

Study of the Investigation of Infiltration and Inflow Based on Historical Data

Whole term

2004.12 ~ 2005.3

(Purpose)

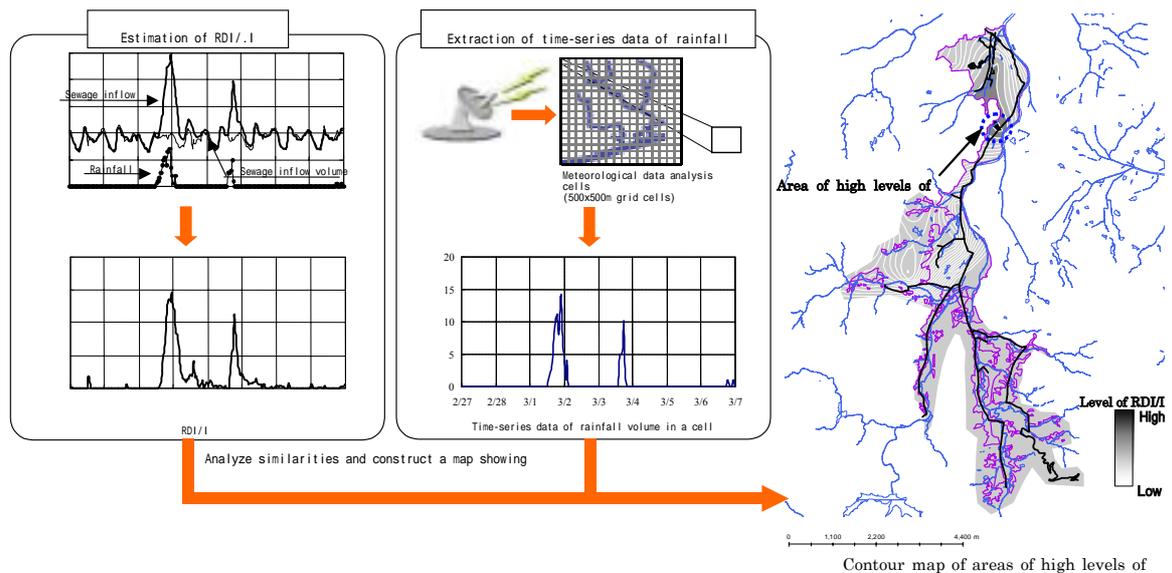
In the soil pipelines and wastewater treatment facilities of sanitary sewer systems, a sudden increase in sewage inflow volume has frequently been observed in wet weather. In the service area of M. Pump Station in K. City, Japan (drainage area of 780 ha), problems including sewer overflows have occurred in recent years due to infiltration and inflow (I/I) of stormwater during heavy rainfall. In considering future action against this I/I problem, there was an urgent need to conduct an investigation to find areas affected by I/I.

The purpose of this investigation is to narrow down areas of high levels of rainfall-derived infiltration and inflow (RDI/I) based on historical data recorded daily at the pump station, and radar rainfall data. By employing this investigation, measures against I/I can be prioritized so that further investigations to identify I/I sources and areas for repair can be carried out in a planned manner.

(Outline of the investigation)

A contour map displaying areas of high levels of RDI/I was made using the following procedure:

- 1 . Sewage inflow volume to M. Pump Station was calculated using data on pump displacements and water level of the inflow channels gathered at M. Pump Station for the past two years, as well as the sewage volume retained in pipes.
- 2 . Sewage inflow volume in dry weather was estimated by searching past data of sewage inflow volume in dry weather that most closely resembles the present condition. RDI/I was calculated by subtracting the estimated sewage inflow volume in dry weather from sewage inflow volume in wet weather.



- 3 . The service area was divided according to the analysis cells used for the meteorological data, and rainfall volume was arranged in a time series.
- 4 . Similarities between the trends of time series data for RDI/I volume and rainfall volume were analyzed for all cells in the service area. The degree of similarity was displayed by color, and areas of high levels of RDI/I were shown by contour lines.
- 5 . Pipeline data was superimposed on topographic features based on latitude and longitude data from GIS to create a contour map showing areas of high levels of RDI/I.

(Analysis results)

We were able to narrow down the locations estimated to have high levels of RDI/I to an area of approximately 500 x 500 meters. The contour map can be used to consider future action against I/I. From this study, it was found that the areas estimated to have high levels of RDI/I are close to the river. The correlation between fluctuations of sewage inflow volume and the river's water level makes it likely that a rise in groundwater level may have an effect on I/I of sewer pipes. Further investigation in target areas is needed to identify the sources of I/I.

Research funded by Kitakyushu City

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key words

Sanitary Sewer system , rainfall-derived infiltration , data analysis