

Research on Master Plan of Rainwater Drainage System Construction (Omachi City)

Year of Research

2011 • 2012

Implementation of anti-inundation measures

(Purpose)

The rain water which falls on the central area in Omachi City is discharged to Nogu-river through the existing urban drainage system. However, supplied and drained water from a surrounding large farmland flows into the urban area through the existing drainage system for rainwater, resulting in lowering flow capability at the time of heavy rain. Besides, many facilities are operated in manual ways, leading to impediments that choke off control of heavy rain even though various practices to protect the urban area against influx of water for agricultural use are taken by building sluices and floodgates, closing valves and trying others during heavy rain. This research prepares the "Master Plan of Rainwater Drainage System Construction in Omachi City" in consideration of improvement in flow capability of urban drainage systems and aging sewers along with arrangement of the various elements for the drainage basin.

(Results)

(1) Actual conditions (Figure 1)

The inflow of supplied and drained water for agricultural use during the irrigation season made up 10 to 20% of the flow capability. For this reason, the maximum flow capability is about 30% short in the section covering the shopping district in front of a station in the urban area. Moreover, the sluice / floodgate installed in order to secure water for agricultural use and soil / stones accumulated from 10cm to 20cm on the downstream basin disrupted smooth flow. Degradation inside the entire urban sewer was advancing. In particular, it was deteriorated in JR cross-section.

(2) Examination of proposed measures

At first, the following options were proposed as measures to prevent inundation:

- Replacement of the existing pipes
- Installation of enlargement pipes
- Installation of bypass pipes (**Figure 1**)

It was considered that the third option could be combined with easily workable measures including removal of water gates, automation of weirs, and removal of sediment accumulated in order to realize early solution for inundation. For measures to solve degradation issues, it was recommended that replacement of a pipe lying JR cross section be prioritized as a short-term solution because of its remarkable degradation and important role.

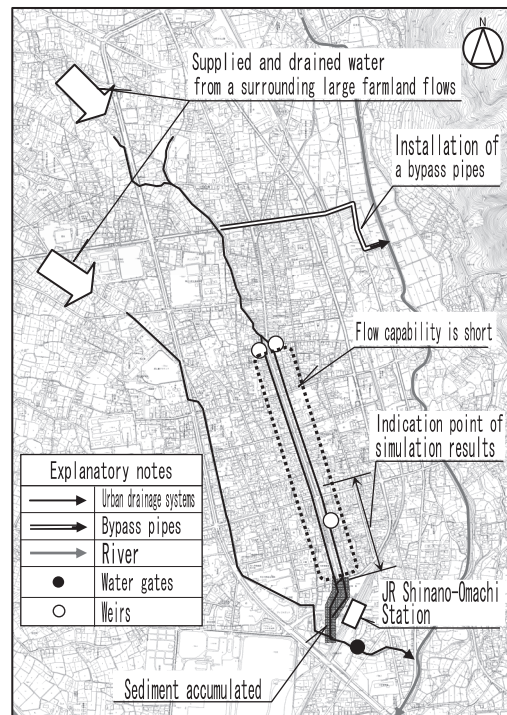


Figure 1 Position figure
(Actual conditions and installation of a bypass pipes)

(3) Simulation results

A comparison was conducted between effects on improving discharge capability of bypass pipes to be installed and simple workable measures including removal of water gates, automation of weirs, and removal of sediment accumulated, as shown in **Figure 2**. In the case where the above-mentioned simple measures were only taken, fluctuations in waterlevel would be small, and frequency of inundation would be reduced at about 30%.

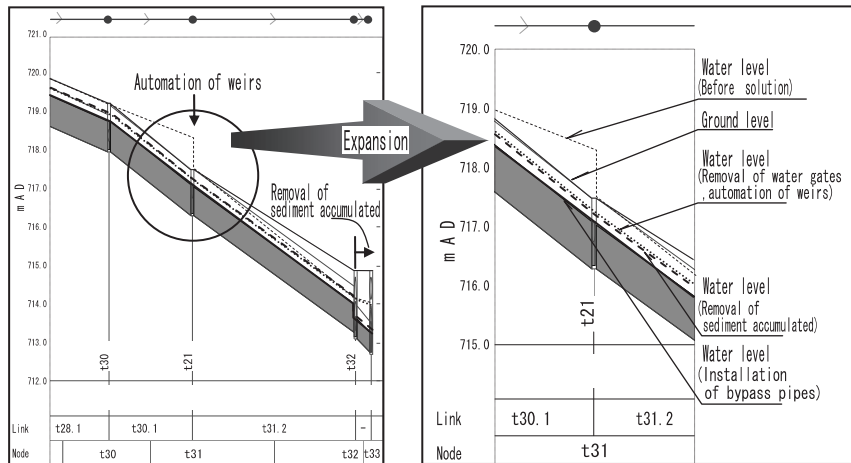


Figure 2 Simulation results

However, it is confirmed that inundation could be avoided after the bypass pipe is installed even if influx of water for agricultural use is taken into consideration.

(4) Development plan

In light of the financial situation, a development plan on the measures is presented in **Table 1**.

Table 1 Development plan

Problem	Short-term solution	Medium and long-term solution
Improvement in flow capability	<ul style="list-style-type: none"> • Installation of bypass pipes • Removal of sediment accumulated • Removal of water gates, automation of weirs 	<ul style="list-style-type: none"> • Periodic removal of sediment accumulated
Solution of aging sewers along	<ul style="list-style-type: none"> • Replacement of a pipe lying JR cross section be prioritized • Mending of other section 	<ul style="list-style-type: none"> • Replacement of other section

(Conclusion)

It is confirmed that efficient countermeasures to avoid inundation can be studied in the area that have local features by carrying out simulation given that influx of supplied and drained water for agricultural use from upper basin areas is fully grasped.

It is recommended that measures to rehabilitate aging pipes be taken along with regeneration plans in the commercial districts in the mid-and-long-term after detailed assessment of degradation is conducted and urgency of rehabilitation for defective parts is respectively grasped.

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