

Flood Protection Wall Inland Harbour Schaartor Hamburg, Section 2

Project Owner:

Freie und Hansestadt Hamburg

Client:

consortium „HWS Schaartor“, c/o Hochtief Solutions AG NL CEM and F + Z Baugesellschaft mbH

Quick Info:

Tie-back anchoring and deep foundation of a flood protection facility at the inland harbour Schaartor with GEWI-micropiles, type 63,5 DKS, from the waterside and including bore hole surveys and warfare agent detection, in the course of the remodelling of the promenade

Technical Information:

System:	GEWI-Micropile, type 63,5 and 63,5 Plus DKS
Quantity:	130 pcs.
Length:	19,50 – 35,00 m
Service Load:	400 – 1300 kN
Test Load:	500 – 1625 kN
Technique:	double head drilling
Building Ground:	sand
Time Frame of Works:	May – August 2011

In order to increase the appeal of the city centre of Hamburg to pedestrians and tourists, a complex building project encompassing the redesign of the entire waterside promenade was initiated at the inland harbour Schaartor under consideration of latest flood protection standards. First, a new harbour sheet pile wall was erected in the harbour basin parallel to the old quay structure. It was our job to anchor the new wall with 51 pcs. inclined GEWI mini piles with two bore units from separate water pontoons (see Image 1). Initially, all piling and



Image 1

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anchoring works had to be carried out from the tidal waters of the Elbe river in order to limit any restrictions on road traffic and avoid the resulting narrow work space. With an average tidal range of 3,60 m and a strong current, this endeavour turned out to be especially challenging. Workers and machines alike had to prove a high degree of precision and flexibility, as most of the drill starting points were located under water in high tides of + 2,10 m. It took ongoing readjustment of the bore apparatus in order to reach these drill points in an accurate fashion. In the course of pile production, we inserted protective steel tubes in lengths ranging from 10,00 to 20,00 m into the sand horizon in order to bridge potential cavities and ensure an adequate grout body around the GEWI-steel. Moreover, our works were accompanied by warfare agent detection. In order to avoid any collisions of our inclined micropiles with the vertical bore piles to be produced later on, we carried out bore hole surveys on each pile. After our anchoring works from the water, the space in between old and new harbour wall was filled with sand. From this work platform, we continued to produce 36 vertical GEWI-micropiles for the deep foundation of the future promenade. We then installed another 43 micropiles from street

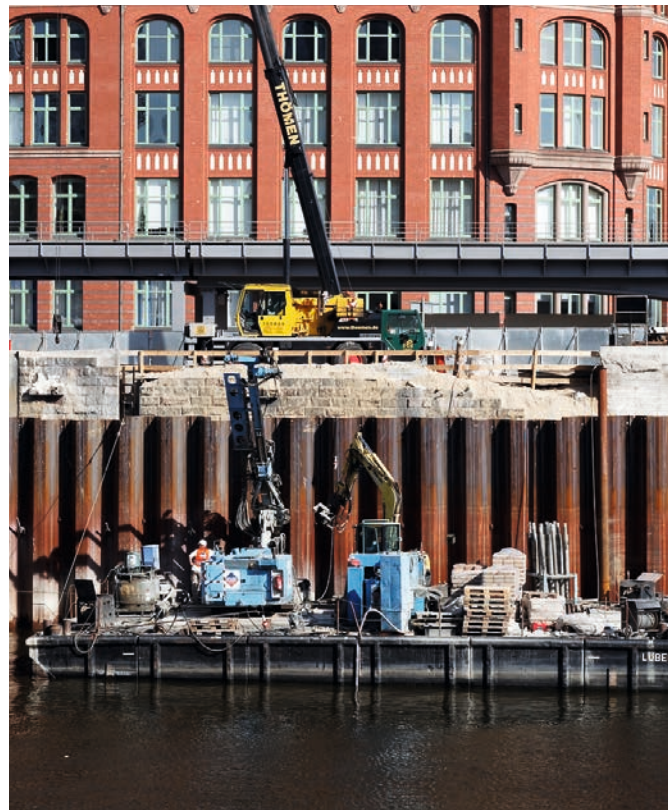


Image 2

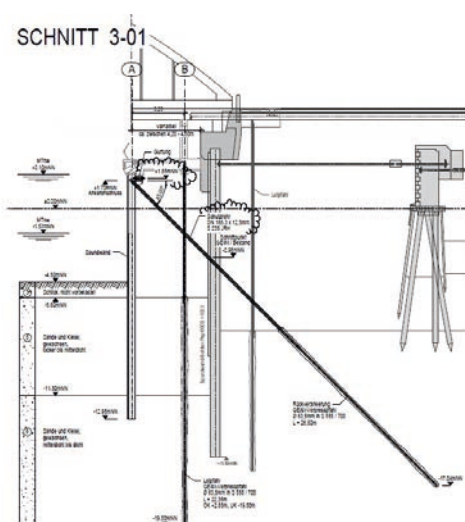


Image 3

level for the foundation of the new flood protection wall. These works were conducted with a special 5 to mini drill rig (future promenade) and with a "normal" 16 to piling rig on the upper level (street level). In both cases, we had to carry out our micropiling works underneath street and pedestrian bridges with limited working heights. In part, those bridges leading into the HarbourCity also had to be secured with tie-back anchors. This was achieved by means of a shortened drill mast and by the use of 3,00 to 4,00 m long GEWI coupling elements. After completion of our micropiles, all of them were tested for acceptance. All 130 pcs. passed this test within the required safety margin. Image 3 depicts a side cut of the combined anchoring and micropiling solution underneath one of the bridges. In this drawing, the old quay wall including horizontal anchoring is also displayed.