

Research on Countermeasures to Deal with Infiltration Water during Rainfall in a Separate Sewer System

Year of Research

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(Purpose)

There have been many reports of the rapid increase of water flowing into pump houses or wastewater treatment plants during rainfall (below referred to as “infiltration water during rainfall”) at wastewater facilities on a separate sewer system. It is feared that when infiltration water during rainfall rises, exceeding the capacity of existing facilities, lands may be overflowed from sewer pipelines, pump houses and treatment plants may be submerged, and the treatment capacity of treatment plants may decline. And under present harsh financial conditions, municipal governments managing sewer systems view the infiltration water during rainfall, a phenomenon which encourages the increase of maintenance costs, as a severe problem, but adequate countermeasures have not been taken.

This research is intended to summarize methods of inventorying challenges and proposing countermeasures to meet the problem of infiltration water during rainfall from systematic and integrated perspectives and to consider medium and long-term countermeasure plans, and at the same time, to inventory the revision of plans based on cost benefit analysis methods and post-project evaluations in order to clarify the effectiveness of infiltration water countermeasures.

(Results)

(1) Questionnaire survey of infiltration water during rainfall.

A questionnaire survey of municipal governments which have introduced separate sewer systems throughout Japan was performed to organize the present state of, and challenges posed by, infiltration water during rainfall, and information and opinions concerning efforts to deal with these challenges by municipal governments. The first questionnaire survey was aimed at 1,469 municipal governments, while the second questionnaire survey was aimed at 94 municipal governments.

(2) System of infiltration water during rainfall countermeasures

Infiltration water during rainfall countermeasures are, as shown in Figure 1, categorized as “rainfall period rising water countermeasures” which are emergency countermeasures to prevent immediate damage, and “medium and long-term infiltration water during rainfall countermeasures”, which efficiently and continually reduce infiltration water during rainfall. And “rainfall period rising water countermeasures” can be broken down further into “infiltration water reduction countermeasures” which are taken on infiltration routes to control the sources of infiltration water and “facility countermeasures” which are taken at facilities premised on infiltration occurring.

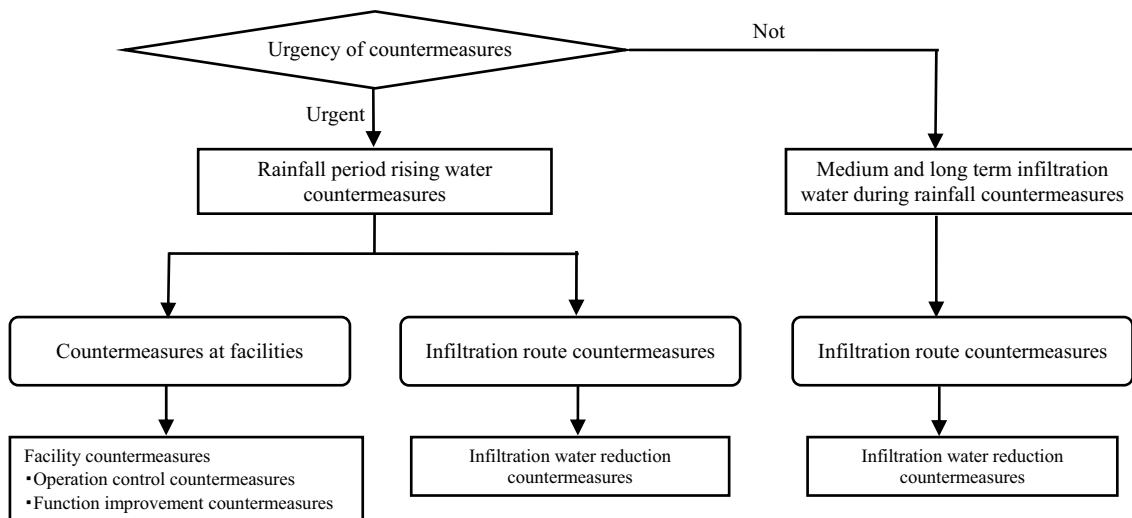


Figure 1. System of Infiltration Water during Rainfall Countermeasures

(3) Inventorying survey methods to clarify causes

A number of methods of narrowing the focus from drainage basins and entire treatment districts to large, medium, and small blocks, then conducting detailed surveys to clarify the causes of infiltration water during rainfall have been systematically summarized.

(4) Clarifying infiltration water reduction countermeasure methods and their effectiveness.

A method of clarifying reduction effectiveness by a flow rate survey was introduced and examples of its application were presented. In the application examples, as shown by Figure 2, countermeasures at drainage facilities were the most effective.

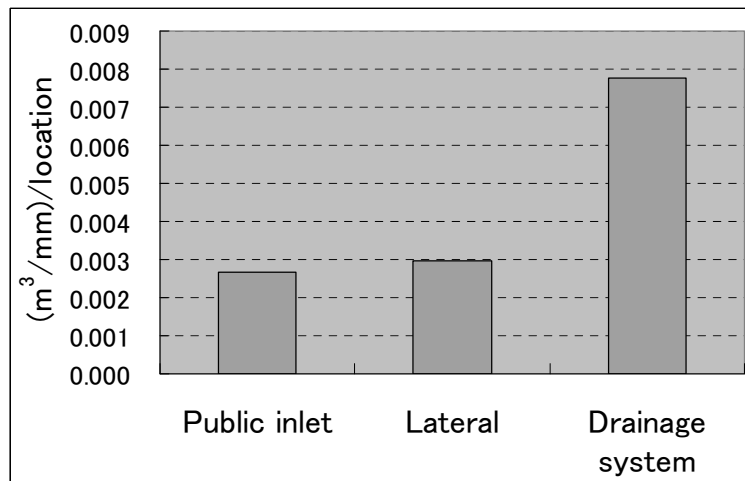


Figure 2. Example of Reduction Effectiveness by Countermeasure Location

(5) Evaluation of infiltration water reduction countermeasure methods

Infiltration water reduction countermeasure evaluation methods were presented. From among these, specific application examples, case study results and so on, concerning cost analysis and cost-effects analysis in particular were introduced.

(6) Product

The Infiltration Water During Rainfall Countermeasures for Separate Sewer System Planning Manual

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Key words

Separate sewage system, infiltration water during rainfall