

Long Distance Micro tunneling with Direct Pipe and E-Power Pipe

Direct Pipe has initially been developed to complement the HDD technology for challenging river crossing. The method combines the well-established Micro tunneling technique with the Pipe Thruster technology and thereby makes it ideal for difficult (permeable) soil conditions which pose a certain risk for frac-outs using the HDD method.

The innovative Direct Pipe® method has first been used in 2007 at the Rhine river crossing in Worms, Germany, where permeable soil conditions did not allow the use of HDD. The first installation in the U.S. was in August 2010 crossing Hwy 70 in Florida. Besides the minimum frac-out risk the owner (DOT) appreciated the high alignment accuracy, flexibility in operation (only one shift operation) as well as the almost zero settlements across the highway. Meanwhile more than 120 Direct Pipe® installations have been carried out worldwide with a total of 50 in North America.

The first installation in Canada was in September 2013 by Michels Canada, crossing the Beaver River near Bonnyville, Alberta. A further milestone was the approval by the US Army Corp of Engineers in early 2015, preferring the technology for the sensitive levee crossings. In December 2017, Laney Directional Drilling conducted the first Direct Pipe® Sea Outfall in North America installing a 42 inch (1,050mm) pipeline 1,495m (4,900ft.) into the Gulf of Mexico and thereby taking over the world record in long-distance Direct Pipe® installations at that time.

E-Power Pipe® on the other hand, has been developed for long-distance pipeline installations of smaller diameter pipes (<30 inches), with installation length of over 1,000m (3,300ft.). First, the AVNS excavates the borehole using a temporary jacking pipe concept. Second, the rack and pinion jacking frame pulls in the prefabricated HDPE casing pipe for high-voltage underground cables. To date, three projects with a total of 15 drives have been executed successfully reaching drive lengths of up to 670m (2200ft.). Both technologies are entitled for longer crossings whereas in typical Micro tunneling installations intermediate shafts are foreseen. A key benefit is the retract ability in case unforeseen e.g. obstacles are encountered along the tunneling alignment or cutting tool or complete cutting wheel changes are required. During the pullback process highly viscous bentonite stabilizes the borehole until the modified machine is reinserted into the borehole to finish the drive. In order to provide sufficient pulling capacity steel pipes are used with proper welds to transfer the tensile loads. In the two-stage E-Power Pipe® application, special jacking pipes have been developed with a new chain type coupling system which allows very fast assembly and disassembly of the pipes. These pipes serve as installation pipes for the pilot bore and are recovered to be reused on the next project.

One of the key features of the new E-Power Pipe® system is the jet pump technology which is about to be used in small diameter Direct Pipe® installations (<30 inches/<900mm) in the near future as well thus providing an alternative to HDD in soil conditions where safety against hydraulic fracture is too high.