

Research on Development of Maintenance Methods of Infiltration Facilities (Niigata City)

Year of research

2009~2010

Implementation of anti-inundation measures

(Purpose)

Niigata city is promoting installation of stormwater infiltration inlets to encourage self-help and mutual-help among the residents as a part of measures for stormwater runoff control. There is concern that the infiltration function of those infiltration inlets may decline with age. This research has been conducted to evaluate changes in infiltration capability with age, identify factors deteriorating infiltration and examine maintenance methods.

(Results)

(1) Evaluation of infiltration capability

① Infiltration facilities to be evaluated

We selected infiltration facilities to be evaluated on infiltration capability, aiming to find out difference in the impact on the infiltration capability by types of earth (two areas: dune and delta).

② Measurement of infiltration capability

We took measurements for 3 years in 3 locations in 2 areas, or 18 measurements in total to observe changes with age according to difference in type of earth and identify factors deteriorating infiltration. The measurement was carried out by constant head test. Figure 1 shows that the infiltration capability declines with age in both dune and delta.

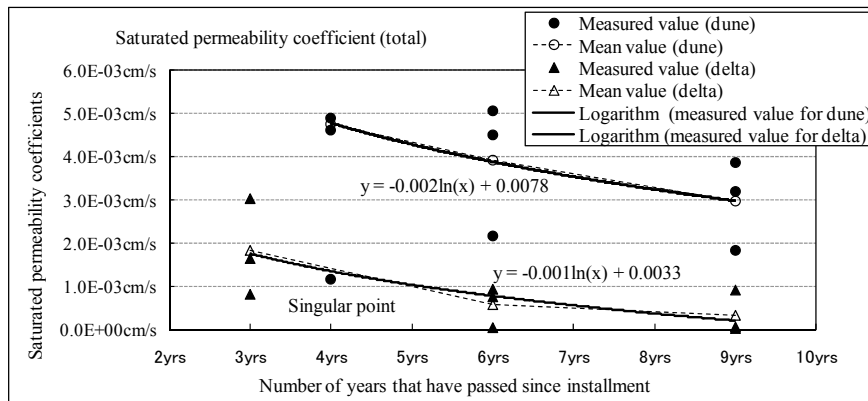


Figure 1 Change in infiltration capability with age by type of earth

(2) Identification of infiltration deteriorating factors

① Identification of infiltration deteriorating factors

To identify factors deteriorating infiltration capability with age, we have analyzed the residues in the infiltration inlets. Table 1 shows the analysis result. The residues consist mostly of sediment particles with diameters (below 1 mm) close to the permeable diameter. This indicates that clogging by the sediment is the deteriorating factor. It is presumed that sediment accumulated in a roof drainage or gutter flows into the system with the rain.

Table 1 Analysis of infiltration deteriorating factors

Analysis	Organic	Inorganic
Visual inspection and microscopic observation	Microorganisms and plants are present in small amounts	Muddy soil and sand are the main component
Particle size distribution	—	Predominantly diameters of not more than 1.0 mm
Ignition loss	Amount of organic matter ranges from 3% to 7%	Inorganic materials represent 90% or more

② Recover of infiltration capability

We have conducted capability recovery test using two maintenance methods of infiltration inlets: high pressure washing and excavation/cleaning. As shown in Figure 2, the high pressure washing is low in recovery effect but the excavation/cleaning is high in recovery effect on the dune. The saturated permeability coefficient was restored to the maximum level. On the delta, the infiltration capability didn't recover with either method. This is because the soil itself is low in infiltration capability.

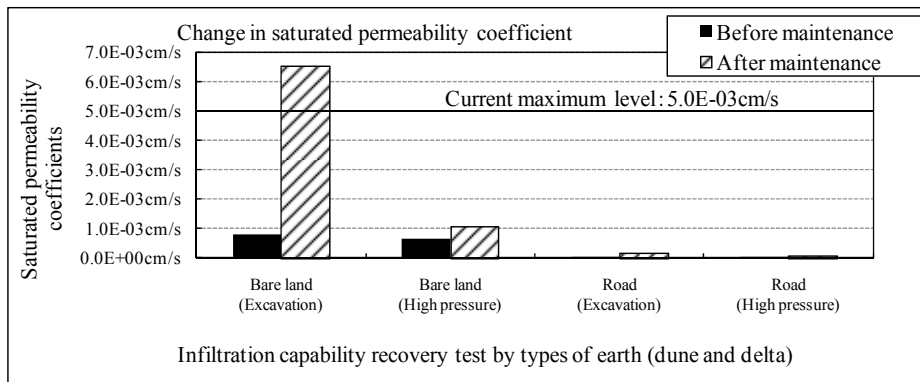


Figure 2 Result of infiltration capability recovery test

(3) Maintenance methods

① Survey result

We conducted a survey on residents who were using infiltration inlets about their maintenance. Although some 60% of the residents replied that they would do maintenance, more than half of them said they would be able to only remove dirt in the box.

② Examination of maintenance methods

In this research, we have found that a major factor deteriorating infiltration capability is inflow of sediment. The survey result indicates that it is not practical to ask the residents to do excavation/cleaning to remove the sediment that clogs the infiltration inlet. For maintenance, it will be necessary to install a device to separate and remove the sediment by precipitation before it goes into the infiltration inlet.

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Key words

Stormwater infiltration, Stormwater runoff control, Clogging