

## The study to resolve the urban flood phenomenon

Whole Term

2005.1 ~ 2006.3

### ( Purpose )

Based on the law called Particular Urban River Flood Damage Protection Legislation enforced in May 2004, in the area appointed as the particular urban rivers or its' basins are to be promoted to Overall Flood Damage Protection Measure by programming drainage basin food control measures, flood damage protection measures, regulations of the particular urban river basins' drainage control and reservation of the expected urban flooded and submerged area.

To implement those regulations, it needs to use NILIM (New Integrated Low-land Inundation Model - improved model of the old DOKEN(Public Works Research Institute) model developed by KOKUSOKEN (National Institute for Land and Infrastructure Management) or software from overseas to analyze urban submergences, but there haven't been enough verifications of those effects (i.e. flow of the overflow or reenter to the drainage pipes) of the relationships between hydraulics analysis's drainage pipe in flood and ground submergences.

Therefore in this study that is subsequent study of 2003, through the discussions in the workshops includes the literates, problems and differences between the real submergence phenomenon caused by urban floods and calculation methods in NILIM are going to be revealed. In order to accurate NILIM analysis method, the subject of hydraulic tests and test methods will be discussed, and by studying the way to incorporates the results to the model, suggestion will be made to improve the NILIM.

### ( Result )

The experiments' principles had been decided in 2004.

#### 1 . Subjects of the test

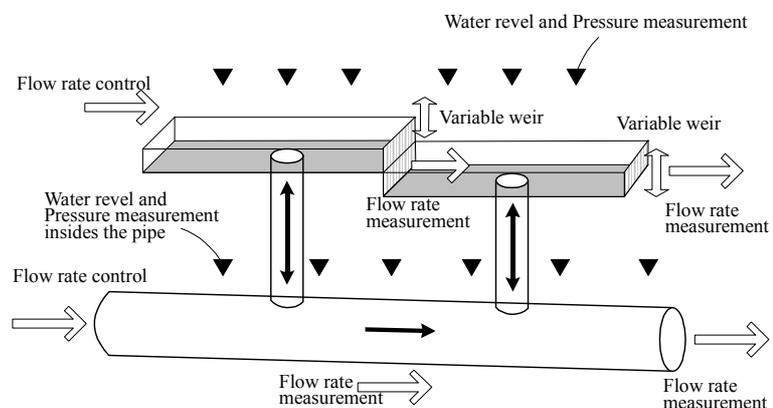
To resolve the problems of each factor in the analyzing model, many hydraulic tests' subjects were discussed. Testing the "overflow to the ground surface and reenter to the drainage pipe" is the first to proceeds, and the experiments' basic principles were suggested as follows (also see table 1).

#### 2 . The experiments' principles

The following three types of experiments were planed and through the discussion of the workshops, decision was made that the type A (see figure 1) should be tested.

**Table 1** Judgments of experimental subjects

Factor	Subject (The key word)	Subject of test	Judge	Type of experiment
Effective rainfall rate	Loss, Infiltration	Flow	Needful	-
Flow to surface	Basin divide, Ground roughness, Drainage route	Response of flow	Needless	-
Hydraulics of inside of pipes	Open channel- change with pressure	Phenomenon of Hydraulics	Needless	-
	Head loss in pipe	Flow inside pipe	Needless	-
Overflow to surface Reenter to pipe	Overflow and reenter	Condition of submergence	Necessary	Type- A
	Road channel, Storm water inlet, Manhole	Condition of submergence	Necessary	Type- B
Behavior of flood	Reflection of small inclination.	Condition of submergence	Necessary	Type- C



**Figure 1** Concept of the experiment

a ) Type A – to understand basic hydraulic phenomena.

Using the model, the mechanisms of the phenomenon that overflow from the manholes and reenter to the manholes again that is the basics of the flood condition will be understood, and specify the factors that rules those phenomena.

b ) Type B – to understand the features of the individual facilities.

The features of the overflow and reenter flow from different types of the storm water inlet and the manholes will be understood, then the way to install the tests' results into the hydraulic models are tried to find out (i.e. using the tests' results as the head loss constants).

c ) Type C – to understand the features of the allover basin.

From the overall basin view, and assuming real basin, the features of the cases like all the main pipes, manholes and storm water inlets are used simultaneously will be understood. Then the way to install the results to the hydraulic models is tried to find out (i.e. using the results as the gain or drop constants).

3 . The experiment cases.

In 2005, varying the water levels 6 ways inside the drainage pipes and the surface water level 4 ways, the experiments will be proceeded to understand the spurts and reenter phenomenon of the water. Then after each phenomenon is solved, the tests will be practiced about continuously/ collaterally related effect with spurts and return phenomenon.

#### **( Study Schedule)**

In 2005, according to the basic plan of the tests, specific experiment plans will be made, after practicing the experiments, the results be gathered to try to find the way to install those results in the hydraulic models. Then suggestions will be presented to improve NILIM. Yet in 2005, the workshop will be held includes the members of this study and the other literates.

This study is consignment from Ministry of Land, Infrastructure and Transport, National Institute for Land and Infrastructure Management, Risk Management Technical Research Center and Flood Research Laboratory.

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key words

Urban submergences ,flood analysis ,specific urban river flood damages protection legislation.