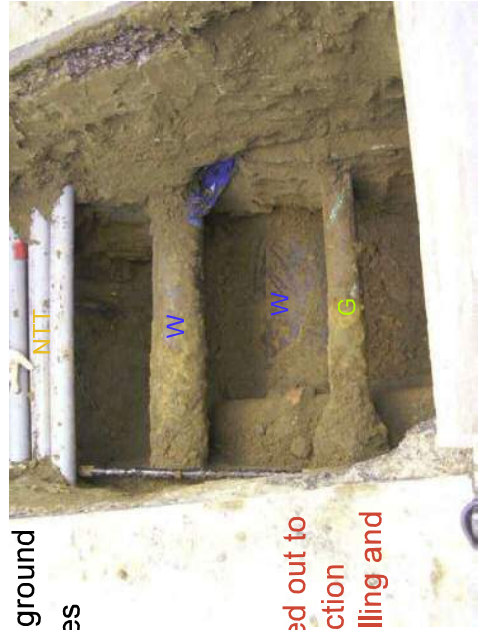
## 2. (1) Formulation of renewal plan (image)



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## 2. (2) Characteristics of pipelines

- Pipelines (about 26,000km) constitute a majority of the existing water supply facilities.
- Their regular inspections and examinations are difficult.
  - Buried in the ground
  - Pressure pipes



**Inspections are carried out to coincide with construction works that involve drilling and water stoppage.**

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## 2. (2) Details of inspection

- Conducted as part of the entrusted maintenance management operations (conducted by TSS)
- The state of aged deterioration of pipelines is checked in detail.
- Pipelines of which water supply is stopped due to replacement or maintenance work are subject to inspection (sampling).

Surveyed items	Details of survey
Specifications of pipelines	Bore diameter, pipe type, joint, etc.
External survey	Corrosion, pitting corrosion, coating condition, bolt condition etc.
Internal survey	Corrosion, neutralization, seal coating, lining, etc.
Soil survey	Specific resistance, pH value, etc.
Laying condition	Railways, road traffic, etc.

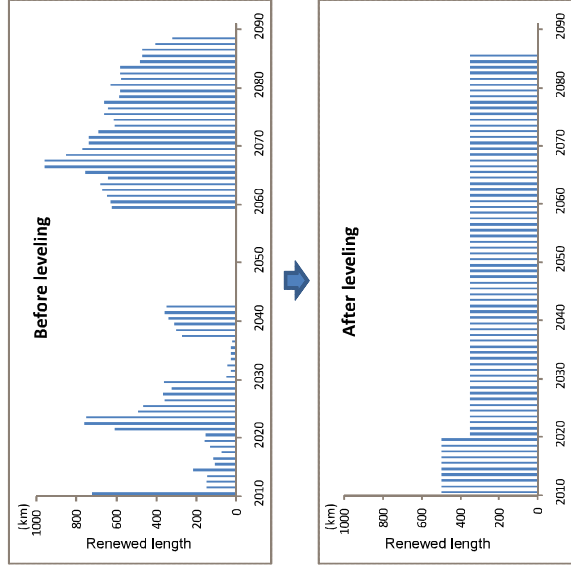
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## 2. (2) Formulation of renewal plan (image)



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## 3. Three principles necessary for asset management

- ① Daily inspection and establishment and renewal of database
- ② Analysis of database and promotion of consistency with financial aspects
- ③ Securing and developing human resources to conduct inspections

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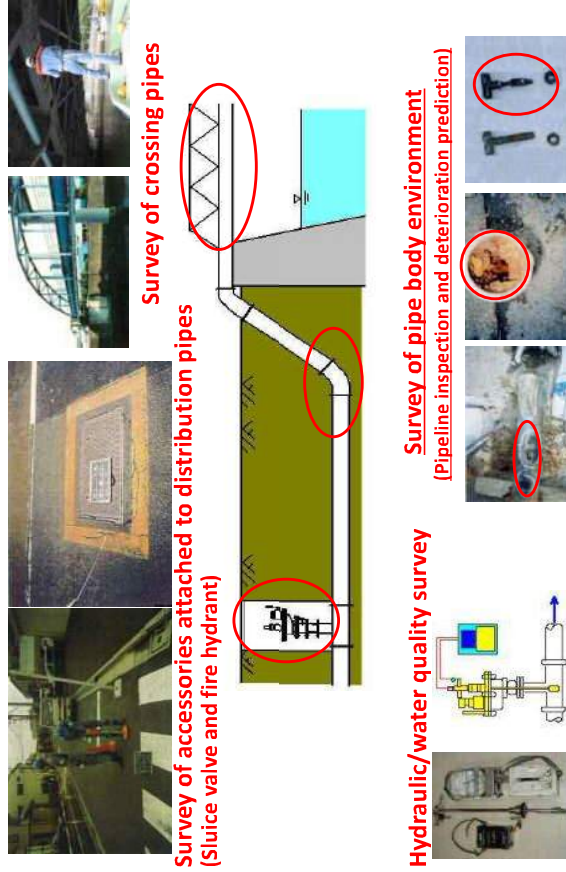
6

## 2. (2) Database of mapping system

Sub-layer name	Distribution_small pipe
Name	Attribute value
Drawing number	272374
System key number	5450955
Completion drawing category	available drawing
Micro number	11173000007
Construction number	1700501
Installation year	2010
Diameter unit category	mm
Diameter (mm)	350
Diameter (m.)	FCD [NS]
Material joint	None
Special part	No construction
Small-scale construction	Pipe joint coating
Polyethylene sleeves	0m
Registered length	0m
Tama index number (SUB1)	Distribution small pipe
Important line category	Important line
Shallowly-buried pipe	Normal
Distribution pipe sequence number	78
Calculated length	260.550m

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## 2. (2) Other inspections/surveys



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It's best to promote database  
construction, human resources  
development and asset  
management in an integrated  
manner!

**Thank you for your attention.** <sup>25</sup>