

## Research on the technology development of steep gradient water supply sewer in Otsu City(2)

Period

1996 . 1 - 1997 . 3

61P ~ 64P

### ( Purpose )

Otsu City carried out changing authorization which incorporated the flatland district into the public sewerage zone in 1993. Although this flatland ward was a district of villa land which the private developer developed in 1965's for residences, it becomes the usual housing land at present. Sanitary sewage of the district is transported to the sewage-treatment plant installed in estate development at present, and after treatment, it is discharged to the Yanagawa upstream.

Sewer laying route of the authorization in first was laid along one of approach road to this villa. On this approach route, since there were sections with steep gradient and steep curve in great numbers, and the sewerage gradient was reversed for the road gradient, it required the pumping station due to location of very deep part, also it has long distance and narrow width ( extension 3107m, 2.5~ 5.0m width ),so the considerable constraints in traffic regulations and installation methods had induced the high construction cost .

Then, in order to shorten the pipe line extension, avoid the traffic regulation and reduce the construction period and construction expenses, etc., by utilizing laying of steep gradient sewer and new technology such as energy dissipation work and perpendicular sewer, Otsu City and this Organization examined the changing ( laying and extension 591m ) of the sewer route to the steep mountainous region.

By carrying out topographic survey and geological survey, the laying route being a most suitable sewerage facilities for steep gradient sloping land, energy dissipation scale, pipe kinds, substructures, pipe diameters and construction technique were decided. ( were reported in 1995 hypodermic water supply new technology laboratory annual report ). In this fiscal year, the examination on re-routing, sewer laying method, embankment method and perpendicular sewer( drop shaft ) with the change of the energy dissipater location was carried out.

### ( Result )

1. Examination of the relocation of laying route ( steep gradient sewer, energy dissipater )

The laying route was carried out by the Comparative examination and was set based on the ground stability, safety construction, and knowledge got from hydraulic model study etc. until now.

2. Examination of the sewer laying method

For the relocation of laying route, the part with the steepest gradient in all route was added and examined for the improvement of ground and construction of a drainage system around the sewer.

3. Examination of the embankment method with the installation of the energy dissipater

The embankment method with the installation of the energy dissipater was examined, and the reinforced soil wall method (Terre Armee method ) was adopted.

4. Examination of perpendicular sewer (drop shaft )

Since high head occurred from the energy dissipater between lower downstream and the established manhole, perpendicular sewer (drop shaft) should be newly founded, and the dimensions were decided.

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**Key Words** | Steep gradient water supply sewer, energy dissipater, perpendicular sewer