Main Category	Asset Management and Facility Renewal
Sub Category	Mapping System

Most of the water pipes in Japan were laid during the period of rapid economic growth in the 1960s and 1970s, and now, over 40 years after being laid, they are due for replacement. On the other hand, since it is not easy to replace water pipes, it is necessary to renew them in a planned manner. Under these circumstances, mapping systems are playing an important role in getting accurate information early on the condition of water pipelines.

1. What is a mapping system?

A mapping system allows an electronic management of water pipeline and other related drawings along with their important information (e.g. pipe material, diameter, year of construction, and ground classification) in an integrated manner.

Basic Function 1: simulation of service interruption

- used for simulating the impact of service interruption during planned construction work

Basic Function 2: analysis of pipe network

- used for reconsidering the configuration of water distribution systems

1. Features of a mapping system

- The mapping system can be used in various occasions, such as customer service, emergencies, and pipeline renewal planning.
- It is an information infrastructure that can be used by a large number of employees
- Security functions taking into account the handling of personal information
- High scalability and inheritance of data assets

3. Optional functions

(1) Mapping mobile terminal (Saitama City Waterworks Bureau)

- Mobile terminals can be taken out to the field and used during emergency response.

(2) Two types of interfaces (Osaka Water Supply Authority)

- Two types of interfaces are available to meet user needs while having the same registered information.
  - Detailed interface with multiple functions
  - Simple interface for functions necessary for daily operations

(3) Earthquake damage prediction -Part 1- (Public Enterprises Agency, Kanagawa Prefectural Government)

- Used for planning water transmission and distribution pipe replacement, seismic reinforcement, and anti-disaster planning.
- The rate of earthquake damage to pipelines is calculated using as parameters the pipe

material and diameter from the GIS as well as the additional information on the seismic motion, ground, liquefaction of anticipated earthquakes

(4) Earthquake damage prediction -Part 2- (Chiba Prefectural Public Enterprises Bureau)

- By entering the information on the anticipated epicenter of earthquakes, it is possible to assume damage to the pipe network during that earthquake.

(5) Support system for selecting which pipelines to renew (Chiba Prefectural Public Enterprises Bureau)

- To support the planning of pipeline renewal projects, the mapping system can be used to identify pipelines to be renewed based on the locations of historic red turbid water, corrosion status of pipelines, and other information such as which pipelines should be prioritized for renewal for their importance.

(6) Accident response support (Water and Sewer Bureau, City of Kitakyushu)

- Each department in charge of responding to an accident can enter information into the mapping system, such as the location of the accident, the cause, condition of the pipelines, damage, number of service disruptions, public relations activities, emergency water supply, progress of restoration work, and the restoration method.

(7) Search for properties occupied by other utilities (Bureau of Waterworks, Tokyo Metropolitan Government)

- This function allows users to search for and get information on the buried properties of other utilities.

4. Data management

(1) Saving information at different points in time (Osaka Water Supply Authority)

➢ Registration of facility renewal history

- When a facility is renewed or updated in some way, the information is not overwritten but saved as a history so that it can be referred to later on when necessary.

➢Version management of the registered information

- By saving the entire registered information when updating the mapping system, the status of the entire pipeline at any given time in the past can be referred to later on.

(2) Filing linkage function (Public Enterprises Agency, Kanagawa Prefectural Government)

① By integrating various drawings information and closely linking it to the GIS system, related materials can be easily searched.

② Even large amounts of drawings data can be filed efficiently.

③ Important information can be safely protected by access restrictions.

(3) Publication of water pipeline management charts (Bureau of Waterworks, Tokyo

Metropolitan Government)

➢This function allows users to check the information of water distribution pipes, [illegible] pipes, water meters, etc. on the Internet.

*This function can be used by designated businesses and building contractors who have allotted IDs and passwords.

*Personal information and important facilities cannot be viewed.

(4) Publication of construction information (Bureau of Waterworks, Tokyo Metropolitan Government)

➢Of the registered construction work and turbid water/water cutoff information, the construction date, location, name, department in charge, and contractor information are made publicly available on the utility's website.

5. Positive impact of the mapping system

(1) Before the introduction of the mapping system, only the departments that kept the related information in paper format were able to view the drawings, but after the system was introduced, all the offices in the water utility can view the drawings in electronic form.

(2) In the past, modelling pipe networks was done manually, but now analyzing the pipe network can be done without such manual labor. In addition, it is now possible to analyze not only the main part of the pipe network but their details.

(3) The efficiency of related work has been improved.

(4) The system has made it possible to respond more quickly to accidents.

(5) It is now possible to calculate the rate of earthquake damage to pipelines, which was previously difficult to do.