Construction of New Lifting Bridge across Södertälje Canal

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» Client, Civil Contractor and Consulting Engineer

Client: Swedish Trafikverket
Contract: Design and Build
Contractor: MT Højgaard a/s
Consulting Engineer: Rambøll a/s
Multi-discipline Bridge with numerous challenging Construction Solutions
Foundation of the Bridge

Bored piles foundered into bedrock
- Each pile group contains 28-64 piles
- Length between 20m – 45m
- Total pile length: more than 6800m

Steel Core Piles
- 219.1mm x 6.3mm casing
- Ø150mm solid steel rod S355
Concrete Structures – “Red Concrete”

Visible concrete in red:
- Iron oxide pigment
- C35/45
- B500B reinforcement

Pylon Structures:
- 4 pylons of 50m height
- 11 pours of 4.5m
- 4.0m x 4.6m inside
- Wall thickness from 550mm to 300mm
Approaching Bridges

- Box steel girders
- Interacting concrete decks
- Bridge span: 2 x 35m
- Hybrid-girder – different material strength in flanges and webs
  - Girder webs & lower flange: S355
  - Upper flange partially S420
- Fabrication at Ruukki factory in Ylivieska, Finland
- Delivered to site by truck in sections of 2 x 28.5m and 1 x 18m
Approaching Bridges -Launching operation

- Launching set-up for the north side approach bridge
- Launching commence from the north abutment structure
- Girders closing up on the intermediate pier
Approaching Bridges – Lowering operation

- Lowering equipment - “step by step”
- Bridge girders lowered to final level
- Ready for concreting
Lifting Bridge with Machinery
Lifting Bridge - Design

- Truss girder bridge with length of 51.6m and width of 12.3m
- Weight: 420 tons
Lifting Bridge – Fabrication and Delivery to Site

- Fabrication in Vietnam, Ho Chi Minh City
- Swedish standards: BRO 2004 / BV BRO 7 / BSK 99
- Danish supervisors at all times
- NDT
- Sections in movable sizes fabricated in workshop
- NDT before base painting
- Base paint before transportation to assembly yard at nearby deepwater harbour
» Lifting Bridge – Assembly at Harbour
Lifting Bridge – Transportation to Södertälje

- Transportation from assembly yard to quay side: 500m
- Multi wheeler /SPMT
- Special cargo ship with direct transportation to Södertälje harbour
- Off-loading to barge in Södertälje
- Preparation for installation in December 2009
Lifting Bridge - Installation

- Installation from barge positioned in-between the pylons
- Wire-jacks positioned on top of pylons
Positioning of Bridge

Barge with bridge transported in-between the pylons

Lifting operation in process
Lifting Operation
Machinery
Winch and Pulleys OD 1620, 2350, 3150mm
Completed Winch, Counterweights and Motor/Gear ready for Installation in Pylons
Wire Pulley
Pylon Top Structure
Machinery inside the Crossbeam
PLC System

Control system: Redundant with red and blue system

Lifting system are CE marked
Interface between Railway and Structures
» Bridge in Operation since 11th May 2010
Movable Bridges in Södertälje
Next Movable Bridge by MT Højgaard

Odin’s Bridge in Odense, Denmark

Will be the largest double swing bridge in northern Europe