Esbjerg Beach, phase 1

Moving marina and constructing new recreational urban space

The Esbjerg Strand project is Esbjerg Municipality's ambitious plan to develop an attractive urban space with a marina, green areas and harbour-related businesses. The project is divided into three phases, and phase 0 has already been completed. Working in One Company collaboration with Aarsleff's coastal protection specialist, VG Entreprenør A/S, Per Aarsleff A/S has delivered the main contract work for the first part of phase 1.

Many specialist skills involved

Phase 1 is split into two work stages consisting of marine work and onshore work. Aarsleff started working on the marine project in the summer of 2017. This work included the moving of the existing marina from a commercial harbour basin plus construction of a south pier and a north embankment, framing the outer harbour. In addition, we constructed a flood lock, a harbour island, two connecting bridges and a marina with new pontoon bridges. A new recreational urban space will be created on the harbour island, and the new inner harbour and the canal around the harbour island will open up for water-related activities such as water sports.

For this complex project, we used a wide range of our specialist skills within ground engineering, coastal protection, marine construction and bridges. Thanks to the close One Company collaboration within the Aarsleff Group, we delivered all work needed for this project as in-house production.

Off to a good start

In July 2017, we began excavating sand from the seabed, and since then we have dredged about 250,000 cubic metres. Some of the excavated sand was reused for backfilling when we constructed the 250-metre breakwater. This breakwater and the 850-metre embankment will help protect the future harbour structure from the elements. As the pier and embankment work was to be completed before the flood season, we worked seven days a week from six in the morning till six in the evening.

In addition, we installed 2,600 running metres of sheet piles plus 26 tubular steel piles ranging from DN711 to DN1016 millimetres. The pipes were installed with a vibrator and redriven with a nine tons hammer. Next, the bridge abutments for the southern bridge section were cast. The bridges are made of in situ concrete and precast elements cast on Aarsleff's production facility in Poland and then sailed to Esbjerg. We then carried out the anchoring work around the lock, outer harbour and on the harbour island. We also constructed the 60,000-square metre harbour island reusing the dredged material.

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Once we completed the pier and embankment work before the start of the winter season, we were better protected from the elements throughout the remaining work in the inner harbour and around the harbour island. The remaining work included dredging work to allow boats to berth at the marina on the harbour island as well as construction of the bridges, connecting the harbour island to the mainland. Finally, we installed the flood lock, carrying out the lock base work from level -8 to level +6. The flood lock consists of a complex concrete structure with 11-metre-high walls. Because of the many openings and groutings of the structure we worked within very small tolerances throughout the casting process. The temporary structures for the construction pit, including the bracing system and the groundwater lowering method for the flood lock, were designed by Aarsleff's in-house design teams.

Data

- 2,600 rm of sheet piles, a total of 3,700 tons of sheet piles
- 52 m of tubular steel piles
- 2 road bridges
- 850 m of revetment
- 325 m of stone-protected sheet pile embankment
- 500 new pontoon bridges including 90 Y-booms
- 2×100 m of cellular cofferdams carried out as mutually anchored sheet piles
- 1 flood lock between the two cellular cofferdams

Client

Esbjerg Municipality

Contractor

Per Aarsleff A/S

Cooperation partner

VG Entreprenør A/S

Type of contract

Main contract

Consultant/Architect

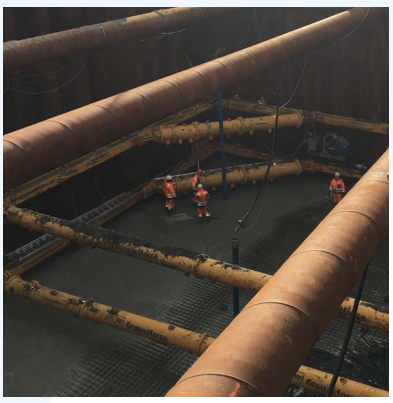
NIRAS A/S

Construction period

July 2017-May 2019

Contract value

The initial contract value amounted to DKK 150 million. However, additional work increased the total contract value to approx. DKK 182 million.



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