

## Survey study on the introduction of water cycle complex system in a new city area (Nagareyama area)

**Whole term**

**2000.2-2001.3**

**(Purpose)**

In recent years, the comprehensive flood control is measured by the cooperation of sewerage and river is promoted as the effective and efficient measures against flood. Projects of rainwater storage and infiltration are positioned as the important measure in this area. According to the increasing of rainwater outflow and the reduction of river flow rate by the expansion of impervious area, to perform the measure for the recovery of water cycle is necessary in the river basin in which urbanization is progressing. In order to solve these problems, the sewer system in consideration for water cycle, which is similar to the method of planning and evaluation of sewer system reflecting outflow control effect, was examined by the cooperative research of Urban Development Corp and the author. In addition, "the guide (proposal) of planning of rainwater circulation sewerage system in city maintenance" was decided.

According to this research, the author examined the case study of countermeasure plan for rainwater that introduced the water cycle complex system based on the outcome of "the study group of outflow control by the water cycle complex system in urban development", which was objected for the method shown in "the guide of planning of rainwater circulation sewerage system" and the Shonan central area. The development area along the Joban new rail way (plan zone 96.86ha) in Nagareyama city, Chiba was observed.

**(Result)**

The infiltration tanks and infiltration channels were selected as the osmosis facilities which can be installed and maintained certainly the rain water from the roof was targeted. When the standard infiltration amount from the result of the infiltration experiment in actual site was calculated, the standard infiltration amount of low elevation site or banking site was small (4 to 18% of the soil layer), thus the infiltration appropriate site to the soil layer was limited

**(1) Reduction Effect for Rainwater Drainage Facilities**

Since the amount of rainwater outflow decreased by introducing the onsite storage and infiltration facilities, the scale of the sewer conduit (rainwater drain) can be reduced. Two different cases with and without infiltration facilities suggested that the section of conduit was reducible in 32 routes of all 401 routes as the result of designing of rainwater drain.

**(2) Reduction Effect for Equalizing Tank**

Since the amount of rainwater outflow decreased by introducing the onsite storage and infiltration facilities, the capacity of equalizing tanks can be reduced. It turned out that the reduction of capacity of the equalizing tank can be expected to be about 8000 m<sup>3</sup> by storage facilities, about 2000 m<sup>3</sup> by infiltration facilities.

**(3) Calculation of Cost Reduction Effect**

The rainwater drain and sewerage equalizing tank can be reduced by introducing the onsite storage and infiltration facilities. Trial calculation of two plans with/without introduction showed that the reduction of the land cost by the scale concretionary effect of the equalizing tank was larger than the increasing of the installation cost of osmosis facilities, and the onsite storage and infiltration facilities has reduction effect of cost as total.

**(4) Evaluation of Water Environment Preservation Effect**

The preservation effect of water environment was examined by the water balance model. The control effect for the increase of maximum flux of river after development was observed, and the amount of 95-day flow, the long-run average water flow, and low-water runoff which were considered to reduce after development were not recovered to the present condition but only minor recovery was found.. Thus, it turned out that improvement effect of river environment could be expected.

**(5) Summary of Implementation Measures of Facilities**

The infiltration facilities, which constitute the water cycle complex system, must be installed certainly and maintained for the good continuity functions. Therefore, the method of implementation of installation of infiltration facilities and maintenance of its functions were also arranged.

Research funded by Urban Infrastructure Development Corporation Chiba regional branch office  
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**Key words**

Water circulation compound system, Rainwater Storage and Infiltration facilities, Effect of water circulation maintenance