

Joint research planning to improve the earthquake resistance of sewerage facilities considering network (Nagoya)

Year of Research

2008 · 2010

(Purpose)

The sewage work in Nagoya city has a long history. There is need to improve the function of sewage facility sequentially by renewal or renovation of them which greatly exceeded service life. But there are many problems due to the number of them, the operational status, the limitation of sites and so on.

On the other hand, for the Tokai Earthquake and the Tonankai earthquake are expected to occur, earthquake-proof of each facility must be improved immediately. However, much time and cost are necessary, so it is impossible to satisfy all realistic.

Therefore, for the purpose of saving the minimum function of the facility for 14 water treatment centers and 55 pump stations even in case of large-scale earthquake, we studied on-site and off-site mitigation measures; network using of existing pipes between water treatment centers or pump stations.

(Results)

The contents and results of this study are as follows:

(1) Simplified seismic diagnosis

For judgment of earthquake-proof ability of construction in summary, simplified seismic diagnosis method with the limited information: existing as-built drawing etc. was considered. Each weighting factor: 10 items (e.g. expansion joint and the seismic scale) was set by AHP (analytic hierarchy process) based on the questionnaire on engineers of collaborators.

(2) Setting of earthquake-proof ability

Based on the decision by simplified seismic diagnosis, seismic performance of constructions are grouped into five types(S, A, B, C, D). And based on the questionnaire to affected local governments in the past, each boundary value was considered with the number of days of this recovery.

(3) Estimation of the disaster situation

By estimation of large-scale earthquake damage of each water treatment center construction, lack of processing capacity on disaster was feared in some centers.

(4) On-site mitigation measures

As on-site mitigation measures, using the retrofit telescopic flexible joints was presented in considerations of past affected cases and easy construction.

(5) Off-site mitigation measures

As off-site mitigation measures, existing pipes between water treatment centers or pump stations were examined for network.

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Key words

Disaster Decreasing, Simplified Seismic Diagnosis, AHP, Earthquake-proof Ability Rank, Remained Ability, Network