

Research on the standardization of spiral guideway style drop shaft

Period

1998.8~ 1999.3

(Purpose)

The manhole with high head has been nationally founded in great numbers. However, there are many problems in aspects of structure and maintenance because the design technique proven with theory and flow characters for high head has not been established.

According to "sewerage facilities plan and design guidelines and explanation", the applications of level difference junction and step junction using the duplicative pipe were shown as a joining method of sewers installed for the steep gradient surface. However, in fact there are many examples of founding manhole for the high head which make the sewage only freely fall without applying level difference junction or step junction for the reasons shown in the following.

It is not economical for the increment of construction cost with the number of the manhole increases.

The construction period is become longer, and the construction becomes complicated.

When such manhole was founded, the problems such as dispersion of sewage, scour of manhole bottom, air entrainment, noise and vibration, odor and so on occur. In order to solve these problems, the high head construction such as multistage free falling style, plunging style, vortex and spiral guideway style have been devised and used in practice. In this organization, the examination has been advanced for spiral guideway style drop shaft of middle omission style since 1994.

The research result of drop shaft done until now was rearranged, and standard design data (for the medium-scale) was made based on the installation results.

(Result)

In organization, the cooperative research on guideway style drop shaft has been carried out with seven local public bodies such as Nagano Prefecture and so on after the 1994 fiscal year.

The first drop shaft was installed in the manhole of the Chikumagawa River river-basin sewerage in 1996, and the common use was started in September, 1996. Design examinations of about 80 spiral guideway style drop shafts were carried out by the 1998, and the about 30 of them have been installed actually. On the situation of inside of the drop shafts, the follow-up study using video camera has been also carried out. So far, the failure of blockades by the contaminants, etc. does not happen.

From the results of installation achievements and follow-up study of the cooperative research, the standardization seems to be possible, if it is designed within discharge $2\text{m}^3/\text{s}$ and high 12m head or less. In design data (for the medium-scale), decision procedure of the shape of spiral guideway style drop shaft, connection method with incurrent pipes, the manhole shape (manhole inner space and opening size of floor plate, etc.) necessary for installing spiral guideway style drop shaft were described.

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Key Words

Drop shaft, high water head manhole.