

Research Survey for Formulation of Sewage Urgent Improvement Plan for Earthquake Countermeasures to Arakawa Left Bank Southern Basin-Wide Sewerage System Sewage Treatment Plant and Formulation of Sewage Urgent Improvement Plan for Earthquake Countermeasures (Arakawa Right Bank Sewage Treatment Plant)

Year of Research

2007

(Purpose)

The Arakawa Sewage Treatment Plant and Arakawa Right Bank Sewage Treatment Plant are two large basin sewerage plants in Saitama Prefecture with a treatment capacity of 600 to 800 thousand square meters per day. The Arakawa Sewage Treatment Plant entered service 35 years ago and the Arakawa Right Bank Sewage Treatment Plant 27 years ago, and it has been confirmed that these treatment plants are now decrepit, and their earthquake resistance low. Urgent countermeasures are required because they are expected to suffer serious damage in the event of a large earthquake while in their present condition.

This research survey was conducted to make an urgent sewerage improvement planning for earthquake countermeasures, aimed at investigating the feasibility of networking the treatment facilities and formulating a network improvement plan and implementation plan for the treatment facilities.

(Results)

(1) Use of networked facilities

Use of networked facilities is basically a countermeasure against earthquakes, but one networked facility can also be used to supplement the treatment capacity while the other facility is being rebuilt or renovated.

Table 1 Use of network pipe

Sanitary pipe	During earthquake		During earthquake ⇒ Water is conveyed by pumps from the affected sewage treatment plant to an intact one and treated there. Water conveying capacity: 145,000 m ³ per day
	Other than above		While the Arakawa Sewage treatment Plant's water treatment facility is being rebuilt or renovated. Water conveying capacity: 60,100 m ³ per day ⇒ Water is conveyed by gravity flow to the Arakawa Right Bank Sewage Treatment Plant and treated there.
Sludge pipe	At present	During earthquake	Sludge is conveyed by pumps from the affected sewage treatment plant to an intact one and treated there.
		Other than above	During maintenance, sludge is conveyed by pumps and treated.
	Future	During earthquake	Sludge is conveyed by pumps from the affected sewage treatment plant to an intact one and treated there.
		Other than above	(1) During maintenance, sludge is conveyed by pumps and treated. (2) A study will be done on centralized treatment at the Arakawa Right Bank Sewage Treatment Plant.
Power cable	During earthquake		If one treatment plant loses power and its independent power generator is disabled. ⇒ Power is supplied from the independent power generator of the other treatment plant.

(2) Basic structure of network pipe

In deciding the basic structure of the network pipe, an investigation was conducted on the longitudinal profile (route, etc.), cross section (included objects, etc.) and structure of the inlet and outlet (water and sludge conveyance method, etc.). For the network pipe structure, the inner diameter was set to 4,000 mm and the length was set to 3,200 meters. The included objects include sanitary pipes (two pipes 900 mm in diameter) and sludge pipes (two pipes 400 mm in diameter).

(3) Formulating a network improvement plan and implementation plan

For the two treatment plants, the inflow forecast was determined from value of the comprehensive basin-wide planning of sewerage system and the inflow results for the past ten years, and a 50-year improvement plan was formulated, to run from FY2005 to 2055. Based on this plan, a comparison was conducted between an isolated scheme and a networked scheme for the water treatment facilities and among an isolated scheme, a flexible scheme, and a centralized scheme for the sludge treatment facilities.

With regard to the water treatment facilities, the inflow to the Arakawa Sewage Treatment Plant is increasing, and it is estimated that under the insolated scheme the treatment capacity deficit will be up to 60,100 m³ per day from FY2013 to 2029. Under the networked scheme, it would be possible to make up for the capacity deficit by conveying water to the Arakawa Right Bank Sewage Treatment Plant on the opposite bank.

With regard to the sludge treatment facilities, it was found in a comparison of the flexible scheme with the isolated scheme that the mechanical thickeners and dehydrators could be reduced by one unit respectively by sharing the reserve unit in the former scheme. In the centralized scheme, a reduction of about two dehydrating facilities, incinerating facilities and the like is expected to be possible by taking advantage of the economies of scale for the facilities. These effects will be reflected in the implementation expenses.

(Further plan)

To proceed with the basic design after this, it will be necessary to investigate the maintenance methods for water pipes and sludge pipes (cleaning, drying, etc.) and measures against the hydrogen sulfide that accompanies long-distance conveyance of sewage and sludge.

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Key words

Network, Sewage urgent improvement plan for earthquake countermeasures, Improvement plan, Implementation plan