



Case Study of the Longest Single Span Timber Bridge for Highway Loads in Sweden

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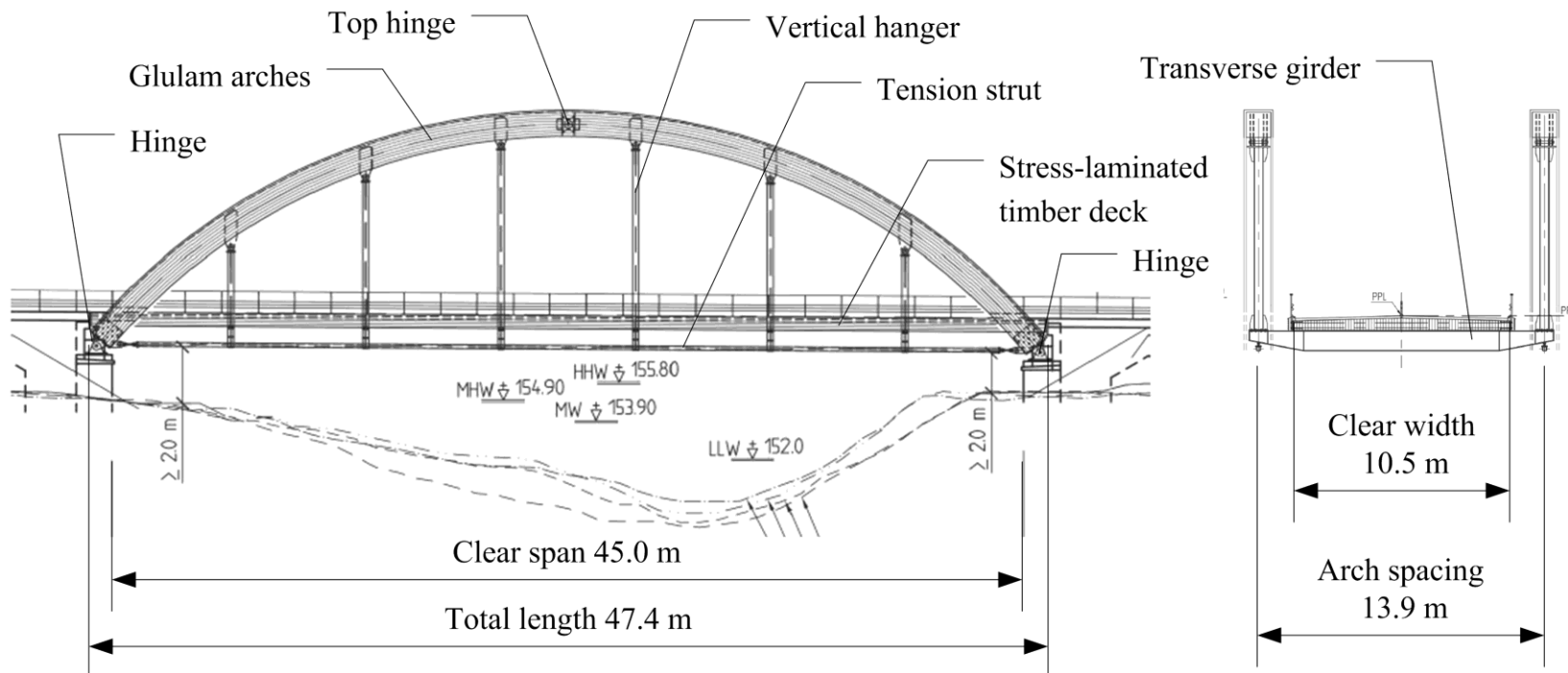
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DIFFERENCE



Background



- Proposal drawing, Aug 2010
- Trafikverket (owner) → Svevia (contractor) → Moelven Töreboda (manufacturer) → WSP Bridge & Hydraulic Design
- WSP worked with design and analysis, mid 2012 – mid 2013



Loads and design standards



Loads

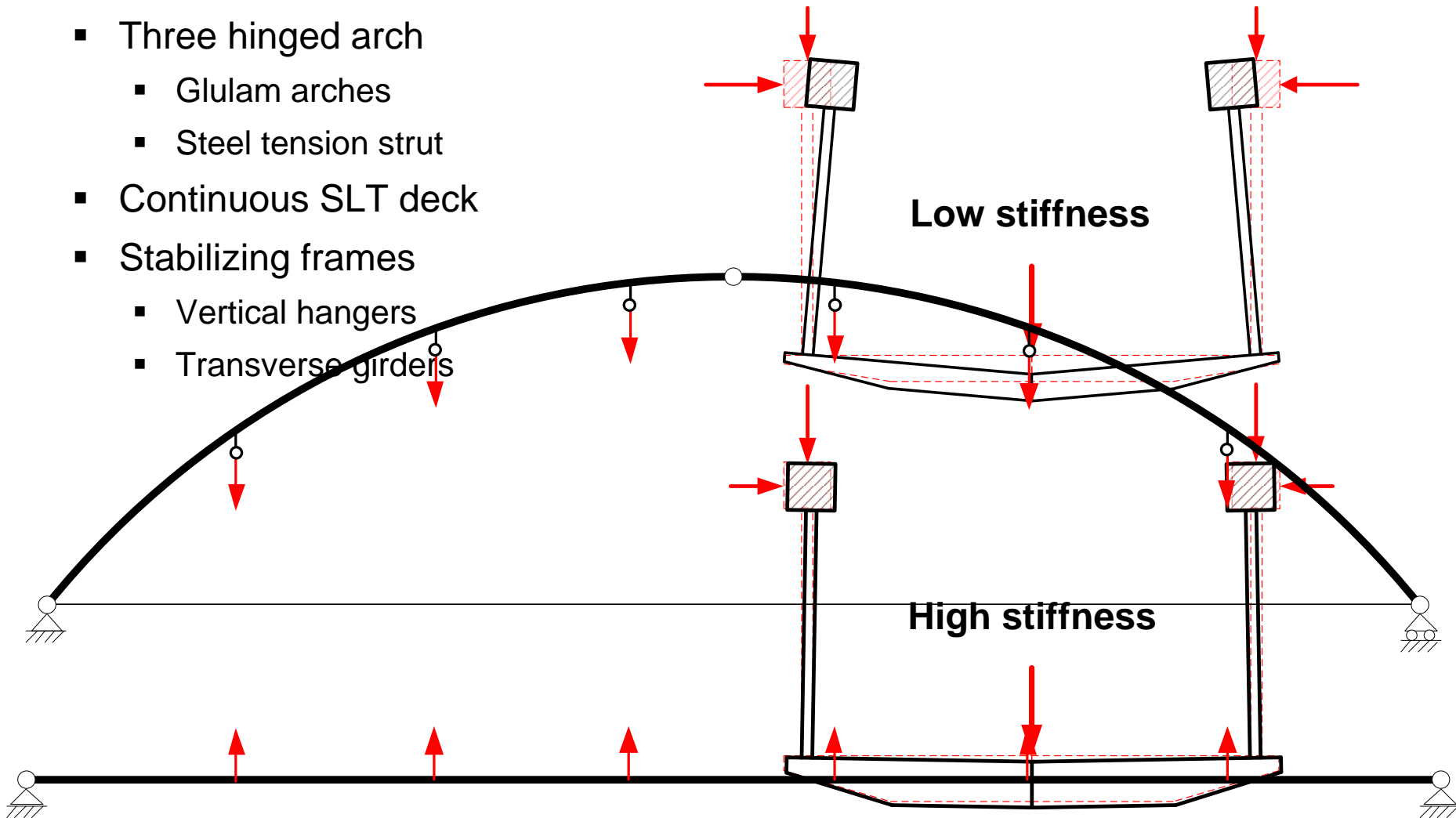
- Dead loads (Wood, Steel and Asphalt)
- Vehicle loads
 - Load Models (EN 1991-2)
 - Classification vehicles in Sweden
- Wind loads
 - Dynamic wind analysis →
 - Quasi-static load
- Temperature load
- Accidental load

Design standards

- Swedish standards
 - TK Bro
 - Glulam specifications for CE L40c
- Eurocode
 - EN 1990
 - EN 1991-1-1
 - EN 1991-1-4
 - EN 1991-1-5
 - EN 1991-2
 - EN 1995-1-1
 - EN 1995-2

Structural system of bridge

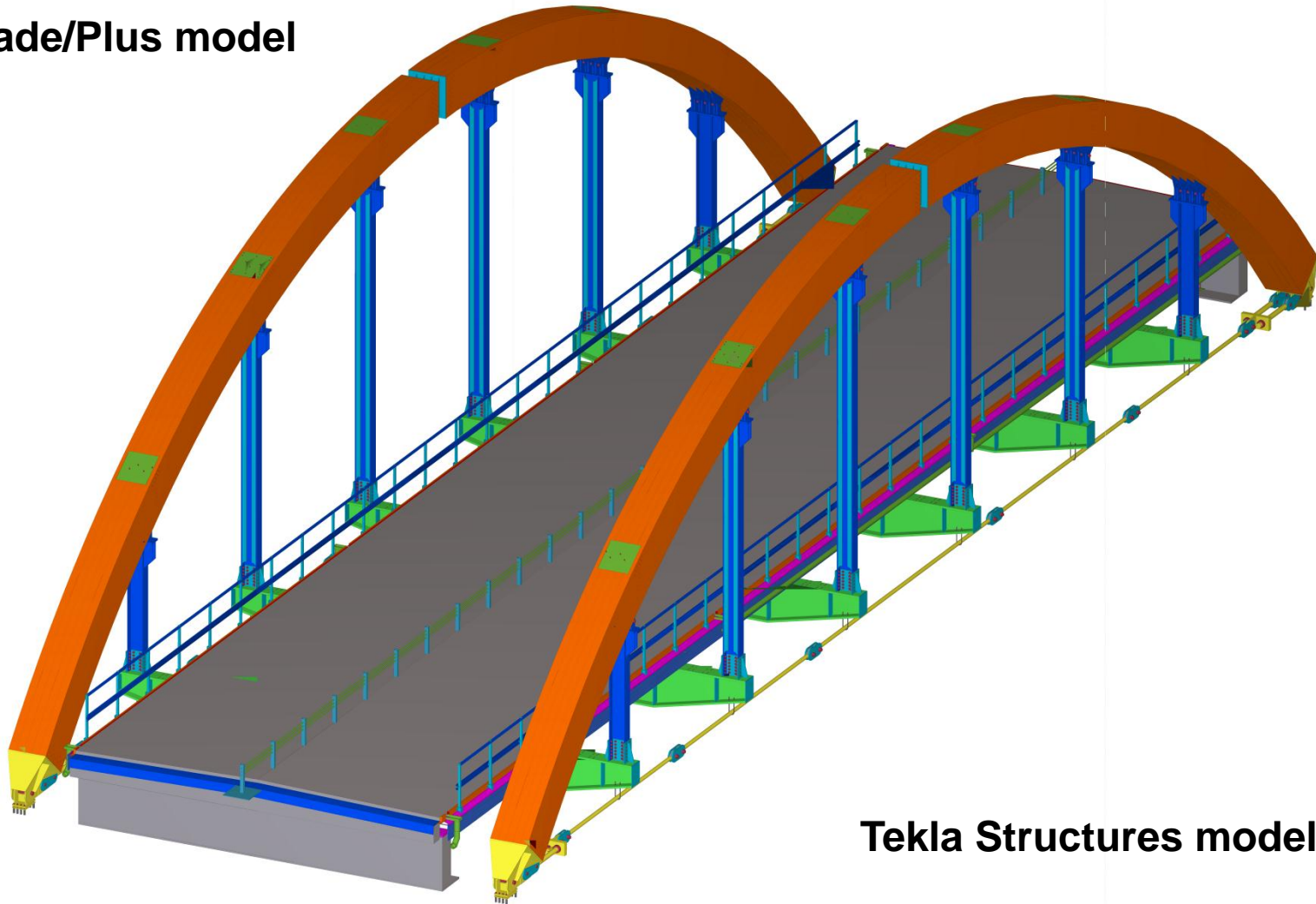
- Three hinged arch
 - Glulam arches
 - Steel tension strut
- Continuous SLT deck
- Stabilizing frames
 - Vertical hangers
 - Transverse girders



Numerical model and Design model



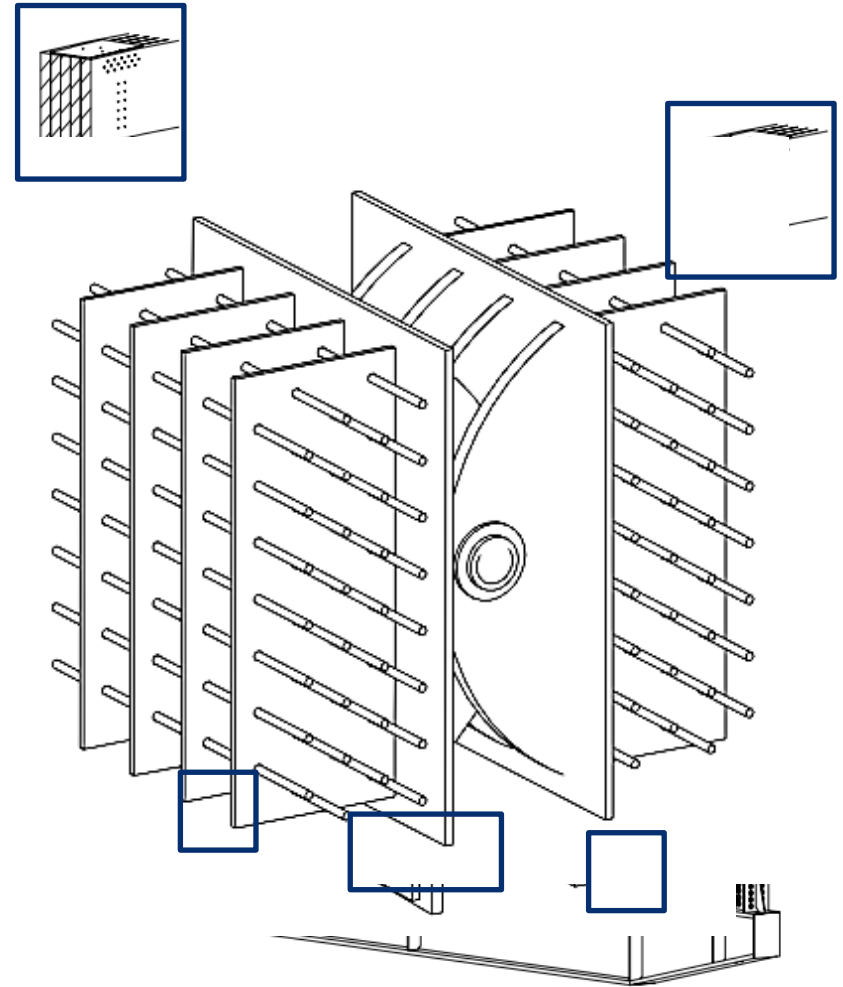
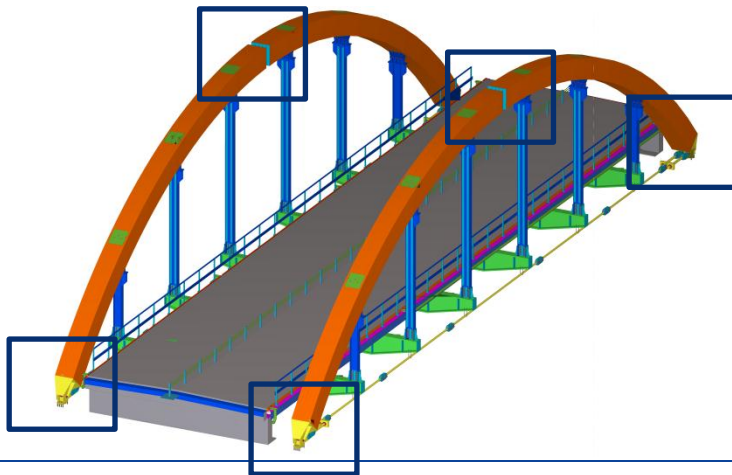
Brigade/Plus model



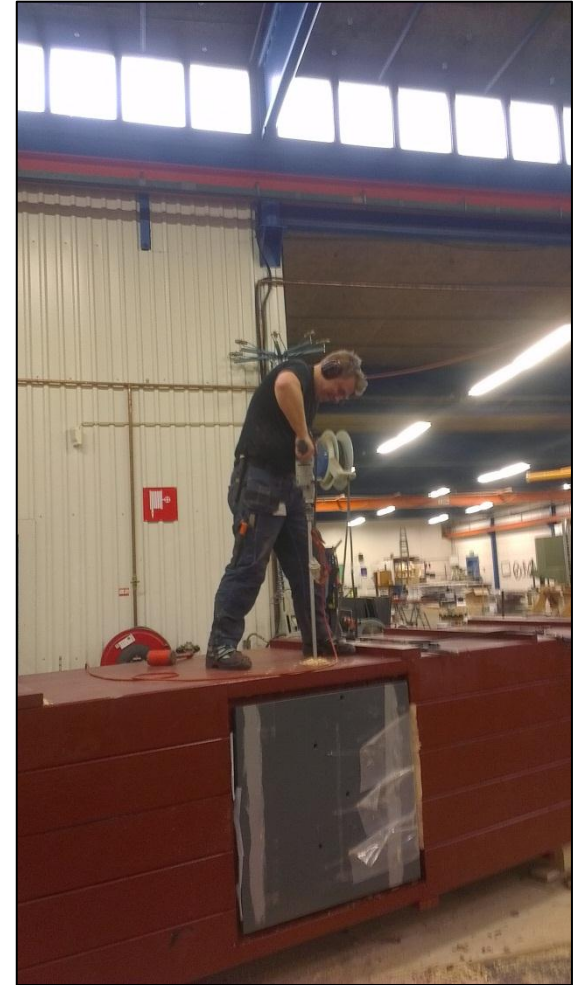
Tekla Structures model

Steel-wood connections

- Slotted-in plates with dowels
 - Glulam arch – bearing
 - Glulam arch – glulam arch
 - Glulam arch – vertical hanger
- Slotted-in plates without dowels
 - SLT deck – transverse girder
- Bolted connection
 - SLT deck – transverse girder



Pre-assembly of arches



Transportation from factory to construction site



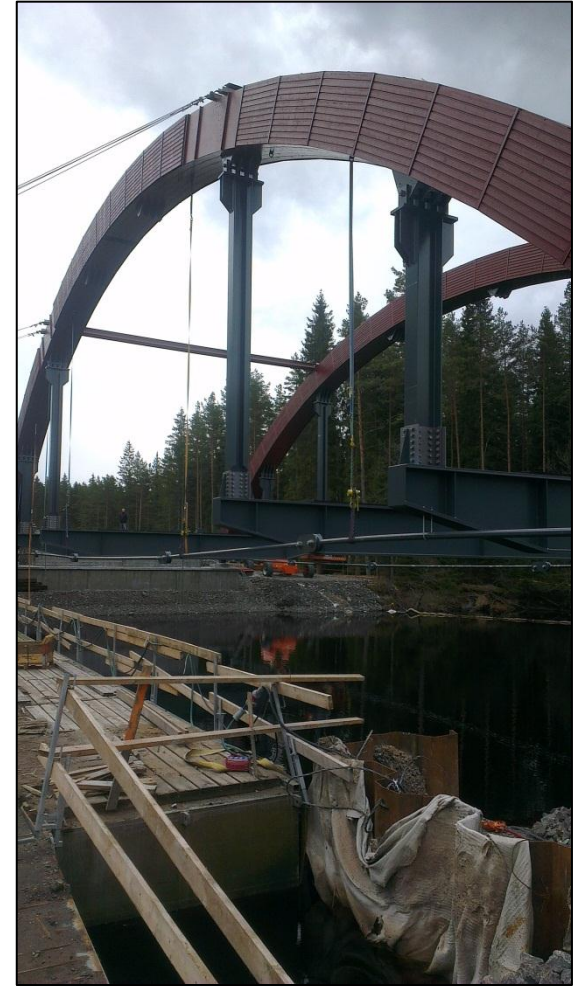
Manufacturing of transverse girders and vertical hangers



Assembly of arches using cranes



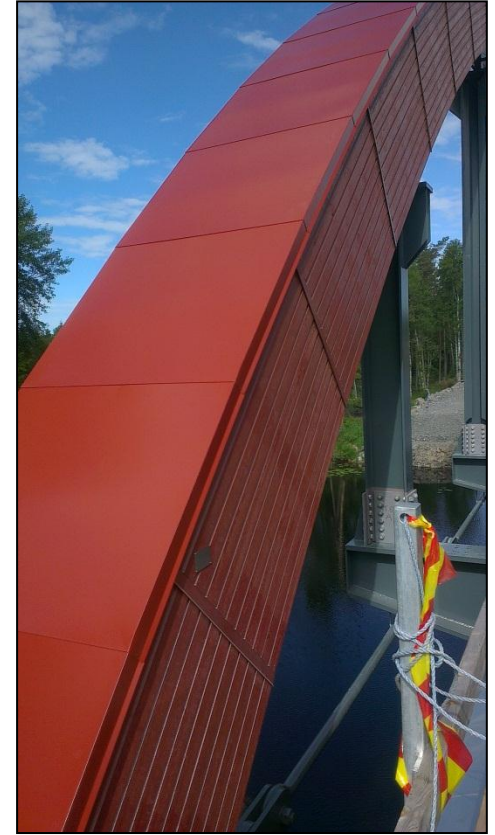
Assembly of stabilizing frames (hangers + girders)



Almost done, mid August



Durability details



Thank you for you attention

Questions?