Marine works

Diaphragm wall - Reinforced slurry wall - Tie beams - Civil Engineering
Earthworks - Micropiles - Instrumentation

DRY DOCK N°1

BREST - FRANCE

Widening and modernisation of Dry Dock N°1 at the Brest Port de Commerce

The Brest dry dock N°1 came into service in 1905. With the arrival of ever larger vessels, this dry dock was only capable of taking a small number of vessels, others being sent to larger dry dock facilities.

The modernisation project consisted of widening the dry dock, creating a new flat base slab by demolishing the old steps and installing a new system for collecting water and separating soiled bilge water from clean water. Additionally, beams were built on both sides of the dry dock and equipped with a hauling rail anchoring system. Furthermore, a crane track was rebuilt on the platform behind the wall to take the new handling crane subsequently installed by the Brest C.CI. de Brest which operates the dry dock.

Thanks to this project that has been financed partly by the Brittany Region, by the European Community and the Government, the Brest Chamber of Commerce hopes that the dry dock usage will increase from 145 to 245 days of the year.

Dry dock after completion of works

CLIENT:	CONSEIL RÉGIONAL DE BRETAGNE
SUPERVISING ENGINEER:	DIRECTION DÉPARTEMENTALE DU FINISTÈRE
CONTRACTOR:	SOLÉTANCHE BACHY / QUILLE JOINT VENTURE
DURATION OF WORKS:	DECEMBER 2006 TO JANUARY 2008

MAIN QUANTITIES:

- Diaphragm wall 800mm thick: 2,800m²
- Slurry wall 600mm thick: 2,600m²
- 26m passive ground anchors: 168 U
- Demolition of the side wall: 12,000m³
- 8.55m of base slab anchors: 728 U
- Excavation and backfill: 25,800m³
- Crane track beams (2 beams): 360m
- Diaphragm wall steel: 239 T
- Metal sections: 175 T
- Civil Works concrete: 1,615m³
- Civil Works steel: 173 T
- Concrete for the base slab: 5,900m³
- Steel for the base slab: 502 T

Description of the structure

The dry dock is being widened by demolishing one of its side walls. Before this can take place, a diaphragm wall was built behind the side wall and

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Dry dock before commencement of works

Constructing the diaphragm wall

Constructing the new base slab

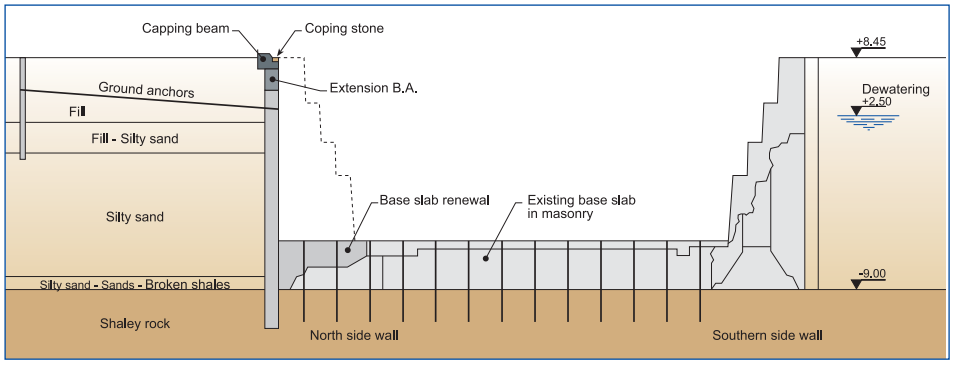
Demolishing the side wall and constructing the ring beam

secured using passive ground anchors to form the new wall. Doubts about the stability of the side wall left in front of the diaphragm wall have resulted in the working platform level being lowered by 2 metres. In order to achieve this, the first step consisted of constructing a watertight curtain by installing a slurry wall around the ground anchor drilling area. Metal sections were embedded in this wall to form the attachment points for the diaphragm wall passive ground anchors. The ground anchors were installed after excavating 25,800m^3 of spoil.

The height of the diaphragm wall then has to be raised by casting a concrete wall which is then topped off by the capping beam and haulage track. Once the peripheral steps in the bottom of the dry dock have been demolished, a reinforced concrete base slab will be constructed over the existing base slab and anchored into the substratum rock using micro piles. This base slab will incorporate a new drainage system.

Phasing the works and specific points

Phase 1: from the top platform behind the side wall, construction of a reinforced slurry wall, in two shifts, using a KS 2 rig.
Phase 2: checking the low level of the water table (dewatering could have been used) and earth moving in order to lower the working platform level by 2m.
Phase 3: demolition of the side wall upper offset using 3 heavy duty 3 BRH (Boom mounted demolition hammers).
On the floor of the dry dock:
Construction of the first 550 base slab anchor points. In view of the considerable amount of water circulating in the bottom of the dry dock and of artesian phenomena, a silicate cement slurry was injected to tie in the ground anchors.
Phase 4: a KS 2 and a drilling rig were used to construct the diaphragm wall.
Phase 5: earth moving and construction of the working platform for installing the ground anchors which consisted of a bed of sand between 2 layers of geotextile.
Phase 6: the ground anchors were installed and the excavation backfilled up to the level of the diaphragm wall. In the bottom of the dry dock: installation of base slab reinforcement bars and then concreting at 7 locations.
Phase 7: construction of the extension wall using tamped concrete.
Phase 8: construction of the North and South haulage beams.
Phase 9: demolition of the side wall which is 6.50m wide at its foot. Demolition took 4 months to complete.
Phase 10: construction of the rear crane track.
In the bottom of the dry dock: ground anchors were installed in the area of the demolished base of the side wall, installing reinforcement bars and concreting the slab.



Final general cross section of the structure

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