

CSO control technology and management in Tokyo

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1. Introduction

The sewage works in the Tokyo metropolitan area, which consists of the 23 wards, began with the construction of “Kanda drainage” in 1884. Bureau of Sewerage, Tokyo Metropolitan Government (“TMG”), established in 1958, and the sewer population rate reached almost 100% in the Tokyo ward area in 1995. There are 13 wastewater treatment plants (“Water Reclamation Center”) and 84 pumping stations in the Metropolitan Area.

Approximately 82% of the sewer system is the combined sewer system in the ward area because it was not easy to construct separate sewer system in a short period due to a lot of narrow roads and was taken into account an effective measure for both wastewater and storm water drainage.

A combined sewer system has a potential problem of combined sewer overflow (“CSO”) which causes the pollution in public water body. It was widely reported by mass media in Japan in 2000 that oil balls floated in Odaiba in the Tokyo bay area and they seemed to flow into the river from the combined sewer system.

2. The main measures

TMG started an investigation to reduce the pollution load from the combined sewer system, and have developed new technologies and analysis models since 1971. We are conducting the following measures.

(1) The increase of intercepting rate of pipes to 3Q

The increase of intercepting rate has been carried out from 2times to 3times of the dry weather flow. At present, more than 90% of improvement of intercepting sewer has been done.

(2) Storm water tank in pumping stations and near sewer outlet

The storm water tanks have been built to store a fixed quantity of first flush of CSO which contains high pollutant load. The total storage capacity of the tanks was 410,000 m³ at the end of FY2010.

(3) Storm water tank in Water Reclamation Plants.

The storm water tanks have been built for collecting the first flush which exceeds the secondary treatment capacity. The total storage capacity of the tanks was 550,000 m³ at the end of FY2010.

3. CSO control target

(1) Long-term target

TMG advance measures for reducing the total pollutant load of CSO as comparable as that of separate sewer system.

(2) Mid-term target

The CSO water quality standards for combined sewer systems came into force in Japan in 2004. TMG is required to achieve the regulated water quality target (average BOD in a treatment district is 40mg/l or less) by 2023 and it made a plan to improve the water quality of 14 water bodies such as a part of rivers with little water flow and closed water bodies.

(3) Urgent target (Control of debris outflow)

In order to control the outflow of debris such as oil balls, garbage, etc., TMG installed newly own-developed water surface control systems in sewer outlet and also applied fine mesh screens and oil fences at Water Reclamation Centers and pumping stations. The improvement of sewer outlet by the water surface control has been done at 710 of 733 at the end of FY2010.

4. Calculation of the required tank capacity by a simulation

A simulation has been conducted to decide the concrete numerical target of storm water storage capacity in the whole 23-wards area to achieve the aims above. The RRL load model was used for calculations of storm water runoff, while the PWRI method for calculations of pollutant load.

As a result, the required amount for storm water storage capacity in the metropolitan area was expected to 3,600,000 m³ for the long-term target and 1,700,000 m³ for the mid-term target, respectively.

5. Other measures

(1) Rainfall infiltration

In order to reduce the amount of storm water runoff to sewer systems, TGM is advancing the installation of the storm water infiltration facilities under roads and in resident areas.

(2) Partial separated sewer system

In some re-developed areas and public facilities, the storm water is separated from sewage for directly discharging to river.

6. New measures

TMG is developing a new CSO technology. It can be installed into the existing but limited space like a manhole-shaft for improving combined sewer systems especially for the densely populated area where it is difficult to build a new storm water tank.

7. References

Bureau of Sewerage, Tokyo Metropolitan Government (2010), The Tokyo Bureau of Sewerage's 2010 Management Plan

Bureau of Sewerage, Tokyo Metropolitan Government (2001), Quick Plan for combined sewer system