

Brooktorkai in Hamburg

Project Owner:

St. Annen Platz GmbH & Co. KG

Client:

Bilfinger Berger AG, NL Spezialtiefbau

Quick info:

Tie-back of a flood protection wall from the waterside at the Brooktorkai, triple layered anchoring of two building pits, horizontal anchoring of a cofferdam between the two building pits, and vertical drill works (see Image 2) for the construction of a waterproof gel-based foundation bottom

Technical Information:

Systems:	Gewi-pile / steel diameter 63,5 mm (horizontal anchor); Ischebeck TITAN grouted micro pile / type 103/51 and 103/78 (inclined pile); BBV-strand anchor with 6 and 7 strands (inclined anchor) and Suspa-DSI strand anchor with 12 strands (horizontal anchor)
Quantity:	422 pieces inclined anchors, 20 pieces horizontal anchors (system: Gewi-pile), 7 pieces horizontal anchors (system: Suspa-DSI 12-stranded anchor), 73 inclined piles
Length:	25 – 36 m
Service Load:	885 – 1787 kN
Technique:	overburden flush drilling (horizontal und inclined anchors) and rotary percussion drilling (inclined micro piles)
Building Ground:	sand of at least medium density
Time Span of Works:	August 2007 – Juli 2008



Image 1

The Brooktorkai project involves the combined erection of a new hotel and a headquarter building for the Germanic Lloyd in the HafenCity at Hamburg Harbour in between the Brooktorkai and the Brooktorkai harbour basin. This endeavour required the design of a 100% waterproof building pit for the basement levels. Moreover, the deteriorating condition of the existing quay wall, which was built in 1963, made the erection of a new flood protection wall necessary. A variety of special circumstances had to be considered with regard to the difficult piling and anchoring works. All grouted micro piles for the new flood protection wall had to be installed through steel pipes from the waterside, which we accomplished by setting up our own hanging scaffold (see Image 3). We were able to pass on considerable cost savings to our client by virtue of making a special proposition to use our Ischebek TITAN pile system instead of the originally intended 5 m IPB steel carriers for this job. The steel carriers would have had to be driven into the ground, which was known to contain a number of different obstacles, and thereby make the endeavour both costly and unpractical.

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For the reciprocal anchoring of the two steel sheet pile walls (cofferdam) separating the two building pits, we installed strand anchors with 12 strands each in order to carry the required loads of 1200 kN. Our drill works were significantly complicated by high ground water pressure. Both steel sheet pile walls had to be penetrated without ground water leakage, which was accomplished through special gel injections both at the drill start and end points. Another difficulty was presented to us in precisely locating the drill end point, such that the gel injections could be placed very accurately. For the prestressing of our anchors, we used special Suspa-DSI rams (see Image 1) designed for such heavy loads.

The described drill works were exclusively executed with our own drill rigs including various types of the Klemm 806 and 807, Klemm KW 2000, as well as a Boart DB 102. We only encountered complications due to an extraordinary high flood at one point, which forced us to quickly set up an additional ramp on top of our hanging scaffold in order to save our drill rig from the quickly rising water level. Fortunately, the elevated position of our drill rig was just enough to prevent any damage on the machine and thereby cause a delay of the subsequent works.



Image 2



Image 3



Image 4