

# Internal Pipeline Inspection and Extension of Service Life Using the Impact Elastic Wave Method (Fukuoka City)

Year of Research

2013

Appropriate stock management

**(Purpose)**

In this project, we conducted an inspection of aging pipes in Kamiya and Chiyo districts of Fukuoka city using a TV camera and the impact elastic wave method. The inspection results were used to select the construction method (including structural calculation) for the rehabilitation of the pipes and to study the effectiveness of the method when it is used for renewal and extension of service life. In addition, we developed basic data to estimate the remaining life of aging pipes.

We also cut open pipes that were diagnosed as "healthy" and "deteriorated" to conduct a destructive test on pipeline in question. We then checked the load bearing ability of aging pipes and compared the actual measurement value with the breaking load value estimated with the impact elastic wave method to check consistency. We compared the value with the results of past verification tests to demonstrate the reliability of results obtained with the impact elastic wave method.

**(Results)**

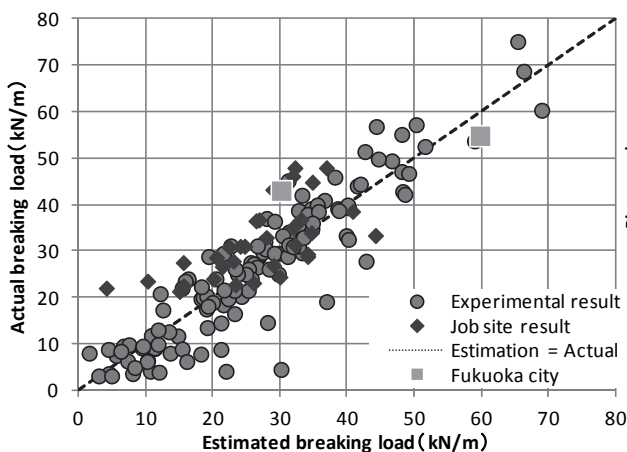
(1) Renovation and repair decision and review of construction method

After studying all 48 spans, the following results were obtained with the TV camera and impact elastic wave method for overall consideration: degree of urgency I: 5 spans (10%), degree of urgency II: 6 spans (13%), degree of urgency III: 35 spans (73%), No urgency: 2 spans (4%).

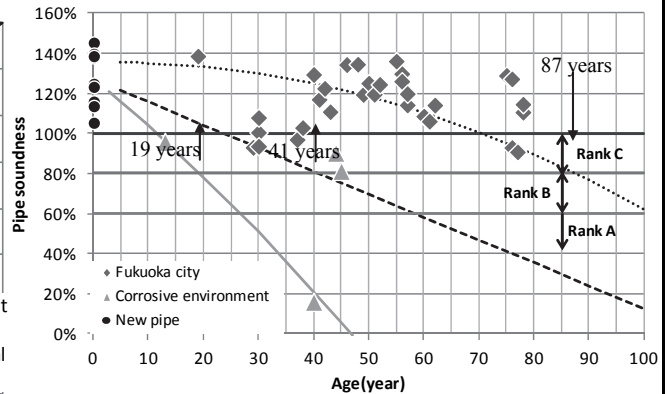
- ① Of all 11 spans with degrees of urgency I and II, 8 spans were determined to require action to extend the service life.
- ② All 8 spans can be adapted to composite pipes. In addition, we confirmed that selecting a composite pipe can reduce the cost by approximately 20%.
- ③ The pipes were taken out of the ground in order to conduct a destructive test. The estimated value obtained by the impact elastic wave method showed good consistency with the actual value (**Figure 1**).

(2) Estimation of remaining life with using soundness of pipes

- ① The service life was estimated by taking into account data from 6 districts of Fukuoka city and other cities (**Figure 2**).
- ③ The progress of deterioration differs depending on the environmental conditions of the pipeline. Therefore, frequency and other factors can be set depending on the conditions.



**Figure 1. Comparison between estimated and actual measurements**



- ① Deterioration obvious at an early stage
- ② Slow deterioration progress
- ③ Corrosive environment

**Figure 2. Relationship between soundness of pipes and number of years elapsed**

**(Summary)**

We found that it is possible to obtain data that can be used to reduce the cost of rehabilitation and develop a long term plan using soundness by using the impact elastic wave method.

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Key words

Diagnostic investigation, life extension plan, impact elastic wave test, repair, reconstruction