

Study on Rainwater Storage/Infiltration and Drainage Piping System in Small-scale Facilities

Whole term

2005.4 ~ 2007.3

(Purpose)

The Specified Urban River Flood Damage Measure Law was enacted in May 2004 to put in place a framework to promote comprehensive flood damage measures through the combined forces of sewerage managers, river managers and local governments. Article 8 of this Law, in particular, entitles sewerage managers to set up technical standards on storage and filtration of rainwater and drainage facilities of each home in specified urban river basins if an appropriate enabling ordinance is established. In response to this regulatory promotion, a “small-scale rainwater storage/infiltration system” for installation in private residential houses is being developed as a technique to diffuse individual home storage/infiltration facilities.

For general drainage systems, an outdoor inspection chambers is installed for each sanitary unit, and the drainage pipe is laid out surrounding the periphery of the house to connect with those pits. This type of system with drainage pipes thus connected often makes it difficult to find space to install a rainwater storage/infiltration system. The proposed method involves collecting all the drainage pipes from sanitary units to a header pipe installed under the floor and using a “drainage piping system” that leads the drain to outside discharge through a single drainage pipe. This system can set aside a space for installation of the “small-scale rainwater storage/infiltration system.”

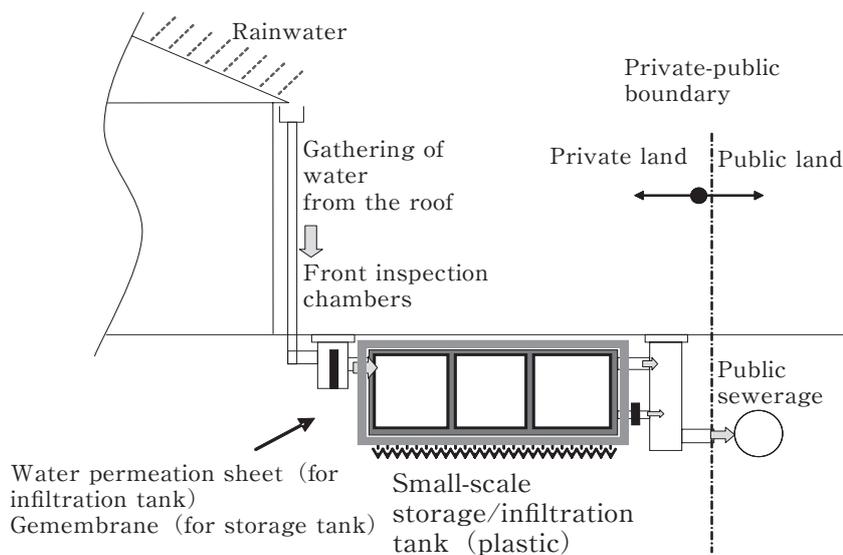
This research aims at reviewing the possibility of development and commercialization of a “small-scale rainwater storage/infiltration and drainage piping system” to respond to the above need and issuing technical documents that clarify the design specifications of such a system.

(Contents)

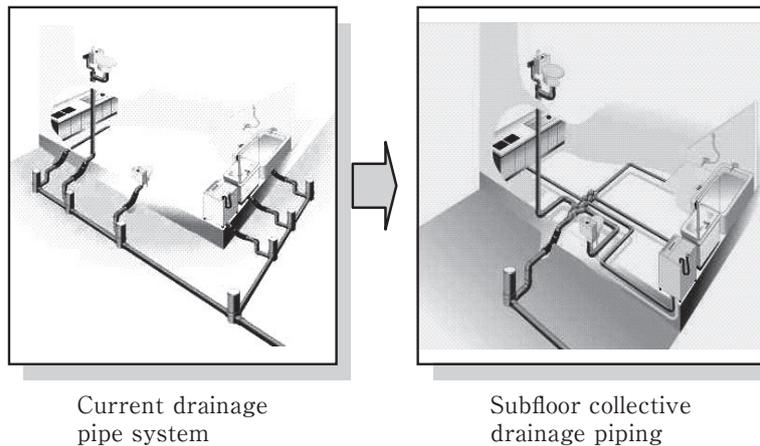
1. Outline of Study

(1) Small-scale rainwater storage/infiltration system (Figure— 1)

- ① Verification of basic performance
 - Front inspection chambers : verification of the capability to remove solids
 - Storage/infiltration tank : verification of filtration capability
- ② Verification of long-term retention of functions (accelerated test)
 - Front inspection chambers : verification of the capability to remove solids



Figure— 1 Outline of small-scale rainwater storage / infiltration system



Figure— 2 Outline of drainage piping system

- Storage/infiltration tank : verification of filtration capability
- ③ Field test
 - Verification of comprehensive performances in actual rainfall
- (2) Drainage piping system (Figure— 2)
 - ① Verification of water sealing capability
 - ② Confirmation of maintainability
- 2. Results
 - (1) A pseudo rainwater model was determined based on the analysis result of the turbid content contained in rainwater run-off from the Research Materials of the Public Works Research Institute (Material No. 2975).
 - (2) It was confirmed that the front inspection chambers is capable of removing about 60% of the turbid content for rainfall of about 10mm/hr (roof area of 60m²). No major degradation of performance was observed after continuous use (without maintenance) equivalent to about two years.
 - (3) It was confirmed that the infiltration capability of the storage/infiltration tank is equal to the existing facility (inspection chambers and trench). The tank has a higher capability to reduce the total run-off from its storage space even more because of a higher void ratio than that of the existing facility. No decrease in long-term infiltration capability was observed.
 - (4) The water sealing capability of the drainage piping system was verified, and its maintainability was checked.

(Study schedule)

The future plan is to conduct a one-year field test to verify the performance, check the effect of run-off control and evaluate maintainability.

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key words

Run-off control, Rainwater, Storage/infiltration, Maintenance, Residential land,
Long-term performance, Drainage pipe