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10. Alssund Bridge (Denmark)

Owner:	*The Danish Road Directorate*
Design and supervision:	*Cowiconsult, Consulting Engineers and Planners AS, Copenhagen*
Contractors:	*The Alssund Consortium:* *– C.G., Jensen A/S, Copenhagen* *– AB Skånska Cementgjuteriet, Göteborg*
Aesthetical consultant:	*E. & O. Nørgaard, Architects, M.D.L., Copenhagen*
Works duration:	*42 months*
Opened to traffic:	*1981*

Main quantities of material

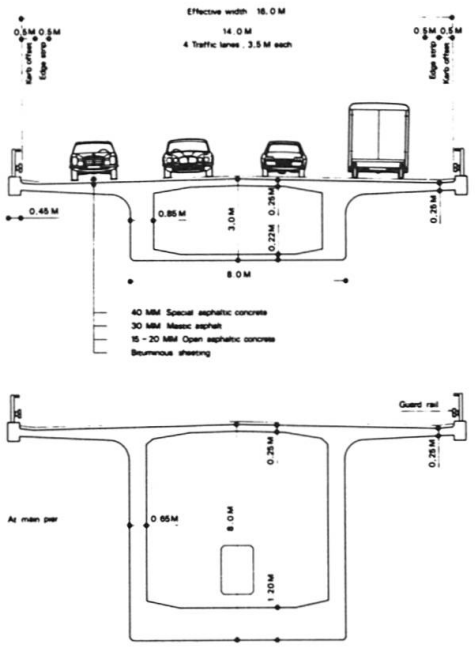
Reinforced concrete (excl. piles):	21,000 m^3
Mild steel reinforcement:	2,000 t
Prestressing:	500 t
Total length of driven RC piles:	9,000 m

Introduction

The Alssund Bridge constitutes a link in the 11.5 km long realignment of the A8 road, which will lead through-traffic round Sønderborg, and thus relieve the King Chr. X's Bridge, a bascule-bridge opened to traffic in 1930.

The bridge is 660 m long and has an effective width of 16 m. It is designed as a box girder bridge with 9 spans, 50 + 2 x 60 + 85 + 150 + 85 + 2 x 60 + 50 m, continuous over all spans with expansion joints at both abutments.

For economic reasons, relatively short approach spans have been chosen. The embankments, however, have not been extended more than is aesthetically justifiable towards the sound.



Cross section at mid span and over pier

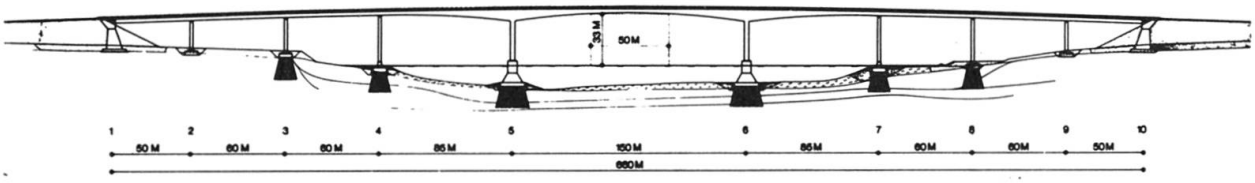
Substructure

The main piers are founded on 140 Nos., approx. 15 m long R.C. piles with a cross section of 0.4 x 0.5 m. The piles are driven through the upper layers of mud and sand into the moraine below. The pier bases are cast in the dry, inside a cofferdam of steel sheet piles, sealed with a bottom plug, cast under water. Heat, evolved during hardening of the concrete in the pier base, is lead away using cooling water circulated in pipes.

The 28 m high pier shafts have hollow sections with external dimensions of 2.8 x 8 m.

The piers on shallow water are founded on 48 Nos., approx. 10-15 m long R.C. piles (0.4 x 0.5 m). The piers and abutments on land are partly founded on 0.3 x 0.3 m R.C. piles and partly directly founded.

The pier shafts for the approach spans have hollow sections with external dimensions of 2.0 x 8.0 m.



Elevation

Superstructure

The superstructure of the main bridge is constructed in post-tensioned concrete using the balanced free cantilever method. The cross section is designed as a central box-type girder having an overlying bridge deck of concrete cantilevered over both sides of the central box.

The box girder is 8.0 m wide. The height varies from 8.0 m over the main piers to 2.9 m at the midpoint of the main span, and 3.0 m at the transitions to the approach span. The thickness of the bottom slab varies correspondingly from 1.2 m over the piers to 0.22 m at the midpoint of the main span and 0.45 m at the approach spans. The wall is 0.65 m thick.

The length of each casting section varied from 3.5 m at the supports to 5.0 m at mid-span. A total of 16 sections were cast for each cantilever.

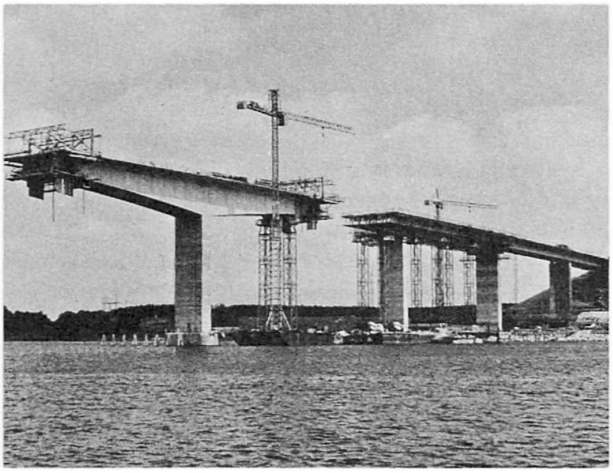
The prestressing used is the Freyssinet system 12L15, low relaxation steel, grade 1680/1865 MPa. The prestressing in the main bridge consists of 116 cantilever cables, 38 continuous cables for the bottom slab at mid-span and 12 continuous cables at bottom slab in the side spans.

The superstructure of the approach spans is constructed in post-tensioned concrete cast in place, using the span by span method starting from the abutment on either side of the sound.

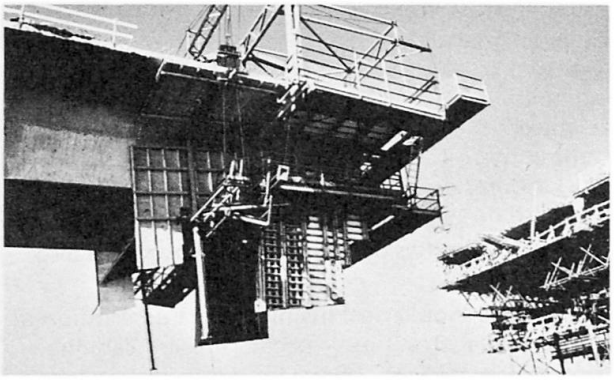
The superstructure in the approach spans is supported on 16 MN sliding point rocker bearings on each pier.

The concrete used in the superstructure has a cylinder strength of 35 MPa.

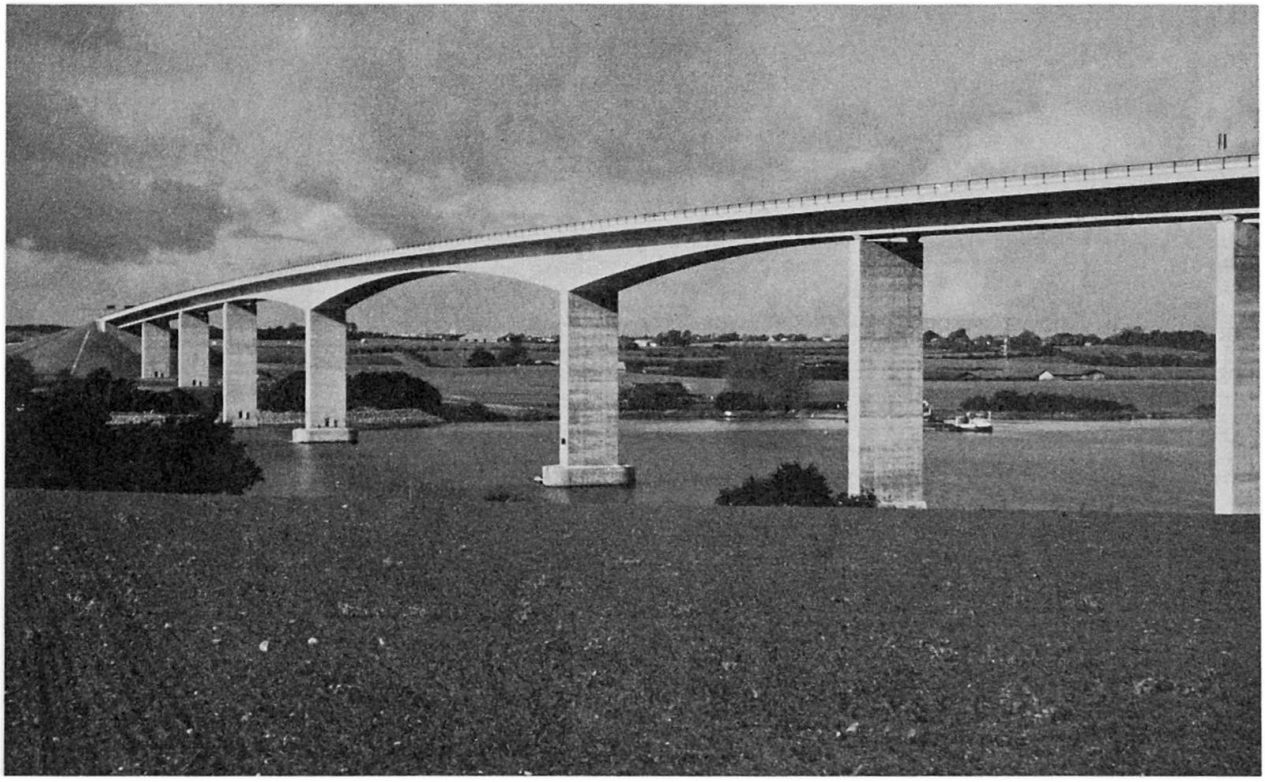
(A. Petersen)



Casting of approach span and cantilever construction symmetrically from main pier



Joining of cantilever and approach span



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