

Investigation research on pressure flow of Moriyama Rittou storm water trunk line in Shiga Prefecture

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(Purpose)

Moriyama Rittou storm- water trunk line are the utilities which combine inundation countermeasure of urban district with non- point countermeasure of influent in the initial stage. The trunk line is overflow weir under dry management which is impounded when empty, and when overflowed, it will be discharged to the new Moriyama River by the difference of water head in natural downward flow.

By the cooperative research with Shiga Prefecture, this study does examination on the hydraulic problem of the long and high pressure flow sewer. The appropriate dimensions of utilities were decided, while the countermeasures of prevention of manhole lid scattered by the air and non- point were considered.

Main examination items are Flow capacity and exhaust utilities scale of storm- water trunk line
Effect on the new Moriyama river by discharge Examination of high head treatment of the trunk line connection manhole.

The examination of was done by using contraction scale of 1 / 25 models of from storm- water trunk line to the new Moriyama river, and was examined by using manhole model of contraction scale of 1/10.

(Result)

The proposal articles from this study on the hydraulic problems which had been clarified in examination are shown in the following

1. On flow capacity of storm water trunk line.

Since the insufficiency of flow capacity was clarified in respect to design draft dimension of storm- water trunk line, the countermeasures of widening of connecting pipe, reduction of confluences head loss by making the confluence angle to be 60°, extension of inner diameter of manhole in the discharge site, and reduction head loss by widening the waterway width of discharge sewer, etc. were proposed, and the reduction of dynamic water level of the whole trunk line was attempted, that ensured the plan flow capacity.

2. Scale of exhaust utilities of storm water trunk line.

It was proposed that the exhaust utilities are centered on departure and reception shaft in middle of trunk line, and, the opening area of 2m² is set for discharging at 10m/s of wind velocity in No.15 manhole where the largest exhaust becomes 20.1m³/s.

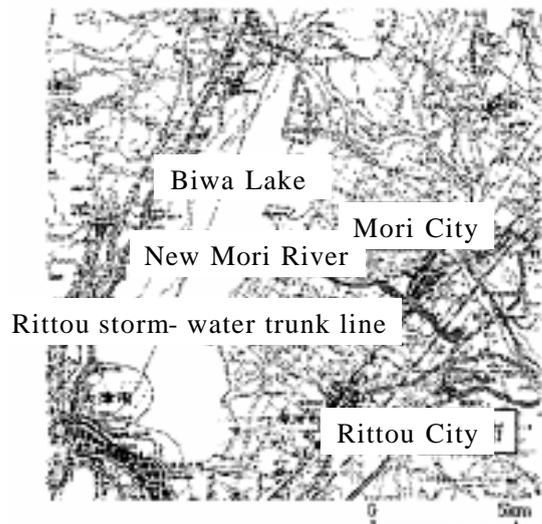
3. Effect on the new Moriyama river by discharge.

On the effect on the destination river, when start to use in common, the flow of river is little, the discharge from discharge sewer is at velocity of about 4m/s, the countermeasure range was set as the range of about 160m until its returning in usual of down stream flow based on flow velocity distribution by the experiment, since the Risk of the Scouring occurs in the revetment of river bed and opposite shore.

4. Treatment of high head of manhole in the uppermost site of trunk line

The Optimum arrangement and energy dissipater of eddy current- styled drop shaft and spiral guideway- styled drop shaft were determined by comparison of the flow conditions.

The eddy current- styled drop shaft was made to be performance of good flow condition and energy dissipation situation by modifying channel linear correction from the inflow pipe and installation of the circular energy dissipation weir. On the spiral guideway style drop shaft, it raised the energy dissipating



effect by turning the direction of the outflow pipe to reverse-direction of trunk line sewer.

And, the countermeasure which reduced the air entrainment quantity by the air vent tube was proposed. Though the air of largest 2.4% was taken in the intake of sewer, by installing the air vent tube at the crown of sewer, it was possible to reduce the entrainment quantity to 0.05% in downstream.

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Key Words

Conveying line Movement water level Head loss Plumbing mind utilities River bed protection Vortex style drop shaft Spiral guideway style drop shaft .