

All Show and All Substance in Tilburg, NL

Efficient Relining with **HOBAS®** NC Line® Wins No Dig Award

The sewer in Sint Josephstraat, The Netherlands, is part of the Tilburg main sewer and is an important link in the system of the waste water treatment plant and the rainwater overflow at the Wilhelmina Channel. Designed in 1927 and installed one year later, it consists of a concrete base with a masonry arch. Its transversal section is that of a reversed egg profile, with 1.90 m maximal width and 2.15 m height.



In the late 90's the road above the sewer constantly subsided. Inspection with radar equipment showed that this problem occurred due to the collapse of cavities beside the sewer. The cavities themselves developed because of sand being washed through cracks in the base of the construction. Repair works became immanent and resin was injected to stop the sand from passing through. This solution, however, proved to be unsuccessful so that the municipality of Tilburg was confronted with the question whether to take structural measures.



The problem was solved step by step and with the support of external consultancies and also HOBAS Benelux offered their expertise.

Step 1 - Research

To find the cause for the cracks in the sewer, drill samples were taken from the line. Each sample was strength tested. The masonry proved to be of excellent quality: strength > 60 N/m². The quality of the concrete base, however, did not exceed class B10 and calculations proved that the cracks evolved due to an overload on the structure.

Step 2 - Evaluation

The gravity and scope of damage had to be evaluated in order to determine which measures were to be taken and what should be prioritized. Sewer renovations ask for tailor-made solutions where local circumstances play an important role. Since repairs did not solve the problem, relining or the replacement of the sewer had to be taken into consideration. The latter option would have called for the destruction of the complete existing line in open trench whereas with relining the old structure would remain. The idea of replacing the sewer was soon set aside for it posed technical as well as implementation problems. Moreover it would have been the most costly method.

Basing the decision on the analysis, Tilburg chose prefabricated reinforced plastic (GRP) pipe elements to reline the whole affected section. An important precondition concerning pipe capacity was the maximal acceptable diameter reduction of 10 cm. This limited the number of sliplining methods ("lining with continuous" or "discrete pipes"). Another criterion was the length of the damaged section which does not exceed horizontal deviations (angle distortion) in the line.





The application of (cured-in-place) hose relining could not be implemented for several reasons, mainly concerning the uneven distribution on the non-circular sewer walls which would anticipate uneven load distribution as well as possible buckling because of the required wall thickness, deviations, angles, and for simply being irreversible once applied. Apart from this, there was little experience with hose relining in large non-circular constructions as such and the method does not allow temporary use of the sewer while being applied. HOBAS NC Line therefore promised to be the better solution. During its installation the sewage is redirected. At heavy rainfall, however, the HOBAS NC Line can be used temporarily and may be evacuated within 10 minutes.



Step 3 - Measures

The number of suppliers for non circular pipe segments that are manufactured in advance is limited. Tilburg soon selected sliplining and HOBAS NC Line Systems. Most important criteria were the guaranteed product quality, provided technical know-how for the implementation, tested and certified homogeneous pipe material and high strength with a relatively small reduction in flow volume.

The pipe design and implementation method were handled by the manufacturer and contractor. Also a wide range of fittings such as manholes, inlets, etc. were included in the

tender which the municipality released in 2007. Contractor Heijmans Infra techniek BV from Rosmalen won the bid.

Step 4 - Implementation

Preparing the implementation, the contractor had to prove that the design meets all specified requirements. The pipe strength was classified with an FEM (finite elements method) calculation which is based on the German directive ATV-DVWK-A-127 and particularly ATV-M-127-2.

The structural wall thickness of the pipe segments was calculated to be 26 mm. For installation, a special transportation vehicle was developed by the constructor. After assembly, the space between NC Line and original structure will be filled where the line needs to be kept in place, preventing it from buoying up.

Being an impressive trenchless solution efficiently realized with HOBAS NC Line, it rightly deserved its reward at the NSTT No Dig Award 2009.

Overview	
Year of Construction	2008
Duration	5 months
Total Length of Pipe	860 m
Pressure Class	PN 1
Diameter	2150/1900 mm
Installation method	open trench
Application	SewerLine®, NC Line®
Client	Community Tilburg
Contractor	Heijmans Infra techniek BV
Advantages	made to measure profiles, complete leak tight system, high quality, small loss in relining diameter