

Investigation research on spiral guideway style drop shaft installed in the right bank river-basin sewerage of Katura River.

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(Purpose)

Katura River right bank river-basin sewerage storm trunk line is the large-scale rain water storage facilities in which the rain water of about 250000m³ is stored for the purpose of resolution of the inundation damage of the Katura River right bank watershed. In national sewage works, there is no practical example of such large-scale storm storage and drainage system until now. Therefore, there remain many research subjects such as reduction of construction cost, exhaust of the satisfying functions and rational maintenance. Especially, this facilities has ultra-high head with having never such example until now between storm trunk line (the storm storage pipe) and incurrent pipes.

Within watershed storm trunk line of the total extension of 8730m, the watershed where the north trunk line No.1 pipe (diameter F 8.0m, extension 935m, gradient 0.1%) was installed in uppermost stream division and the inundation frequently occurs at present, has been made to be the interval in which the preceding improvement has been carried out from 1996 to 2000. The inflow shaft is installed to connect with up and down stream of north trunk line No.1 pipe.

Upstream inflow shaft (the Storm No.1 inflow shaft) of north trunk line No.1 pipe becomes the facilities that make the storm stream flow down vertical (the head $H=29.7251m$) with the discharge $Q=2.53l^3/s$. In the years 1996,1997, the ideal way of high head facilities of upstream and downstream shaft of north trunk line No.1 pipes was examined. Based on these research results, the spiral guideway style drop shaft (called drop shaft in the following) would be adopted in the storm No.1 inflow shaft. The hydraulic model study and material experiment were carried out on flow characteristics, geometrics and material of the drop shaft, etc., and structure of the drop shaft and shape of inlet of storage flow pipe were decided based on the results.

(Result)

The hydraulic tests for the upstream shaft of north trunk line No.1 pipe of Katura River right bank river-basin sewerage shown in the following was carried out, and rational and stabilized head treatment structure were selected.

- Examination of inflow division.
- Examination of middle guideway division
- Examination of lower guideway
- Examination of energy dissipation structure
- Examination of air entrainment quantity
- Examination on effect of water level in the storage pipe
- Examination on exhaust method

The items necessary for constructing full scale based on the research result of hydraulic test and analysis of spiral guideway style drop shaft done by now was presented.

As a result of the examination, hydrology structure of the drop shaft installed in Katura River right bank river-basin sewerage was obtained. For this hydrology structure, the experiment of loading at first sheet from the lower guide plate was carried out, and the material thickness was decided.

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Key Words

drop shaft, stabilized storm water, air entrainment quantity.