Joint research regarding rainwater level management using real-time information networks (Niigata City)

Year of Research	2011～2014	Implementation of anti-inundation measures

(Purpose)

A real-time information network ("RTN") is a system that collects and predicts the state of rainfall amounts, water levels and flow rates, rainwater pump operation, and other similar data in real time. This research uses flood-prone areas of Niigata City (the Sakaiwa and Kurosaki Teraji drainage zones) as a model for the construction of an RTN to monitor and visualize the operating status of major trunk lines and pump sites and to investigate possible methods of increasing the efficiency of countermeasures for improving confluence.

(Results)

(1) Effects of Countermeasures for Improving Confluence

1) Survey Details

A reduction in the number of unprocessed outflows due to accumulation in pipes along the Sakaiwa trunk line was observed when the Sakaiwa Pump Site was operated at high water levels during light rainfall (confluence improvement mode).

By using a set trigger to change to normal operation mode based on an alert, the site can be operated without the risk of flooding even during heavy rainfall. The trigger was set at 0.50 m above the water level where activation of the rainwater pump is stopped when at the predicted pump well water level of 30 minutes prior.

2) Survey Results

Operation Changed at 14:46There was strong rainfall of 54 mm/hr during the monitoring period (2013/7/31 to 8/1); however, we conducted this survey by postulating for a light rainfall that would cause some pipeline accumulation to occur beforehand. Assuming that the pump would switch over to normal operation mode when the trigger set at the water level predicted 30 minutes prior is exceeded, the water level could be lowered sufficiently before the peak of the rainfall (refer to Figure 1). The amount of pipeline accumulation when the set trigger alert was activated was approximately 11,000 m^3, and it was confirmed that a capacity greater than the 6,300 m^3 required for confluence improvement countermeasures could be allocated.

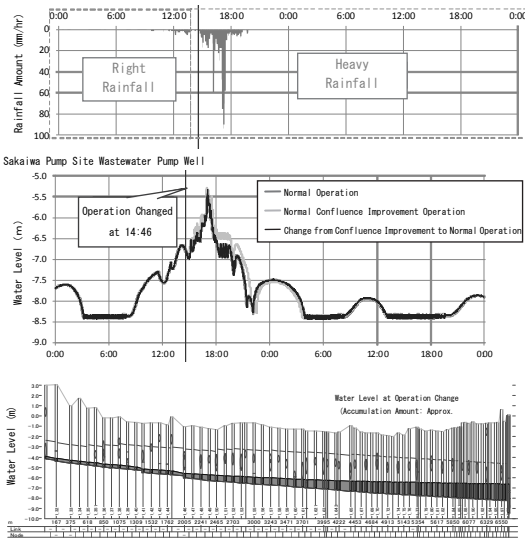

Figure 1 - Results of Survey on Effects of Confluence Improvement Measures

(2) Effects of Anti-inundation Measures

The two drainage zones that were the target of this research are located next to each other. We tested to see if the difference in concentration times could be used with the inflow from the bypass pipes from both drainage zones to provide efficient countermeasures for flooding. Our results showed that at peak inflow into the bypass pipe from the Sakaiwa Drainage Zone, the peak water level was high which caused an outflow to the low water levels of the Kurosaki Teraji Drainage Zone. This was confirmed as an effective method of reducing flooding in the Sakaiwa Drainage Zone.

We also confirmed that there was no risk of flooding from the backflow due to the differential at the peak time for the Kurosaki Teraji Drainage Zone.

We confirmed that movable gates were not required to prevent the movement of flooding at the target areas for this research, and that the current flood countermeasure facilities are of a sufficient and proper design.

(Summary)

The results of this survey show that effective use of the existing pipes and drains and soft countermeasures that utilize the existing facilities are sufficient without the need for any new accumulation facilities or hard countermeasures.

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