

# Joint research on the longer operation life plan of sewerage pipes in Katano city

Year of Research

2013

Appropriate stock management

## (Purpose)

Katano city started their Sewerage Works relatively early in 1967 and the part of sewerage pipes will reach the useful life soon. Therefore, it is necessary to design the longer operation life plan to implement the reconstruction of sewerage pipes.

Further, in the separate sewer system of Katano city, the presence of stormwater inflow has been reported in wet weather. Against this background, our institute analyzed the survey results on the inside of sewerage pipes, mulled measures, and developed the longer operation life plan concerning the watershed where the presence of stormwater inflow has been observed (the total length of sewerage pipes is about 4.9 km and the area is about 16.9ha). Also, we verified the applicability of the prediction formulae on the soundness of sewerage pipes proposed by National Institute for Land and Infrastructure Management (hereinafter referred to as "NILIM") to the sewerage pipes of Katano city.

## (Results)

(1) On the survey results on the inside of sewerage pipes

**Table.1** shows the line number of each degree of urgency which was judged by the survey results. As a result, urgency I was 12 lines (5.3%), urgency II was 67 lines (29.6%), and urgency III was 147 lines (65.0%), respectively. In consideration of the period of the longer operation life plan, we set urgency I and urgency II as the target of the longer operation life plan because sewerage pipes of urgency I and urgency II should be reconstructed within 5 years. In addition, **Figure.1** shows the line number of the measures for old sewerage pipes which were judged finally as replacement, rehabilitation, and so on.

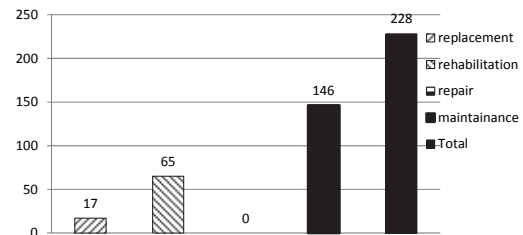
The lines of the target of the longer operation life plan were about 36.0 % of the total ((17 lines of replacement + 65 lines of rehabilitation) / 228 lines of total). Although almost sewerage pipes reach the useful life soon, the rate of pipes which became the target of the longer operation life plan was relatively low.

(2) Applicability evaluation of the prediction formulae on the soundness of sewerage pipes

**Table.2** shows the results of the percentage of each urgency calculated by the prediction formulae proposed by NILIM (hereinafter referred to as "the prediction formula"). In addition, **Figure.2** shows the comparison between **Table.1** (the soundness by survey) and **Table.2** (the soundness by the prediction formulae).

**Tab.1 The line number of each degree urgency by the survey result**

Types of pipe	passe years	Urgency (The numbe of span)			Urgency (%)		
		※the results of survey			※the results of survey		
		I	II	III	I	II	III
CP	47	0	16	17	0.0%	48.5%	51.5%
	45	5	31	74	4.5%	28.2%	67.3%
HP	47	1	0	1	50.0%	0.0%	50.0%
	50	6	20	37	9.5%	31.7%	58.7%
VU	45	0	0	3	0.0%	0.0%	100.0%
	47	0	0	2	0.0%	0.0%	100.0%
unkown	unkown	-	-	-	-	-	-
	all	47.67	12	67	147	5.3%	29.6%



**Fig.1 The line number of the measures for old sewerage pipes which are judged finally**

**Tab.2 The percentage of each urgency calculated by the prediction formulae proposed by NILIM**

Types of pipe	passe years	the number of span	Urgency(%)		
			※prediction fomula		
			I	II	III
CP	47	33	17.7%	39.9%	42.4%
	45	110	10.3%	34.1%	55.6%
HP	47	2	12.1%	34.2%	53.6%
	50	63	15.2%	34.0%	50.8%
VU	45	3	-	-	-
	47	2	-	-	-
unkown	unkown	2	-	-	-
	all	47.01	228	13.0%	32.8%



**Fig.2 The comparison between the percentages of the urgency by prediction and by survey.**

**Figure.2** expresses the comparison between the percentage of the urgency calculated by the prediction formulae ( I ~ III PF) and the percentage of the urgency analyzed by survey ( I ~ III SV). Concerning CP47, the gap between the percentage of I SV and the percentage of I PF was large, 17.7%. But except the urgency I of CP47, the differences between the percentage of SV and the percentage of PF were within 10% ( HP 47 was the exception because the number of samples was only 2). That is to say, it is suggested that the prediction formulae can have sufficient accuracy in case of Katano city. In addition, as to urgency I and II, we find the relationship that the percentage of PF is larger than the percentage of SV in most cases. Therefore, it is also suggested that we can predict the urgency I and II on the safer side

**(Conclusion)**

- (1) There were about one third of lines which became the objective of longer operation life plan.
- (2) It is suggested that the prediction formulae of soundness on sewerage pipes which are proposed by NILIM have sufficient accuracy in case of Katano city. In addition, it is also suggested that we can predict the urgency I and II on the safer side. Therefore, we can utilize the prediction formulae by NILIM in designing the longer operation life plan in Katano city effectively.

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Key words

longer operation life plan, Survey on stormwater inflow