

8-1 Feasibility Study on the Real-time Control System of the Pumps for the Reduction of Combined Sewer Overflows

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1. Background

The sewage system for Metropolitan Tokyo has reached 100% target fulfilment for the Tokyo Wards, and approximately 80% of the present facilities are of the combined sewer type collecting both wastewater and rainwater in the same conduit.

The problem with the combined sewer system is that water pollution occurs in the catchment areas as a result of the combined sewer overflow (CSO) in rainy weather conditions.

With regard to flood problems, there has also been an increase in the volume of rainwater runoff as a result of the rapid pace of urbanization in recent years, having created a need for countermeasures at a higher level.

While it is necessary to expand the infrastructure hardware in terms of a reinforcement of the facilities, the problem is that it would take a long time and a major investment commitment to complete the work.

Tokyo Metropolitan government has therefore decided to make the maximum possible use of the existing facilities while ensuring safety against inundation and to promote measures also minimizing combined sewer overflow, the real-time control system (RTC).

2. Outline

A pilot RTC system was introduced in August 2000 for the Shinozaki Pumping Station's catchment area that covers an area of approximately 2,100 hectares. The two trunk sewers are interconnected by bypass pipes. The three Pumping Stations connected to the trunk sewer drain off rainwater while the remainder is drained off at the Shinozaki Pumping Station at the downstream end.

On the basis of data on precipitation volumes in the catchment area and water levels in sewers, gates and drainage pumps are operated while making optimum use of the water storage capacity of the pipes to achieve the effective removal of rainwater overflows. In the development of this system, extensive use was made of state-of-the-art technology, including the use of optic fibre water level gauges suited for measuring the water level inside pipes and the combination with a rainfall data system by radar rain gauges.

From the results of simulations on the basis of past rainfall data, it was found that the RTC can reduce CSO events by roughly 50% for small rainfalls with a total precipitation level of 20mm or less by storing rainwater in the pipe routes at the beginning of the rain.

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