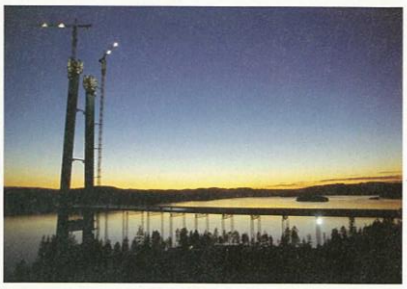
HögakustenbronTechnical data

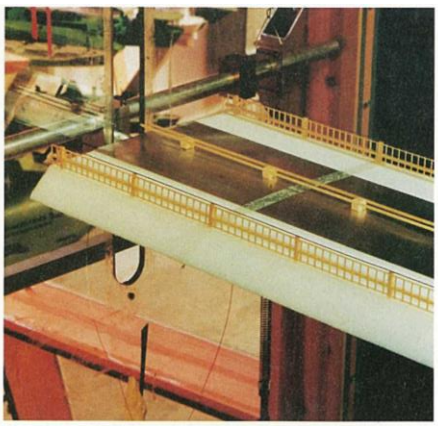


This is the Höga Kusten Project

The Höga Kusten Project - 32 km of new European highway E4 including 35 bridges - will shorten the distance between Härnösand and Örnsköldsvik by 44 km for heavy vehicles and by 8 km for other road users. Among the 35 bridges in the project is the Höga Kusten Bridge over the river Ångermanälven. With its main span of 1210 m the Höga Kusten Bridge will be one of the largest bridges in the world.

Employer: Swedish National Road Administration, Central Region (SNRA)
Total cost, Höga Kusten Project: SEK 2.1 billion
Construction period: 1993 - 1997

Höga Kusten Bridge:
Architect: Ahlgren Edblom Arkitekter AB
Design: Kjessler & Mannerstråle AB
Contractors: Skanska Stockholm AB and a joint venture between Skanska Stockholm AB, Monberg & Torsen A/S and Alfred Andersen A/S
Total cost: SEK 1.1 billion



Design

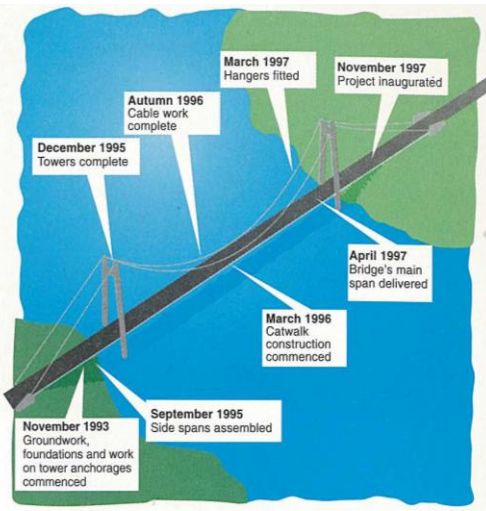
Pilot studies for the Höga Kusten Bridge began in 1987. Following initial studies of possible bridge sites, wind measurements and wind tunnel testing of possible cross sections of the bridge deck was started. A large number of alternatives of overall bridge designs were studied. The tendering process was completed in autumn 1993, and construction commenced in November the same year. Drawings and technical specifications are produced on an ongoing basis during the construction period.

During construction of the Höga Kusten Project the Swedish National Road Administration is especially emphasising the natural and cultural environment as well as aestetic considerations.

Sweden's tallest building

With it's suspended side spans and specially designed towers the Höga Kusten Bridge will be a very attractive suspension bridge. The towers rise 180 m above the surface of the water and are adorned with glass pyramids. Using large sheet piles the foundations for the towers were cast in dryness 18 m below water surface. Due to changing geometry of the tower legs, climbing formwork which varied in cross-section with each casting step was the only possible choice. The tower legs were cast in steps with approximately 4 m height.

Concrete in the towers and abutments: 40,000 tonnes.
Concrete quality: K40 **Climbing formwork by:** PERI
Reinforcement: K500 and Ks60S, 4,000 tonnes.



Project time table

The work on the bridge abutments and the foundations for the towers commenced in autumn 1993. In December 1995 the towers reached their full height. The bridge sections for the side spans (the first 17 of the totally 48 bridge sections) were lifted into place at temporary scaffolding in September 1995.
The catwalks were mounted in the spring of 1996. On these temporary work bridges the spinning of the main cables will take place. After connecting the hangers to the main cables the remaining bridge sections for the main span will be mounted directly to the hangers in the spring of 1997 and welded together to form a continuous girder with 1800 m length. The completed Höga Kusten Project with the Höga Kusten Bridge will be inaugurated in the autumn of 1997.

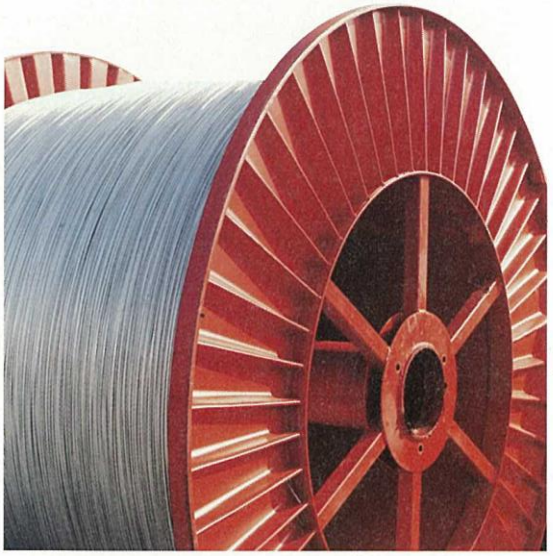
Bridge deck of Swedish steel!

The Swedish steel is being welded together in Finland, at Finnyards in Rauma, to form 40-metre long sections prior to delivery to the construction site. The bridge deck sections weigh approximately 300 tonnes each, and will be put together on site in the summer of 1996 and spring of 1997.

The bridge deck contains dehumidifier units to prevent the formation of rust. An inspection walkway which runs along the bridge deck will facilitate future inspections. The cross-section has been designed in the shape of an aircraft wing to provide optimal wind stability. A free bridge width of 17.8 metres will allow for possible future expansion to a four-lane motorway. In the first stage, however, the road over the bridge (like the remaining stretch of road) will be a 13-metre wide, two-lane road.

The paint used will be a combination of epoxy base and polyurethane. The bridge's sides and main cables will be painted in a red-brown terracotta shade.

Steel in the bridge deck: 14,000 tonnes of Swedish steel from SSAB Oxelösund.
Surface treatment/painting: 60,000 m²



Steel wire for the main cables

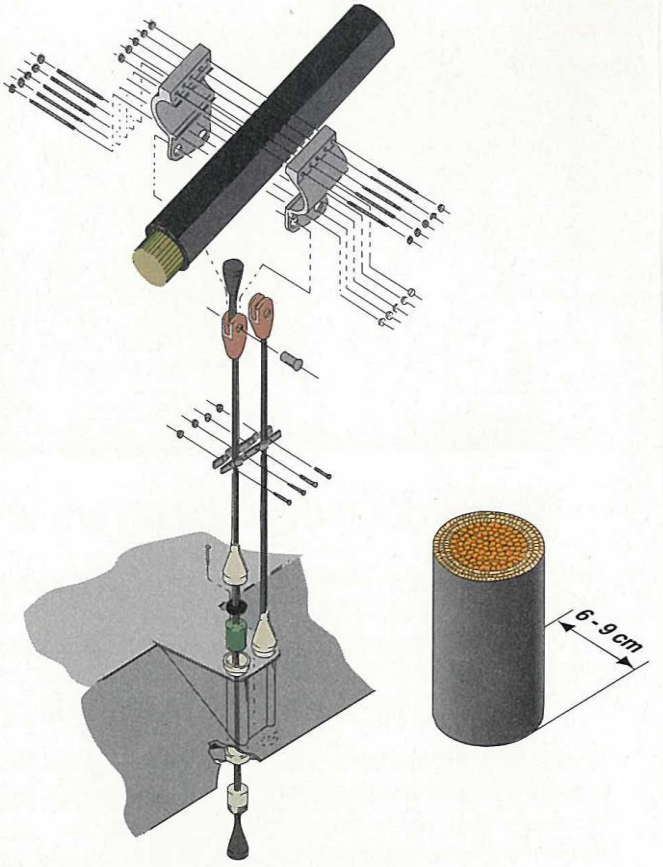
The main cables each contain 11,300 wires. The steel wires are 5.27 mm in diameter, and the finished cable has a diameter of 65 cm. The 11,300 wires which are hot dip zinc coated run parallel to each other and are formed and compacted into a circular shape using hydraulic jacks. The cable is then coiled with another wire and painted.

Total weight of wire in the cables: 7,800 tonnes. The wire is produced by the Spanish company Trencas y Cables S.A.

Work on the catwalk, spring 1996

Cable spinning

Spinning the wires for the main cables will take place from both abutments simultaneously. The wires will be unreeled from large drums and run over the tops of the towers using two boogie wheels, i.e. four wires will be positioned at the same time. Once the wires have reached the correct sag between the towers and in the side spans they are connected to the main cable anchorages. The adjustment of the sag is done at the saddles and at the anchorage points.
The spinning of the cables is carried out in the summer of 1996.



Hangers

The hangers, 328 in total, will carry the whole bridge deck length of 1800 m without any other supporting points than at the bridge ends. They vary in length from 3 to 127 m, and in diameter from 55 to 94 mm. The hangers are of the full locked coil type. This means that their outer layers of wires are spirally wound and of Z-shape and will, with load acting, lock and create a quite effective seal. The hangers are produced by the French company TrefilEurope.

Facts about the Höga Kusten Bridge

Construction period: 1993-1997
Concrete in the towers and abutments: ..... 40,000 m^3
Steel in bridge deck: ..... 14,000 tonnes
Steel wire in main cables and hangers: ..... 8,500 tonnes
Earth excavations: ..... 50,000 m^3
Rock excavations: ..... 20,000 m^3
Total length: ..... approx 1,800 m
Navigational Clearance: ..... 40 m
Length of main span: ..... 1,210 m
Man hours at construction site: approx. 1,000,000 hours