Issue 5/2013

PipeLine

HOBAS®

Jacking Around the Globe | Part 1

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Curved Jacking with HOBAS® Pipes D_e 2160 in Paris, FR

The Société d'Etudes, de Maîtrise d'Ouvrage et d'Aménagement Parisienne SEMAPA (project company for Parisian constructors and road-builders), is coordinating development projects in Paris' 13th arrondissement. In a recent stormwater treatment project on the south bank of the river Seine, 205 m HOBAS GRP Pipes D_e 2160 have been jacked beneath the Ivry-sur-Seine dock.

SEMAPA's mandate involves the redevelopment of 130 ha in the Paris Rive Gauche area to create room for housing, offices, trade and commerce, schools, and infrastructure including the extension of the Paris Métro Line 10. One of the projects in this context was the building of a stormwater storage and treatment system at a cost of 7.8 million euro in the Bruneseau Nord district that should clean the stormwater before it is released into the Seine. The system is installed below the Ivry-sur-Seine dock and includes DN 2000 sewer pipes as well as an overflow for cases of flooding of the Seine.

The decision to install the pipes by means of microtunneling was based on various circumstances. To start with, the high volume of traffic on the dock required an approach that would keep disruptions to a minimum. Furthermore, the position of the sedimentation chamber at the beginning of the track and the diffuser shaft at the end required an installation of the pipeline at a depth of 8-10 m on a 205 meter stretch. An open trench installation at this depth would have been quite difficult and very risky: The subsoil below the Ivry-sur-Seine dock is obstructed by beltway overpass piers, a few gas station tanks, and two slurry walls, and the groundwater table varies between 0 and 5 meters. Furthermore, the two already existing shafts lent themselves as thrust and receiving pits for the microtunneling machine.

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Year of construction
2013
Construction time
2 weeks
Total length of pipe
205 m
Pipe specifications
D_e 2160, PN 1, SN 50000
Installation method
Curved jacking
Client
SEMAPA
Contractor
Ludwig Pfeiffer Microtunnel
Advantages
Very smooth outer surface, constant outer diameter, short pipe lengths possible, optimal for curved jacking thanks to even transmission of the thrust force without timber joint packers

Under these conditions, the dimensions of the microtunneling equipment and pipes also had to meet given constraints. The GRP Jacking Pipes provided by HOBAS France have a wall thickness of 79 mm, an external diameter of D_e 2160, and a very high stiffness at a low inside to outside diameter ratio, allowing for an AVN1600 full face excavation machine to be used instead of an AVN2000. Apart from being light in weight and easy to handle, HOBAS GRP Pipes are also particularly abrasion resistant. Thanks to their smooth surface and constant outer diameter, they allow for low jacking forces and high installation rates. In addition to various international certificates, the GRP Pipes provided by HOBAS France are also CSTBat certified, meaning that they comply with the stringent quality standards of the French "Centre Scientifique et Technique du Bâtiment" (Scientific and Technical Center for Civil Engineering).

The challenge was to build a DN 2000 pipeline on a curved jacking drive passing the beltway overpass piers and a few gas station tanks and through two slurry walls: Two horizontal bends at 500 and 400 m radii as well as an altimetric curve for the transition from a 0.5 to 1% incline had to be realized. HOBAS France provided specifically designed pipes in lengths of 2 meters to facilitate the realization of these curves. HOBAS GRP Pipes are ideal for curved jacking drives in that they allow for an even force transmission without timber joint packers. The thrust force of the straight run is adjusted in accordance with the radius of the curve. In this project, the allowable thrust forces that were calculated on the basis of the radii equalled 5530 kN and 6549 kN (as compared to 8845 kN on a straight drive).

Thanks to precise timing and coordination of personnel and pipe deliveries, the jacking works were completed within two weeks. The construction company Ludwig Pfeiffer Microtunnel chose a boring head that suited the sandy, gravelly clay soil. A special braking system helped regulate the pressure of the water table on the boring head and prevent the pipes from being pushed back out into the thrust pit. Ludwig Pfeiffer's operators steered the microtunneling machine all the way to the exit shaft, arriving precisely on target. Thanks to the optimal characteristics of HOBAS Jacking Pipes, the applied jacking force never exceeded 1570 kN and was therefore far below the calculated maximum force. This site is a showcase project for HOBAS France and Ludwig Pfeiffer Microtunnel, who both demonstrated their microtunneling expertise and ability to realize world-class projects.

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