

Research on Manhole Cover Safety Measures Regional Sewerage Systems in Shiga Prefecture

Whole term

2004.10 ~ 2005.3

(Purpose)

Recently safety concerns in regard to manhole covers have arisen. A large number of manhole lids of combined sewers and drainage sewers have been blown off or floated because of concentrated heavy rain. Also, regarding sanitary sewers, similar accidents due to inflow of stormwater have been reported.

In the four regional sewerage systems of Shiga Prefecture, there have been numerous reports on manhole covers floated and sanitary sewer overflows under severe hydraulic conditions, due to rapidly increasing flow caused by the inflow of stormwater. These phenomena could jeopardize traffic safety and possibly cause a man-made disaster.

In this project, with the aim of contributing to the detailed planning and implementation of the countermeasures in the future, the probability that wet weather flow will blow off manhole covers of the sanitary trunk sewers of the Lake Biwa Regional Sewerage Systems in Shiga Prefecture was examined from the viewpoint of hydraulics, and the facility priority for the urgent measures was determined according to the hydraulic analysis.

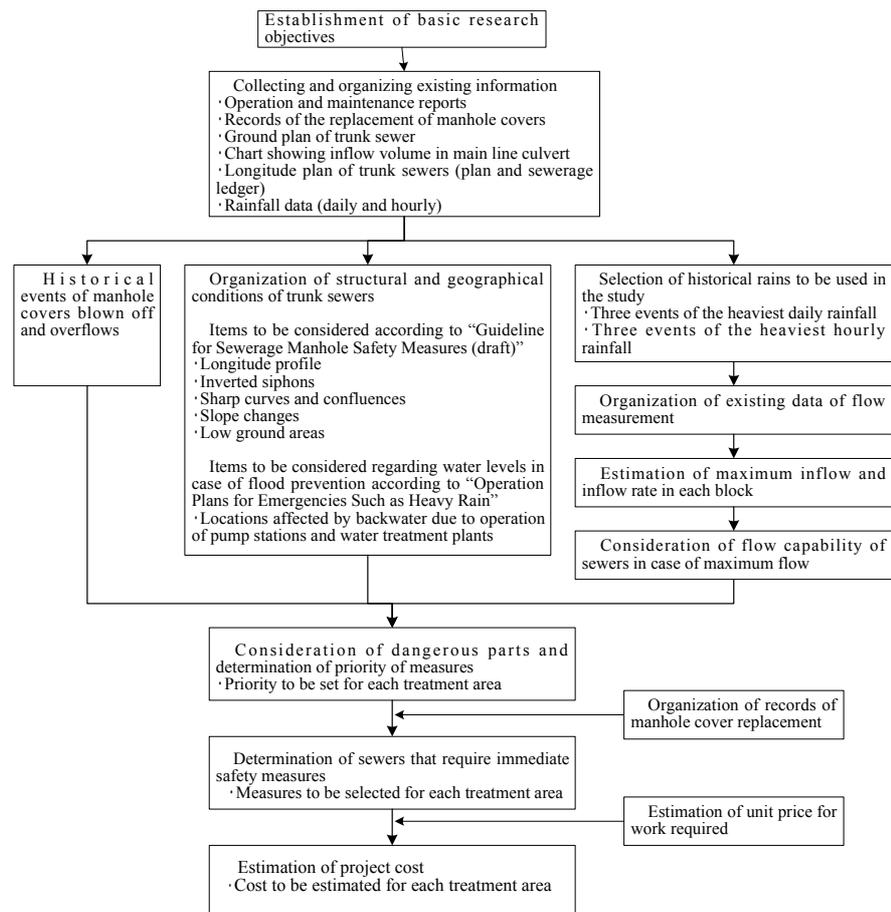


Chart 1: Research Flow

(Conclusion)

The flowchart of the study is shown in Figure 1.

The facility priority of the measures was determined based on the weight of urgency according to the following three viewpoints:

- The number of historical events of manhole covers blown off and sanitary sewer overflows.
- Sewers considered to be dangerous according to the various conditions:

- Structural condition of the sewers/manholes and geographical features
 - Sewers affected by backwater due to operation of pump stations and wastewater treatment plants
- Sewers considered to be dangerous according to maximum inflow and inflow rate (proportion of inflow to dry weather flow)

In the four treatment areas there are 1,434 manholes in total and anti-floating lids have already been introduced to 212 manholes (15%), therefore, the remaining 1,222 manholes were categorized and prioritized as below:

Priority	Conditions	Number of manholes
Top Priority (Highest Priority Facilities)	<ul style="list-style-type: none"> • Manholes of which cover has been blown off or where overflow has occurred previously. • Sewers affected by backwater due to operation of pump stations and wastewater treatment plants 	300(21%)
	<ul style="list-style-type: none"> • Sewers where the inflow rate is greater than 3.0 and sewers considered to be dangerous according to the structural or geographical conditions 	
Second Priority (Priority Facilities)	<ul style="list-style-type: none"> • Sewers where the inflow rate is greater than 3.0 • Sewers considered to be dangerous according to the structural or geographical conditions though the inflow rate is less than 3.0 	343(24%)
Third Priority (Facilities to be considered)	<ul style="list-style-type: none"> • Sewers where the inflow rate is less than 3.0 • Sewers considered not to be dangerous according to the structural or geographical conditions 	579(40%)
Total		1,222 (85%)

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key words

Separated sewer system , manhole cover safety measures , wet weather flow