

Study on drainage diversion structures for large flows in sewerage pipe facilities

Whole term

2005.12 ~ 2006.3

(Purpose)

In recent years frequent large scale damage has been caused by urban flooding because of typhoons and concentrated heavy rainfall together with a reduction in areas for infiltration. To protect against urban flooding, measures have been devised to divert some of the flow from existing trunk lines to new trunk lines using drainage diversion dams, bypass pipes, and so on. In these large flow drainage diversion structures in sewerage pipelines, there are many examples where conventional hydraulic formulae are not applicable, and it is necessary to individually examine the drainage diversion structures or overflow dams. Items to be investigated include : 1 . the geometry and structure of the drainage diversion ; 2 . formulae for calculating the drainage diversion quantity ; 3 . the relationship between flow velocity, dam height, etc., and drainage diversion ratio ; and 4 . Understanding of flow conditions in the drainage diversion portion, etc.

In this research into “large flow drainage diversion”, in order to generate design documents for these types of drainage diversion structures, a literature survey and study of large flow drainage diversion was carried out, examples within the Bureau of Sewerage of the Tokyo Metropolitan Government were identified and studied, and a hydraulic model test plan was established.

(Results)

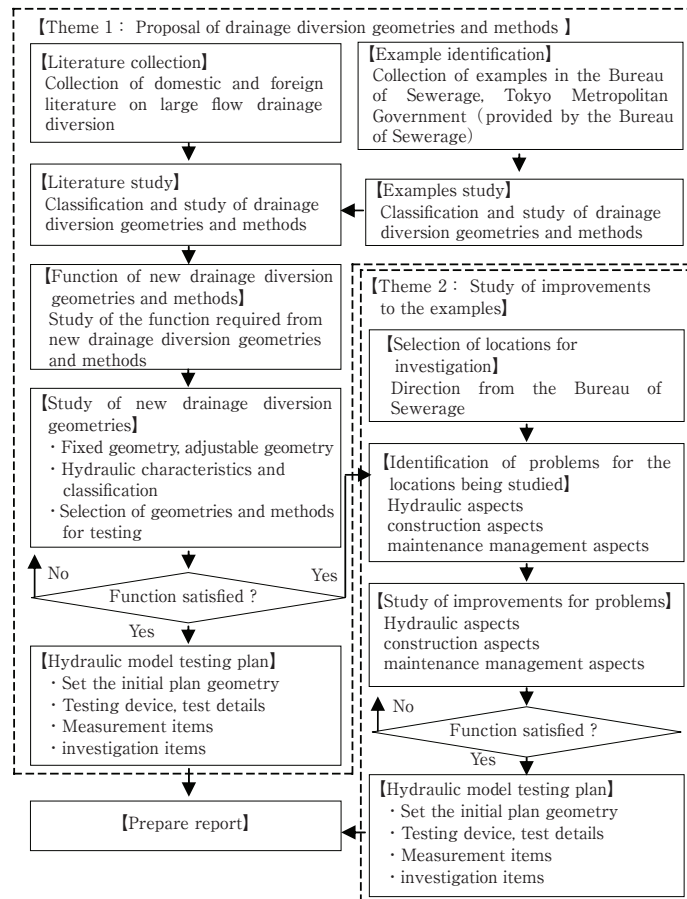
As shown in the study flow chart in **Figure — 1**, the present research studied two themes and established a plan for hydraulic model testing.

1 . Proposal for drainage diversion geometries and methods (theme 1)

(1) Collection of literature and examples

This survey was carried out as a fundamental survey for investigating new geometries and methods of drainage diversion. In the literature collection, both Japanese and foreign literature was collected, as well as the results of research carried out to date by the Japan Institute of Wastewater Engineering Technology (JIWET) that was deemed to be applicable to the present project. The collected literature was classified and sorted according to various aspects, such as “field”, “drainage diversion geometry”, “drainage diversion method”, “flow rate scale”, “drainage diversion facility scale”, “pipeline scale”, and so on.

The identification of examples focused on the drawings of drainage diversion facilities for existing facilities (including those in planning) in the Southern Construction Office of the Bureau of Sewerage, Tokyo Metropolitan Government. The examples collected were classified and sorted according to aspects such as “dam function”, “drainage diversion geometry”, “drainage diversion method”, “dam scale”, “flow rate scale”, “the existence



Figure— 1 Study Flow Chart

of a large difference in head”, and so on.

(2) Proposals for geometries and methods of drainage diversion

The present survey was for sorting out the fundamental items to create design documents. Based upon the results of the study of literature and examples, drainage diversion methods that were considered could be applied to large flow drainage diversion of most sewerage facilities and that would improve existing facilities were identified, drainage diversion methods that should be examined in the future were proposed, and a hydraulic model test plan was prepared with a view to generalization for the creation of design documents.

The hydraulic modal test plan was prepared for three types of drainage diversion method, taking into consideration the range of application to generalization of test results such as scale of water flow rate, etc.

2. Investigation and proposal of improvements for problems identified in the examples (theme 2)

In the present survey, problem points were identified for existing facilities (including those being planned) based upon the survey of examples, and individual improvement measures were investigated and proposed. In FY2005, two facilities were selected for hydraulic model testing taking into consideration “progress on the project”, “the importance of drainage diversion accuracy”, “whether problems have appeared or not”, “characteristics of the drainage diversion method”, and other items based upon the collection and study of examples. Hydraulic testing plans were then established.

The hydraulic testing plans were established as partial extraction tests of drainage diversion structures in two locations.

Research commissioned by the Bureau of Sewerage, Tokyo Metropolitan Government
Researchers : Masayuki Matsuura, Takashi Kirihara, Nobuo Tsuda, Takeshi Okamoto

key words

Large flows, Drainage diversion, Hydraulic model test