Inkeroinen Bridge

INKEROINEN BRIDGE

SUUNNITTELUKORTES OY

FINLAND

ROADS AND WATERWAYS ADMINISTRATION OF FINLAND

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REBUILDING OF THE INKEROINEN BRIDGE

To increase the capacity of the Inkeroinen bridge and improve the level of service Roads and Waterways Administration made a decision to renew it under a tight schedule.

Based on technical and economic studies and further on the central location of the bridge the following design criterions were achieved:

- the bridge was to be built in the same position as the old
- wherever possible the existing bridge foundations were to be used
- provision was to be made for the canalization of the Kymi river

Solution:

The bridge is a continuous composite girder bridge (steel girdes and reinforced concrete deck).

Beams are of weathering steel with erosion factor of 0.5 mm on each surface. The steel structure is so designed that the side span can be cut and connected to an openable bridge when canalization occurs.

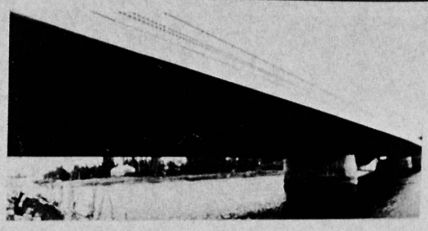
At the intermediate supports the web of the beams is 2400 mm high and 18 mm thick. Height-span ratio is 1/28.

The deck was casted without construction joints using retardants.

In existing pillars the old bearing seatings were removed and new heavily reinforced ones casted in their place.

Costs approx.
4.1 million Fmk 2170 Fmk/m

Steel Structure	273000 kg	145 kg/m
Deck Concrete	585 m³	0.31 m³/m
Deck Reinforcement	136000 kg	230 kg/m
Foundation Concrete	188 m³	
Foundation Reinforcement	13600 kg	

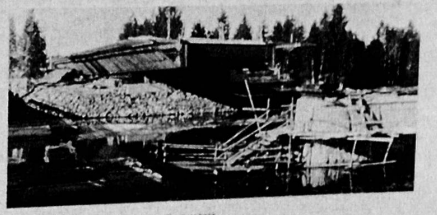


The New Bridge, a composite structure
Spans: 39 + 55.4 + 39 m
Width: 2.75 + 7.5 + 2.75 = 13.0 m

Demolishing of the old steel truss bridge in progress

Two of the old intermediate pillars were removed

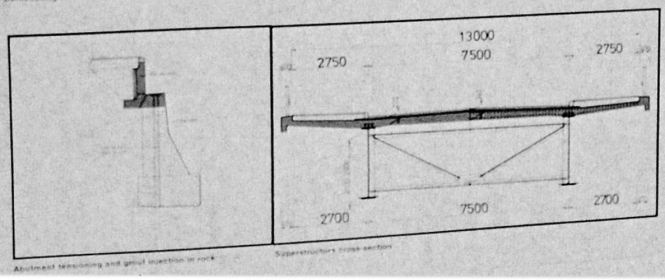
Bearing seatings of remaining pillars were strengthened



The steel structure was jointed together on the river bank

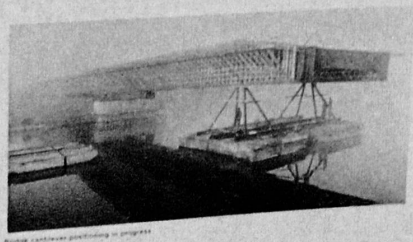
BRIDGING CONDITIONS IN FINLAND

- The most characteristic feature of Finnish geography is the multitude of shallow lakes and the natural beauty of the landscape. The area of our waters is 9.3 % of the whole surface of 337 000 km².
- An average of 200...300 bridges are built in Finland annually, of which 74 % are concrete bridges, 14 % steel bridges, 9 % wooden bridges and 4 % bridges of corrugated pipes.
- The annual mean temperature of the country is +2 °C, the average day temperatures (July, January) varying from +22 °C to −18 °C.
- The steel used in bridges must have high impact strenght and the general requirement is 27 J at −30 °C.
- Concreting is mainly carried out during the cold season.



Abutment remodeling and grout injection in rock

Superstructure cross section



Bridge cantilever positioning in progress

INKEROINEN BRIDGE

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THE REBUILDING OF THE INKEROINEN BRIDGE

1. GENERAL

To increase the capacity of the Inkeroinen bridge and improve the level of service, RWA made the decision to renew it under a tight schedule. Based on technical and economic studies and further on the central location of the bridge the following design criterions were achieved.

- the bridge was to be built in the same position as the old,
- wherever possible the existing bridge foundations were to be used,
- provision was to be made for the canalization of the Kymi river.

2. SOLUTION

2.1 A Steel beam structure

The bridge is a continuous composite girder bridge (steel girders and reinforced concrete deck). The steel framework is formed of two parallel beams joined together by crossbeams at 6600 mm centres. Beams are of weathering steel with erosion factor of 0,5 mm on each surface. The steel structure is so designed that the side span can be cut when canalization occurs. At the intermediate supports the web of the beams is 2400 mm high and 18 mm thick. Height-span ratio is 1/28. The steel structure was jointed together on the river bank and pulled to its final position.

2.2 The Concrete Deck

Automatically welded bolts, ϕ 19 mm, serve to join the concrete to the steel. Thickness of deck slab between the beams is 210 - 340 mm. At the support in the negative moment area the amount of non-prestressed steel is over two percent of the deck cross-section because of crack-width limitations. The deck was casted without construction joints using retardants.

2.3 Foundations

The condition of the existing foundations was checked by core sampling. Two of the intermediate pillars were removed totally and in remaining pillars the old bearing seatings were removed and new heavily reinforced ones casted in their place. The abutments and the fixed bearing pillar were stressed with rock anchors to ensure a sufficient capacity. By using the existing foundations constructing in water was completely eliminated.

3. COSTS AND QUANTITIES

Costs of the project were approx. 4,1 Million Fmk.

Steel Structure	273000 kg	145 kg/m^2
Deck Concrete	585 m^3	0,31 m^3/m^2
Deck Reinforcement	136000 kg	230 kg/m^3
Foundation Concrete	188 m^3	
Foundation Reinforcement	13600 kg	