

Boring in the mud-flats: New drinking water pipe for holm in the North Sea



The Foeckersperger cable plow installing the pipe through the mud flats.



The pipe end in the mud-flats, which were installed with the "plow"



The pipes are prepared for installation in the mud-flats. The pontoon is in the background with the bore rig.



The holm "Nordstrandischmoor" with its 18 inhabitants is a small North Sea island in the mud-flats. A small passage leading through a dam connects the island to the mainland 5 km away. On the other side of the island the company Paasch, from Damendorf, a subsidiary of Güstrow, had to accomplish an unusual job.

In front of the dyke on the mainland a large jobsite sign was erected to notify the public that the water supply board Oeversee is installing a drinking water pipe 225 x 17,3 mm over a length of 5.200 m to the holm Nordstrandischmoor. The reason for this project is that an existing 225 mm asbestos cement pipe laid in 1964, had to be renewed because of its age. Two PE-steel armoured sea pipes, installed in 1990, were to be connected to the newly installed pipes at the transfer shaft at Hallig and to

the mainland. The 355 mm pipes have already been installed into the transfer shaft from the sea below the dykes by employing the HDD method.

Benno Paasch explains: "Since the middle of June we have only been able to work at ebb-tide. The tides determine our operating time and the flood-tide is always bearing down on us. First of all using the plow method the pipe was installed at a depth of 1,50 m over approximately 400 m towards Hallig. A cable and plow unit from manufacturer Föckersperger was used, who developed, constructed and successfully applied the first hydraulically adjustable plow for the installation of pipes in Bavaria. With this technique up to 24 cables or pipes up to 355 mm pipe diameter can be trenchlessly installed simultaneously. The installation unit consists of a winching unit suitable for terrains and the cable plow. With the plow plate, which is lowered to the required depth into the starting pit, the penetration for the hollow space for the installation is produced. The pipe itself is fed in via the installation shaft and pulled in parallel to the



The Grundodrill 12 G-bore unit during the pipe installation



The pontoon carrying the boring equipment.



The bore head is exchanged for the backreamer with the attached PE pipe string.



Pipe pulling.

plow route. For this application the unit had to be adapted to meet the prevailing conditions in the mud-flats. The winching unit with cable winch and anchoring plate was equipped with an undercarriage with rubber

Having almost reached the target the ground conditions suddenly became softer with less load bearing capacity for the vehicles, which slowly sank despite all precautions. It was a dramatic act retrieving the cable and plow unit and the vehicle before the flood set in. Due to the very soft ground conditions the plow could not be used any more. It was decided that the last 400 m would be installed by using HDD methods."

The Grundodrill bore unit type 12 G (manufacturer: Tracto-Technik, Lennestadt) was working on a pontoon adjacent to the jobsite. The first pilot bore over 200 m length was completed without any problems. The bore was carried out from the Hallig dyke in the direction of the pipe installed by the plow, which had immersed from the mudflats and was visible from the shore.

The bore head submerged at the marked exit point. It was equipped with wider steering plates so that it could be steered more easily in the soft ground. The pipe string was ready for installation. The 12 m pipe lengths were welded together with an automatic butt fusion machine as requested to a total length of 200m. The undercarriage pulls the pipe length into the mudflats. Over half the pipe length has to be separated, as the vehicle became stuck in the mud-flats because of the load. The drilling crew quickly removed the bore head from the drill rods and attached a

tracks. The undercarriage of the pipe and cable plow with its four all-round hydraulically adjustable extensions with runners was adapted to overcome the uneven surfaces and keep the soil load to a minimum. Even though this conversion work took several weeks, the installation of the drinking water pipe itself only took 8 working days to cover a distance of 4 km.

355mm backreamer to the pipe string. Close team-work was essential as the pipe had to be installed before the tide came in. Meanwhile the automatic butt fusion machine is driven into the mudflats and during a break the welders successfully welded the two pipe lengths together. Everything went to plan without any unforeseeable interruptions. At high-tide the pontoon set off and drove out to the "connection area" 200 m away. As soon as ebb-tide set in the last bore began.

The connection of the pipe ends at a depth of 1,50 m was a real challenge. The line was cut free over a length of 25 m and 3 - 4 m width at 1,80 m depth. The team were able to connect both pipe ends without any problems during ebb-tide.

Benno Paasch, described the special motivation behind this project and how his company won the tender. "This project was very special - a once in a lifetime job. Out here there are different elements and you always have to expect the worst. Once we had a storm and the 8 m wide pontoon drifted 4 m away, despite being anchored down. This shows the elements we have to fight against here. Paasch were in third place for submission of the public tender, however the company in second place postponed their bid due to an administration error. The company in first place had offered a plow method, which did not meet the approval of the mud-flat protection regulati-

ons, which meant that we were given the official go-ahead by the committee.

Initially a pontoon with a captain on board was supposed to be hired, but Paasch recommended an amphibian type vehicle, which they hired specially. It can carry a load of 14 t and be used either as a driving or floating vehicle. If it becomes stuck, then you only have to wait for the tide. This was much more flexible and cost-saving and proved to be the best decision. The pontoon was only required for a short time for the planned bores.

The water supply board took care of all the licenses. Rangers from the national park kept a close check that all provisions were met and everything was documented in great detail. Any damages to the surface had to be levelled out. Every movement of the amphibian vehicle had to be authorised. A GPS detection system was used to ensure that the pipeline was constantly surveyed in case of any damage.

The project was completed at the end of September. We have met the time schedule extremely well, although with a project of this nature you have to expect a surprise or two all the time."●

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The Trenchless Alliance

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