

Research on Water Surface Control (WSC) to Improve Combined Sewer Systems

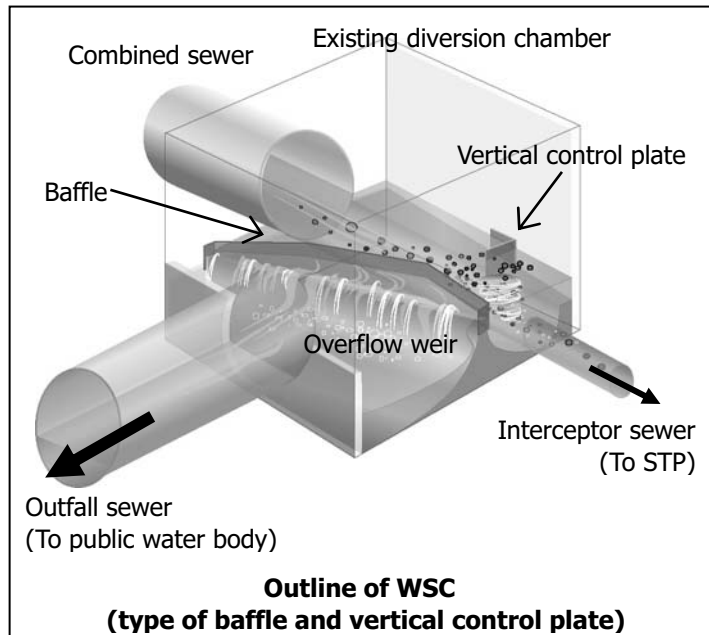
Year of Research

2008

(Purpose)

Combined sewer systems handle both rainwater and sewage, and have been adopted in 191 cities as of March 2009, mainly major cities in Japan where early development of sewer systems occurred. Combined sewer systems must be improved quickly to deal with water pollution, foul odors, and public sanitation in the cities which have adopted the system.

The immediate goals of combined sewer system improvement are; 1) to reduce pollutant loads, 2) to assure the safety of public sanitation, and 3) to reduce debris. Water surface control (WSC) is a device intended to achieve the third of the above goals and consists of a baffle and control plate. It is characterized by a simple structure, no power consumption, easy maintenance, and reasonable initial and maintenance costs. However, there are few technical documents on WSC which sewerage administrators can refer to when adopting this device. The purpose of this research is to present an outline of the WSC, its characteristics and its performance, and also to compile technical issues concerning WSC: applicable cases, design, construction and maintenance, as a technology to improve combined sewer systems.



(Result)

The results of the research are as follows.

- (1) Evaluation of debris removal performance and durability based upon past experiences in cities
 - ① SRV(Screening Retention Value) results of 33.1 - 99.3% at 36 points in 16 cities.
 - ② During a follow-up study conducted for two months after installation of WSC at the 36 points, we did not discover any problems that would spoil the function of WSC. In addition, we evaluated the durability of WSC as outstanding, because it has neither moving parts nor factors causing failure.
- (2) We clarified the present situations, issues and schedules in 138 cities including 17 major cities out of 191 cities, concerning the removal of debris which is a measure urgently required to improve combined sewer systems.
- (3) We determined that the following structural conditions of diversion chambers are necessary to apply WSC;
 - Distance between invert and baffle is more than 150 mm
 - Interceptor sewer is connected to sidewall of diversion chamber
 - Interceptor sewer and combined sewer are connected closely
 - Invert level of combined sewer is less than the top level of overflow weir
- (4) We arranged the work items for adopting WSC as follows;
 - ① Data collection, study of application, field investigation, and discussion with concerned organizations as preparatory work before the design is performed.
 - ② Pre-investigation of rainfall conditions with water gauges and CCD cameras to collect data for layout planning and designing.
 - ③ Layout planning, designing, structural calculation and quantitative calculations based on the result of the pre-investigation.
 - ④ Post-investigation with CCD cameras to confirm the effect of debris removal after installing the device.
- (5) We compiled technical documents based on (1) to (4) above.

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Key words

Combined Sewer System Improvement, debris