Sundøy Bridge

Contract Period
1999-2003

Completion
2003

Construction cost
US$22.4 mill

Services rendered

- Preliminary Design and Cost Estimates
- Dynamic wind measurements on site and deduction of design wind climate
- Dynamic Wind and Seismic Analyses
- Tender documents
- Detailed Design and Specifications
- Construction follow up and supervision

Client
Norwegian Public Roads Administration

The Sundøy Bridge is a 2-lane road bridge designed as one of the world's longest concrete cantilever bridges with a main span of 298 m and total length of 538 m. The main span is designed in high strength light weight aggregate (LWA) concrete LC60, the side spans in normal density (ND) concrete C65. The bridge is high level providing for a ship channel of 43.5 x 80 m. The bridge location is in the county of Nordland, close to the Arctic Circle with a very severe wind climate.

Sundøya Bridge, cont'd

Design considerations

The structure is fully continuous, with flexible piers and large foundations 9x14m to solid rock at level -16.0 and -19.0 respectively. Expansion joints are provided at each abutment. In the design of this long span both Normal Density (ND) and Light Weight Aggregate (LWA) concrete were investigated. As the side spans were limited in length by the road curvature on the Dagsvik side and rock topography on the Sundøy side, a design with high strength LWA concrete LC60 in most of the main span was found to provide for the best solution. Compared to a design with ND-concrete C65 in the main span, the savings were in the order of 2.500.000,- NOK. Auxiliary piers were required to stabilise the free-standing pier/balanced cantilevers during construction.

Also alternative designs with cabled stayed and suspension bridges were investigated in the preliminary design.

Wind climate investigations

The site specific wind climate is an important design parameter for this large bridge and has to be investigated. This investigation was carried out by Aas-Jakobsen using their own dynamic wind measuring instruments and data acquisition system located on site during the winter season. Readings every 0.2 seconds of wind speed and direction in space are automatically recorded simul-taneously at several locations for wind speeds > 10 m/s.

Construction methods

The following construction methods were a basis for the detailed design:

- Main foundations by prefabricated caissons
- Piers by self-climbing forms
- Cantilevers by cast-in-place segments of varying lengths, max 5.0 m

Prefabricated caissons were used due to the rather strong tidal current in the sound.