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Sewer success

By Karl Jansen, Expert Office for Sewer Rehabilitation

Expert Office for Sewer Rehabilitation applies a unique case study analysis to the assessment of ageing sewers, which can save asset owners time and money.

AT LEAST 20 per cent of all international sewer networks have significant pipe bursts or leakages that will ultimately require rehabilitation or replacement.

Comprehensive CCTV inspections of sewer networks can take some 10-15 years to complete, resulting in pipe bursts and leakages not detected in time. In the meantime, secondary defects deteriorate, requiring more costly renovation and replacement measures.

Traditional rehabilitation concepts are only suitable if more than 80 per cent of a sewer has been inspected, and this can be limited by subtle network-specific deterioration and obsolete inspection data. Only 3-5 per cent of available data about the state of construction can be used for current rehabilitation measures.

Conventional comprehensive inspection comprises a consistent inspection of sewers independent of their condition. Therefore, inspection of, for example, 50 per cent of all sewer networks comprises only 50 per cent of the sewers in critical condition.

Alternatively, selective sewer inspection with a maximum sample inspection size of 20 per cent, focuses on inspecting layers with a high number of severely damaged sewers.

BASIC IDEA OF SELECTIVE INSPECTION

A fundamental prerequisite for a reasonable layering of the local sewer network is the correct determination and classification of all relevant local

influencing factors. This comprises all network-specific influencing factors that have contributed significantly to the respective sewer defects, including:

- Year and quality of construction
- Installation and construction method
- Builder
- Pipe materials, sleeves and seals used
- Influences and damages by third parties, especially during war years
- Crossing pipes with impaired sewer structure
- Coverage and position in the traffic area
- Drainage systems
- Diameter
- Soil and ground water type.

So the condition, or ageing, of a sewer is not only a matter of time – it is also the result of various network-specific influencing factors.

On the basis of this classification, qualitative sampling is performed by means of CCTV inspection up to a predefined target layer size of some 20 per cent of all reaches within a layer. Existing inspections can be considered, therefore reducing the sample size.

The results show the distribution of the condition classification of inspected samples for the respective layer. For the distribution of condition classification, the statistical parameters are calculated, (i.e. mean values, standard deviation, variants, standard deviations from the mean value, and the 95 per cent minimum condition of the layer). Additionally, the

upper and lower limit of the confidence interval for each condition class, with a certainty of 95 per cent of the calculated range of the confidence interval and a significance level of only 5 per cent, is also calculated.


Subsequently, the condition of non-inspected reaches of a layer is forecast on the basis of the inspected reaches, including forecast of the total network without layer formation.

Based on this, the efficiency is determined as knowledge of the selective inspection of the relative share of condition classes 1 and 2 that can be collected faster as compared to conventional inspection strategies.

Moreover, the sequence of further inspection and rehabilitation priorities of non-inspected reaches is determined with the probability of condition classes CC1 (DWA CCO) or CC1+2 (DWA CCO+1).

Efficiency and knowledge of this selective inspection are significant, as the hit rates of detected pipe bursts and leakages are initially higher for the same inspection scope than with the conventional, comprehensive inspection.

Thus, the selective inspection is at least two-and-a-half times more cost-effective than a conventional, comprehensive inspection.

Two of Expert Office for Sewer Rehabilitation's products, AQUA-Selekt and AQUA-WertMin, are already in use by Queensland Urban Utilities. 

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A Farsighted View of the Sewer

Program for the condition inspection and leakage identification of sewer systems and house connections with max. 20 % CCTV inspection sample. Thus, these results can be projected to the total network with a respectable precision of 95 %.

AQUA-Selekt for Windows

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