



The soil work is another story. 140,000 cubic metres of soil is not a gigantic amount, but when clean earth and contaminated soil are mixed and have to be handled in different ways, excavating the soil must be planned carefully.

Data

- 8,250 m³ of demolition and reincorporation of concrete structures
- 55,000 tons of excavation and disposal of contaminated soil at approved disposal site
- 38,000 m³ of excavation and reincorporation of contaminated soil
- 73,000 m³ of excavation and reincorporation of clean earth
- 5,500 m² of bentonite membrane
- 1,200 tons of sheet piles
- 21,500 m² of base course gravel
- 600 metres of main drainage pipes (DN200-560 mm)
- 2,900 m of cable ducts
- 3,400 m² of large sett stone
- 11,000 m² of small sett stone
- 2,100 of granite ashlar stone
- 700 m of granite kerbstone
- 700 m of granite gutters
- 35 supplies and plantings of new trees.

Client

Realdania, Elsinore Municipality, the Danish Palaces and Properties Agency

Consulting engineer

NIRAS A/S, consulting engineering, and Juul & Frost, architect

Type of contract

Turnkey contract

Contractor

Aarsleff, Construction and Ground Engineering

Construction period

September 2008-May 2013

Contract value

DKK 233.3 million

Contact

Per Aarsleff A/S
Construction and
Ground Engineering
Estimation & Tender
kalkulation@arsleff.com
Tel +45 8744 2222

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Kronborg Culture Harbour

From shipyard area to modern cultural centre



AARSLEFF

Aarsleff was the turnkey contractor on Project Kronborg Culture Harbour. The project thoroughly renewed and improved the area around Kronborg Castle. Project Kronborg Culture Harbour is a part of the transformation of the harbour and the Kronborg area from a shipyard area to a modern cultural centre with Kronborg Castle as an international landmark.

Project Kronborg Culture Harbour is one of the four projects of the big unifying project in Elsinore. The three other projects are The Culture Yard, The Danish Maritime Museum and Kronborg Castle. Jointly, the projects are to give visitors to Kronborg Castle and Port of Elsinore some new cultural experiences in future in a fantastic and historical environment.

Soil and paving work

Aarsleff carried out the soil and paving work for a new car park and a diversion of road. Furthermore, we excavated a big part of the existing yard peninsula and Kronborgvej to extend the harbour basin and the moat around Kronborg Cas-

tle. We built in the excavated soil in the other project areas or disposed it at an approved disposal site depending on the contamination level.

The contaminated soil on the yard peninsula was placed both over and under level 0. We therefore chose to excavate the inner part of the peninsula at first and keep approx. 10 metres of the outer part as a form of a slope. With this solution, we were able to lower the water level in the inner part to approx. level -4. The big advantage was that clean earth and contaminated soil could be kept separated and consequently, the amount of contaminated soil was reduced, and we avoided paying a disposal fee for wet soil at the disposal site.

Diversion of roads

In addition to the access to Kronborg Castle, the diversion of roads also comprised the access to the area at the North Harbour. Earlier, the traffic was led naturally from the city of Elsinore to Kronborg Castle. After the diversion of road, the traffic is led towards the North Harbour

and the new car park at Kronborg Castle. The traffic had to be maintained during the execution of the diversion of road. Otherwise, we would have had to establish extensive diversions. Therefore, we carried out the diversion of road in six stages.

Extension of harbour basin, the Royal Quay and the moat

In the harbour basin, we installed new sheet pile structures for a new ravelin, extended the existing Royal Quay and separated the basin and the new part of the moat. A big part of the sheet piling structures were carried out from sea with a piling rig on a jackup whereas the remaining part was carried out from land with a piling rig or a crane. It has been a special challenge to install the sheet piling for the Royal Quay and the sheet piling across the existing dock 1. At the Royal Quay, ferries constantly depart and arrive, and Dock 1 is to be used for a new Maritime Museum according to plan. Therefore, precautionary measures were needed to prevent damage to the dock.



Two new central ravelin bridges

A key issue in the Project Kronborg Culture Harbour is the two ravelin bridges which from now on will form the access to the north wing of the Castle. The ravelin bridges are actually embankments with bridges as they are also to function as separation between the new moat and the harbour basin. This solution means that the water level inside the moat is not influenced by the tide in the harbour basin.

After negotiating with the client, we had the tendered steel structure changed to a concrete structure. It consists of bridge elements cast on land. By means of a mobile crane, they were installed on two rows of DN610 millimetre steel columns which were driven 10 metres down into the sea bed. After the bridge elements had been installed, we completed the bridge deck with bridge insulation and planks of ekki wood.

Electrical work

The electrical work comprised establishment of new and removal of the existing road illumination as well as establishment of electrical supply in big parts of the area. Pylons and fixtures for the new road illumination were supplied by the client whereas installation of cables and foundations, pylons and fittings were carried out in cooperation with Wicotec A/S. The new electrical supply comprised main power supply and supply for the different power outlets.

All sheet pile structures are permanent structures which will face the harbour basin or the moat when completed.



ply and supply for the different power outlets.

We established the main power supply in close cooperation with the local power supply company. The big challenge was to make the cable pullings as long as possible. We also carried out the supply to and the installation of power outlets in cooperation with Wicotec A/S.

Thorough planning and logistics

The biggest challenge of the job was planning and logistics. There are many links between the individual project areas. The area around Kronborg Castle is visited by approx. half a million tourists a year. There is only one access road to the area, and it goes through the city of Elsinore.