

## References

**Project:** Ems barrier at Gandersum with a large berth and a pumping station at Leda barrier

**Period:** 1997 - 2002

**Contract Volume:** 2,5 Mio €

**Construction Cost:** approx. 180 Mio €

**Client:** State of Lower Saxony by State Dept. of Water Resources and Coastal Protection

**Short Description:** Feasibility and plan statement documents with conceptual and detailed design for the project and its structure, hydraulic calculations, extensive plans for technical equipment such as mechanical, electrical and control technology as well as formulation of tender documents and cost calculations.

### Performance phase 1 – 7 and part of 8 according to HOAI

Alternative investigations and cost calculations for the barrier works under considerations of hydraulic and ecological aspects with rotor segments and vertical lift gate solutions during the feasibility study. Barriers as storm water protection serving in reverse also as reservoir for transfer of deep draught ships on the Ems including integrated pumping station of 100m<sup>3</sup>/s. Investigation of alternatives and locations for the pumps.



- Barrier with a total of eight gates (1x 60m and 7 x 50m) and pier construction works in the total length of 479 m
- Four lifting doors with the dimensions H/L/T = 8.70/51.75/4.75 m
- Two rotary segment doors with dimensions H/L/T = 10.80/51.00/5.00 m
- One rotary segment door with dimensions H/L/T = 14/51/5.00 m
- One full-lowerable rotary segment door with the dimensions H/L/T = 18.00/63.00/4.00 m and side windows of 24 m diameter.

- Operation bridge Brkl. 30/30, cwide and 50m in length as steel framework bridges with heavy load gratings as carriageways, with integrated upper part of gate for the flow through the gate opening.
- 18 submersible pumps for fast filling of the reservoirs of the Ems with a total output of 100m<sup>3</sup>/s integrated in the column buildings of the barrier.

- Large ship berth in front of the barrier, consisting of four dolphins and four double bollards.
- Northern and southern dyke connections (approx. 700m in length)
- Maintenance of ship travel and road traffic as well as flood protection during construction period.
- Securing of undulations of up to 15m by anchored sheet pile walls construction.
- Anchored underwater concrete bedding and deep foundations for the piles and sill constructions
- Pump works at the Leda barriers with performance in excess of 30m<sup>3</sup>/s with intake structure, outlet canal and outlet structure in the vicinity of the northern abutment of the Leda-barriers. More than six submersible underwater motor pumps for faster reservoir filling of the river Ems for ship transfer actions.
- Accompanying consulting services for the client during the construction phase and checks of the execution plans.

