GRP Liner (CIPP) DN 1600 mm (63”) successfully installed

The Berolina-Liner has been used globally since 1997. BKP has had many years of experience renovating culverts using the Berolina-Liner. The first use of the liner to specifically renovate a rainwater culvert was in Canada in March 2009.

Partial renovation of a rainwater culvert in Sweden using the Berolina-Liner

NCC Construction Sverige AB, one of the leading construction and property development companies in the Nordic region, were responsible for the recent renovation of a rainwater culvert under a railroad track and the E4 highway in Sweden, using the Berolina-Liner DN 1600 mm (63”). The renovated section was 70 meters (230 feet) long. The 12 mm thick UV-cured GRP Liner had been produced by BKP Berolina Polyester GmbH & Co. KG in Velten, near Berlin and was installed near Stockholm.

The local site conditions were extremely difficult. The 100 m long culvert was only accessible from one side. The other end was located in the middle of dense vegetation and a swampy area, and could only be reached by an excavator on wide crawlers. The railroad track above the railroad embankment could not be crossed and remained in operation throughout the renovation works. The areas around both outlets were dried out by pumping away water using multiple effluent pumps with a total capacity of more than 100,000 l/h. Extensive corrosion damage was found on the first 70 meters of the 100 m long culvert. This section was renovated with a 70 m Berolina-Liner.

The Berolina-Liner is located in front of the culvert

Heavy duty equipment required - Crawler excavator replaced winch

A truck-mounted crane had to be used to position the almost 7 ton Berolina-Liner in front of the culvert. All installation equipment had to be lowered into the work area. The gliding foil and the Berolina-Liner could not be winched in as usual. Instead of a winch the crawler excavator had to winch in the Liner. One end can was connected and the liner was pulled in by moving the excavator forwards and backwards several times. Using this approach the Berolina-Liner could be pulled into the correct position of the culvert. The end can on the other outlet was then installed. The liner had been calibrated according to the manufacturer’s

specifications without any problems. The maximum internal pressure needed was 160 mbar (2,3 psi). This pressure calibrated the liner for a “close fit”, i.e. largely without any annular spaces, and even into the sectional corrugations adjacent to the existing pipe. The light train with 9 x 1000W lamps was pulled into the liner without any pressure loss by using an air lock. Once the liner had been completely cured by UV-light, the ends of the liner were cut off.

The assembled end can was pulled together with the Liner

BKP Berolina’s many years of experience renovating culverts

The Canadian installation previously referred to involved installing a 45-meter long GRP with a diameter of 600 mm and a wall thickness of 9 mm. The Berolina-Liner ran under highway 407ETR and has absorbed on the static requirements of the existing heavily corroded corrugated steel pipe since 2009. The fact that it is undersized to varying extents by up to 5% means that the Berolina-Liner can be held in position particularly well against the wall of the existing pipe, without wrinkles. As in the construction measure described above, the Berolina-Liner generally extends almost completely into the sectional corrugations of the corrugated steel pipe. However, the design calculations do not take account of the increase in the annular stiffness created by the resulting profiling of the pipe liner.

Construction manager Magnus Eriksson (NCC) after the renovation in the Liner DN 1600 mm

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