

Sought, Evaluated & Found: The Best Solution for Basel-Stadt HOBAS® NC Line System for a Relief Sewer in Switzerland

After 70 years of service the approximately 1-km-long deteriorated concrete relief sewer Leimgrubenweg/Walkeweg in the Swiss canton Basel-Stadt Switzerland could be no longer maintained with spot repairs. Extensive preliminary investigations and an in-depth evaluation of possible solutions commissioned by the Municipal Works Service Department for Municipal Sewage of the canton Basel-Stadt in Switzerland led to a sliplined HOBAS NC Line solution that ensures trouble-free service for a minimum of 50 years.

The egg-profile concrete line (1420/1970 mm and 1500/2050 mm) with dry weather channel and lateral walkway had been built in 1936 to 1938. As the inspections by Amberg Engineering AG in December 2009 showed, various mends and flexin-injections had already been conducted in the early 1980s. However, infiltration and leaks have been detected along the line and circulating water will further weaken the concrete structure. Since the porous and heterogeneous sewer runs fully below ground water level, defects are expected to spread also to currently unaffected parts – in some parts the line remains tight thanks to the mortar coating and putty only – which suggested the end of the channel's lifetime.

Due to the remaining load-bearing capacity of the old structure, the varying geologic conditions and generally higher installation costs ruled out a new structure installed by microtunneling. Also hose relining could not be taken into consideration as the large diameter of the line together with the manhole spacings would have resulted in too heavy hose weights, which would have been impracticable regarding the restricted space on site. The three best remaining options were therefore: re-profiling mortar, GRP lining and an inside shell of self-compacting concrete (SCC). An in-depth evaluation of costs and benefits was conducted considering: the costs, fitness for purpose/structural safety, hydraulics/capacity, temporary drainage, impacts/measures regarding installation and traffic, maintenance and installation time. In respect of the surrounding conditions the costs and benefits have been weighed and the costs have been calculated on an annual basis since each of the three alternatives has a different product lifetime. Technically as well as economically the evaluation speaks clearly in favor of HOBAS NC Line Systems.

Structural Safety and Fitness for Purpose

A major advantage of the HOBAS GRP NC Line solution is the products' high stability and sturdiness at relatively small wall thicknesses. Despite the presently sufficient load-bearing reserves of the existing structure, the NC Line Profiles have been designed self-supporting with 24 mm thick walls. As only solution that reinforces the old structure also in future when



Year of construction	2011-2012	Pressure class	PN 1
Envisaged installation time	4-5 months depending on rainfall	Installation	Relining
Scope of products	1 km NC Line, 0.5, 1 und 2-m-long sections, prefabricated with dry weather channel and walkway	Application	SewerLine®
Diameter	approx. 1300x1870 mm; self-supporting; wall thickness: 24 mm	Client	Tiefbauamt Stadtentwässerung Basel-Stadt
		Contractor	Insituform Rohr- anierungstechniken GmbH Leonberg Stuttgart
		Benefits	Highest structural safety, long product life, low maintenance costs, fast installation for less impacts



it should further disintegrate, the GRP lineaced out its alternatives in terms of structural safety. The tightness of the system is furthermore provided without greater additional investments in the future and for a service life of at least 50 years.

Hydraulics and Capacity

A reduction in cross-section is inevitable for all three relining methods. The significantly lower roughness coefficient of the inner pipe layer and relatively thin wall thickness of the HOBAS NC Line Profiles, however, provide the greatest discharge capacity compared to the alternatives. The prefabricated 1300x1870 mm NC profiles are designed to match the original channel's form and comprise a dry weather channel as well as a lateral walkway with a safety tread for inspections.

Temporary Drainage, Installation and Environment

Three access shafts were prepared to slipline the HOBAS NC Line Profiles which are delivered in 0.5, 1 and 2 m-lengths to optimally adapt to the pipeline route and for easy installation. The easy handling of the profiles is particularly important regarding the restricted accessibility to the channel and depth (15 to 18 m) of the route. Just-in-time deliveries and a fast installation reduce impacts on the environment, traffic impairments and disturbance of the inhabitants. Despite the necessary drainage of the old structure during construction works and preparation of shafts, the estimated installation period for slipling HOBAS NC Line Systems is the shortest of all compared solutions.

Maintenance Costs

Thanks to the products' longevity of a minimum of 50 years and minimal cleaning efforts due to the smooth finish of the internal pipe walls HOBAS GRP clearly scored in respect to low maintenance costs. Moreover and unlike other proposed materials costs will not rise with the line's service life.

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