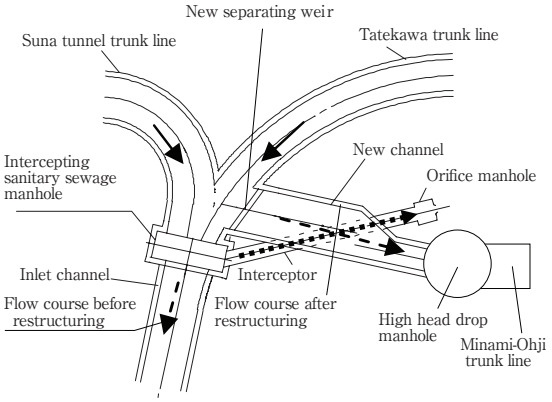
The study for water sharing to Minami-Ohjima sewer trunk line and enegy killing facilities for high head drop

Whole term	2005.8 ～ 2006.3	

(Purpose)

At Tokyo Metropolitan Ohjima sewage treatment area, the restructuring plan has been established and driving for fundamental flood measures. The plan includes new construction of Komatsugawa II pumping staion, Minami-Ohjima sewer trunk line, and abolishment of Ohjima pumping station. Now, The storm water flowing through Suna and Tatekawa sewer trunk line is pumped to outlet channel at Ohjima pumping station. Due to the abolishment, the new channel which leads the storm water to Minami-Ohjima sewer trunk line is needed. To construct this new channel, each of following constrained matters must be solved.



Figure－1　General picture of this Study

1. The design storm water flow is 26 ㎥／s (maximum interim flow is 31 ㎥／s).
2. The gap height between existing Suna and Tatekawa sewer trunk line and new Minami-Ohjima sewer trunk line is 25 m.
3. It's needed that the water sharing at the junction between Suna and Tatekawa sewer trunk line and at the area sanitary sewage interceptor.
4. There is a little space to construct new channel because of existing manhole, structure and high voltage cable.
5. The execution of works should be done in only Ohjima pumping station ground.

The goal of this study is choosing the best plan which solves all conditions mentioned above and to validate a chosen sequence of establishment by the hydraulic experiment.

(Outline)

Our consideration flow of this study is following. It has three steps. The first step is a basic research including site reconnaissance and collection of existing design data. The second step is a desk research about structures of new channel and construction techniques. The last step is a validation by the hydraulic experiment.

1. Basic research
   - The collection of data existing design, plan and buried object.
   - The affirmation of present status by site reconnaissance, plane-table survey and investigation in a channel.
2. Desk research
   - The investigation of water sharing system and elimination facilities of high head drop to solve issues which existing design has.
   - The structural suggestion of new channel and drop shaft proposed by hydraulic calculation, in consideration of constrained conditions such as buried object and construction technique.
3. Hydraulic experiment

The new channel and drop shaft which we will design have following six hydraulic issues. To solve these issues experimentally, the investigation is gone over by means of the hydraulic model which scale is 1 ／ 9.18 and size is about 20 m × 10 m.

①Intercepting sanitary water　②Diversion weir　③New channel
④Vortex drop shaft　⑤Energy killing at the bottom part of drop shaft
⑥Exhaust facilities

(Conclusion)

The configurations of water sharing area, new channel and energy killing facilities for high head drop are decided by this study. Each hydraulic conclusion is following.

(1) Intercepting sanitary water and (2) Diversion weir

The best water sharing structure has extended diversion weir and circular closing wall. This type makes both Suna and Tatekawa sewer trunk line flow smooth and equalizes the amount of intercepting wastewater.

(3) New channel

To keep stable flow to drop shaft, small step and sill with slit are needed.

(4) Vortex drop shaft

The Drop shaft is designed with reference to University of Iowa design method. Smooth flow down is experimentally observed.

(5) Energy killing at the bottom part of drop shaft and (6) Exhaust facilities

The sill with slit set in the Minami-Ohjima trunk line makes water level raised to form pool at the bottom of drop shaft. This facility make energy killing effect stabilized. In addition, the pipe for collecting air entrainment set in the top of Minami-Ohjima trunk line makes gas exhaust efficient.

Research commissioned by the Bureau of Sewerage Tokyo Metropolitan Government

Researchers：Masayuki Matsuura, Takashi Kirihara, Hiroichi Mizukawa , Seijiro Matsumoto, Yusuke Moriya

key words	Hydraulic experiment, Facilities of high head drop, Vortex drop shaft