Smet Group

Project microtunnelling Gijon (ES) Outfall of Aboňo

Client: Confederacion Hydrografica del Norte
Main contractor: Ferrovial Agroman
Machine: CBC
Pipes: reinforced concrete pipes
ID-OD: 1.800—2.400 mm
Length: 703 m
Execution: 2002

The pipe jacking executed by Smet- Tunnelling is part of the construction of a purification plant in Aboño (Gijon) and the laying of an outfall DN1800 for the discharge of treated wastewater. The complete outfall has a total length of approximately 2.2 km, of which the first 700 metres is executed by pipe jacking; the rest of the pipeline is laid in a trench dredged for this purpose.

Pipe Jacking

Behind the quay wall, a departure shaft with a diameter of 13.00 m is constructed. The shaft walls are executed with bore piles diameter 1.5 m; the total length of these bore piles is 15 metres. The jacking forces needed are guided to the shaft floor by a concrete wall to avoid extra forces applied on the bore piles and to secure the watertightness of the shaft. After extensive preliminary soil analysis and sounding, the jacking path was determined as shown in the figure below. The jacking length is 703 metres, almost completely in alluvial sand with stones. Thanks to the special care for bentonite injection and the use of adequate additives, the jacking friction was limited to 0.4 tonnes per m_ pipe area.

Guiding system

The continuous measuring and registration of the pipe jacking parameters is realised using the TUMA-guiding system. This patented system consists of a number of computer guided fully automated theodolites. The exact location of the shield is measured and calculated continuously and compared with the theoretical position. Based on the calculated deviation, the foreman driller is able to make immediate corrections. The guiding system is extremely accurate, which makes it very suitable for longer and/or curved pipe jacking. In these cases, the use of a laser beam is insufficient and manual measuring is no longer interesting from an economic point of view.

Jacking pipes

The reinforced concrete jacking pipes, class 5, have an internal diameter of 1800 mm and an external diameter of 2400 mm. The applicable jacking forces are limited to 1280 ton. Each pipe is 2.40 m long and is fitted with 3 injection holes each, diameter 1". In total 6 intermediate stations are installed according to collective design bij Smet- Tunnelling and the manufacturer Precon.

Shield and equipment

Smet-Tunnelling owns a large number of shields manufactured by Smet-Boring or a third party. For this project, the existing shield CBC20- 1 was altered and fitted with a conical stone crusher, to crush the heterogeneous sand and rock layers more efficiently. The shield weighs 57 ton, measures app. 6.80 m and has 155 kW installed power .The shield is fitted with the necessary provisions for hyperbaric interventions (check and replacement of the cutting tools if necessary) and for the arrival under water. On the surface, a control unit, 20 ton gantry crane and a double de-sanding installation are provided for.

Arrival procedure

The biggest challenge in this project was the safe and fast recuperation of the shield, taking into account the special sea conditions. Special measurements were taken with regard to the jacking pipes, the localisation of the shield, the watertightening of the shield before recuperation and the safe anchoring of the shield to the pontoon. Thanks to the thorough preparation, the recuperation and transport of the shield to the port of Gijon went very quickly, so that the shield could finally be put on land again.

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