

Study on how to eliminate unsewered areas

Year of Research

2008 • 2009

(The purpose of the study)

“Quick Project” to eliminate unsewered areas in a comparatively short period was inaugurated in fiscal 2006 to conduct the experiment which introduces new technique for early implementation of sewerage facilities.

Mashiki Town, Kumamoto Prefecture, took part in the project introducing sewer laying with no earth cover and multiple use of improved siphon structure recommended in Quick Project. The facilities were constructed and put into operation in fiscal 2008.

This research was carried out to verify the validity of above mentioned technique by evaluating the performance of constructed facilities through data collection/analysis and its examination.

(Results of the study)

This experiment was either prepared or carried out in the first stage as follows, while the whole experiment is to be carried out to presume and clarify issues to solve, to evaluate the performance and to propose improvements taking into account 1. Target Achievement, 2. Preservation of Sewer Function, 3. Unexpected issues occurrence, 4. Constraints 5. Necessity for Improvement, 6. Advantages and Disadvantages, 7. Predominance, 8. Availability and 9. Contribution to elimination of unsewered areas.

(1) Sewer laying with no earth cover

- 1) Characteristics of Sewer Material (a): Occurrence of pipe material deterioration by ultraviolet rays and temperature

(Method) The pipe with the same material as that of the pipe laid onsite is laid and left under the same temperature at the pipe gallery of WWTP where it is dark. Strength and deterioration will be examined after one year.

(Conclusion) Pipe laying only was done this year.

- 2) Characteristics of Sewer Material (b): Influence by expansion and contraction of sewer.

(Method) Marking is performed for exposed piping, distance measurement is carried out after progress during a fixed period, and change is checked.

(Conclusion) Amount of expansion and contraction was in the range between +0.5 and -0.3 mm, rate of expansion and contraction is +0.0162-0.0237%. The change was negligible.

- 3) Change in water temperature and water quality.

(Method) Thermometers are installed inside and outside a manhole, and a hydrogen sulfide detector is installed inside the manhole, and measurement is done for a certain period.

(Conclusion) Even if outside temperature became 0°C or lower, pipe and water temperatures were higher than outside temperature by about 3 °C with no sewage freezing. No hydrogen sulfide was detected.

(2) Multiple Use of Improved Siphon Structure

- 1) Flow Capacity.

(Method) The backwater is artificially generated and water level difference is measured at both sides of the siphon. Then, the flow is measured, theoretical head loss is estimated and the actual head loss is measured.

(Conclusion) The measured head loss was smaller than the value described in design guidelines. If the design includes marginal head loss, their difference is judged permissible.

- 2) Influence on the Living Environment.

(Method) The noise and the smell at the siphon manhole are measured. Hydrogen sulfide concentration is measured for a certain period using a hydrogen sulfide detector and a hydrogen sulfide densitometer.

(Conclusion) Noise and smells were rarely detected at the siphon section. The hydrogen sulfide concentration in the manhole was 0 ppm on average with occasional rise to 10 ppm at highest, which implies that the level is not serious.

- 3) Evaluation for the time being

The result so far shows that there will be no serious issues, implemented facilities satisfactorily function, there will be no constraints and specific points to improve and that the system can be applied to other sites.

(Future schedule) The same measurement, the strength test of pipe material, etc. will be done in May - August, 2009, and it will be evaluated from overall viewpoints.

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Key words

Quick Project for Elimination of Unsewered Areas, Sewer Laying with No Earth Cover, Multiple Use of Improved Siphon Structure