System Development to Efficiently Consolidate Damage Information on Large-Scale Earthquakes and other disasters

M. Asuke*, K. Ozawa**, G. Ozeki***

*Bureau of Waterworks, Tokyo Metropolitan Government, 2-8-1 Nishi-Shinjuku, Shinjuku-Ku, Tokyo
asuke-mitsue@waterworks.metro.tokyo.jp
**ozawa-kenji@waterworks.metro.tokyo.jp
***ozeki-gen@tssk.jp

Disaster Preparedness

Japan is an earthquake-prone country. Most recently, the country was hit by the M7.3 Kumamoto earthquakes in 2016 and the M9.0 Great East Japan Earthquake in 2011. At the Tokyo Bureau of Waterworks that props up the capital city of Tokyo, even in the event that such a large-scale earthquake were to occur, we work to minimize water outages and secure as much drinking water as possible.
The Bureau of Waterworks, Tokyo Metropolitan Government ("the Bureau") has 12 water purification plants and water supplying station that store water treated at purification plants. The Bureau manages approximately 28,000 km of water pipelines and many other water facilities. When earthquake disasters occur, it is important for the Bureau to promptly grasp the status of these facilities and share relevant information.
This poster describes a Bureau of Waterworks system that serves to efficiently aggregate damage information in the event of a large-scale disaster such as an earthquake or wide-ranging flood or power outage.

Development of the Earthquake Information System

○ History

April 1999	Constructed and operated as a client / server type. About 120 client terminals were installed at 70 business sites.
2007	Began rebuilding the system in 2007 to account for progress in IT technology, etc.
Sept. 30, 2009	"Webified" the current system, making the system usable via all terminals of the Bureau's internal LAN, used by all of the approximately 4,000 staff members

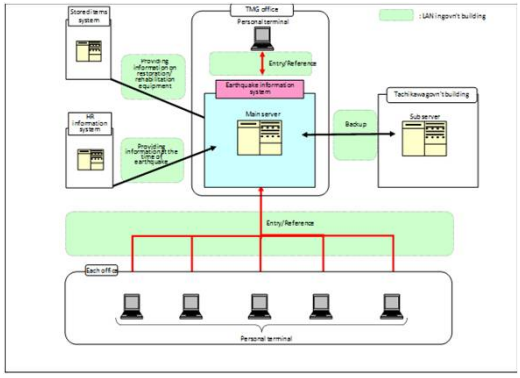
○ Summary

Based on the lessons of the 1995 Great Hanshin-Awaji Earthquake, this system was constructed in 1999 to serve as an effective means of communication in earthquake situations. In 2009, the system was rebuilt to enable all personnel to make use of it via the web.

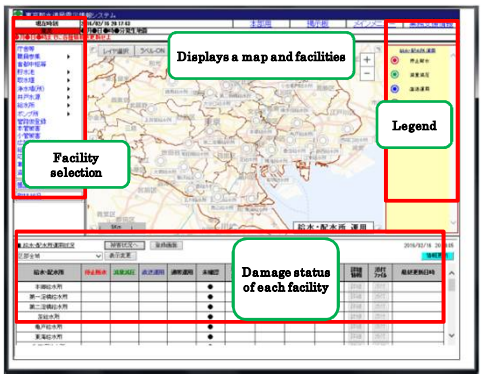
With the current system, in order to ensure that personnel are capable of responding to earthquakes when they occur, the assembly status of personnel is monitored by inputting it into the system so that it can be confirmed that the necessary personnel are available where needed.

The system also has damage information consolidation functionality that collects information on damage and restoration status of pipes and other places where water outages have occurred. The system is also capable of consolidating information on the implementation status of emergency restoration and emergency water supplies. With these two functions combined, it is possible for the system to rapidly and accurately provide information to customers.

This system ensures the rapid collection and sharing of such information, and it is also required to operate safely even in the event of an earthquake. Therefore, in addition to the main server in our main office in Shinjuku in eastern Tokyo, we have also installed a sub-server in the Tachikawa building in western Tokyo. With both servers constructed to be powered by in-house power generation equipment, we have taken thorough earthquake disaster countermeasures for the system itself.



Earthquake information system configuration diagram



Screen image

Functions of this system

- Scrollable map
- Damage information collection and consolidation (Facilities, pipes, etc.)
- Personnel information collection and consolidation (Assembly status, etc.)
- Consolidation of emergency restoration and emergency water supply information (Implementation status, materials and equipment stocks, etc.)
- Provision of customer support and assistance information
- Base personnel allocation and assignment
- Message boards

Usage of the Earthquake Information System

This system is for dedicated use in an earthquake situation and is not used for daily work operations. For this reason, one key point in its implementation was to enable people to make use of the system even without specialized knowledge. To this end, we aimed for a system with simple data input and allowing for quick response so that anyone could make use of it intuitively in a tense situation.

It is also very important to have daily training in order to be able to quickly respond to an earthquake that could occur at any time. We implement Bureau-wide emergency trainings twice a year that are just like the real thing, and this system is also used in these drills as a core information management tool.

Moreover, training is conducted every year to ensure mastery of the system's operation, and system operational training is incorporated into each office's unique drills.

Conclusion

This system may be also useful in other countries, as it can be utilized not only for earthquakes but for any large-scale disaster where the city's urban functions are interrupted due to wide-raging floods, blackouts, etc. caused by something like a large typhoon.

Immediately after a disaster occurs, it is most important to manage information properly (e.g. information collection and consolidation). This earthquake information system is always on standby, enabling us to achieve rapid information management and quickly respond to the disaster

At the Bureau, in addition to making pipes and other facilities more earthquake-resistant, we also work to build and utilize systems such as these so as to support Tokyo in minimizing water outages and securing drinking water for Tokyo residents as much as possible, even in the event of a large-scale earthquake.