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Development of timber bridges

Inventive design by Bloc-Glueing
and timber-concrete-composite

Field report from practice in central
Europe

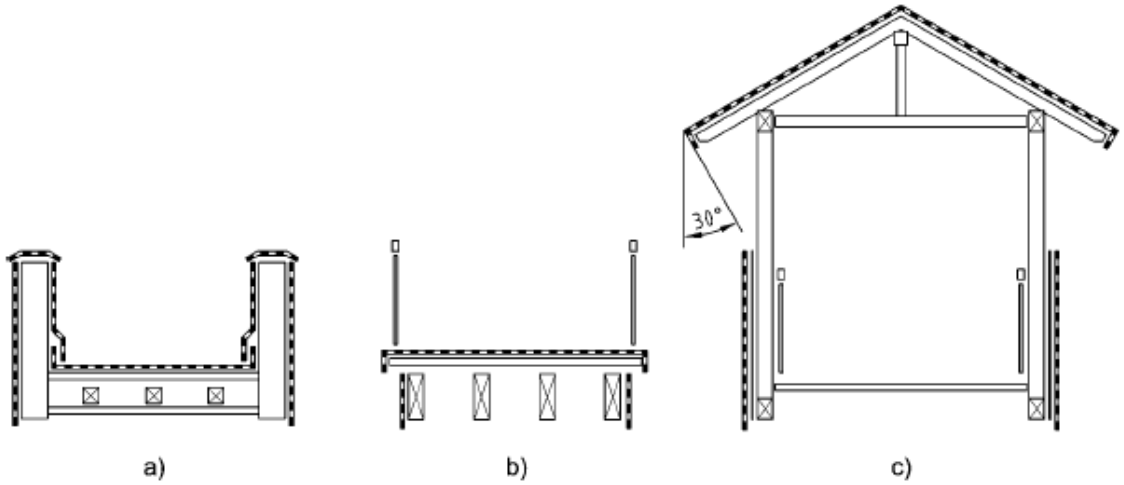
History

evidence of
durability

constructive
wood protection of
the structure

Requirements

accordance with German DIN 1074
as standard - Issue 09/2006



State of the art "protected structures"

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durability

of bloc laminated structures

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System of bloc gluing

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In production
different way of orientation

Horizontal Bloc-Lamination

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Bridge Gera/Ronneburg - D

Length: 225,0m

Width: 2,5-3,8m

Built: 2006

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Bridge Gera/Ronneburg - D

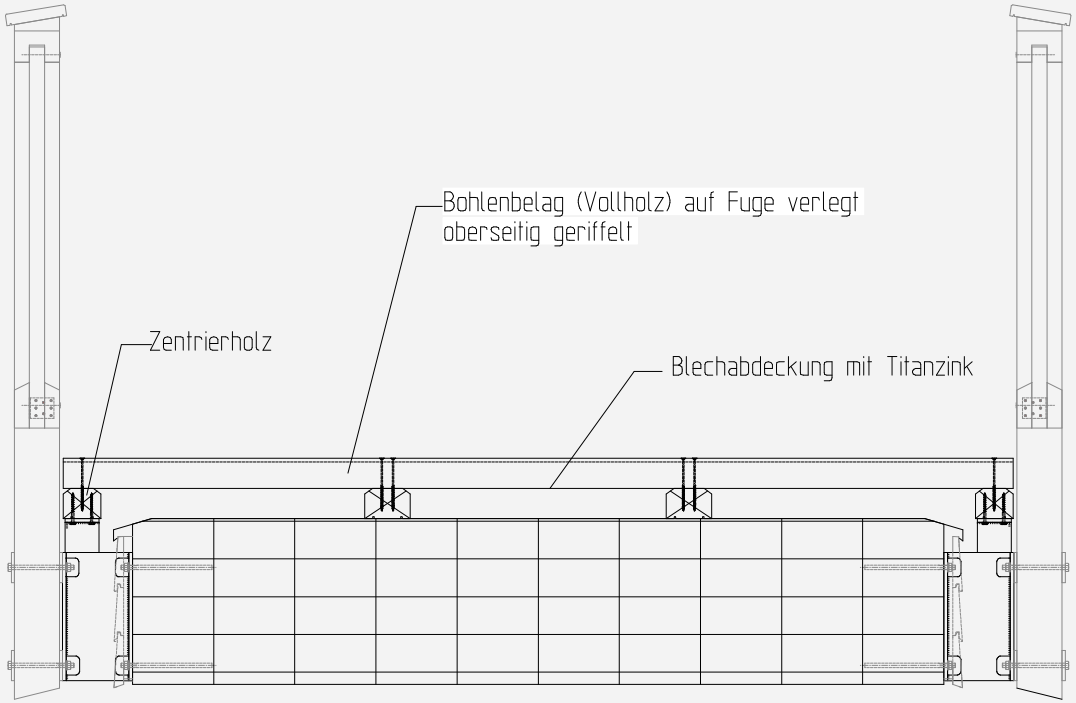
Length: 225,0m

Width: 2,5-3,8m

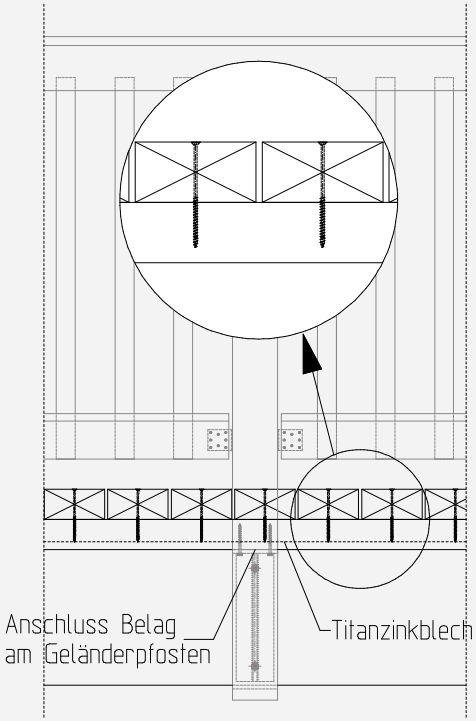
Built: 2006

Wooden decks on girder / blocklaminated bridges

Querschnitt



Ansicht



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Winschoten - NL

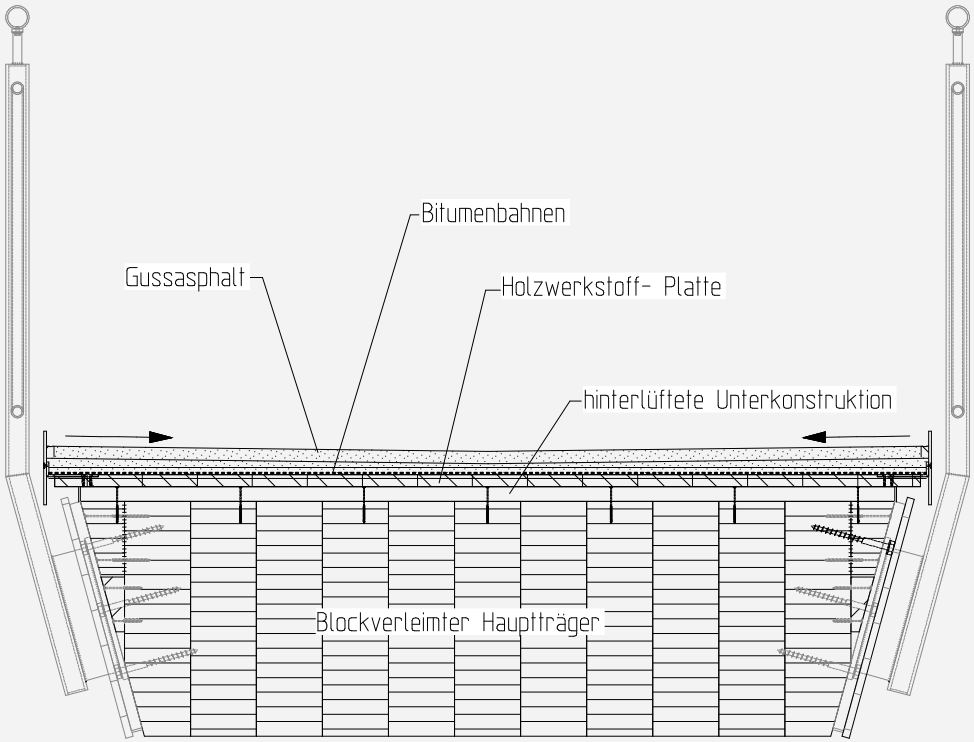
Length: 75,0m

Width: 2,5m

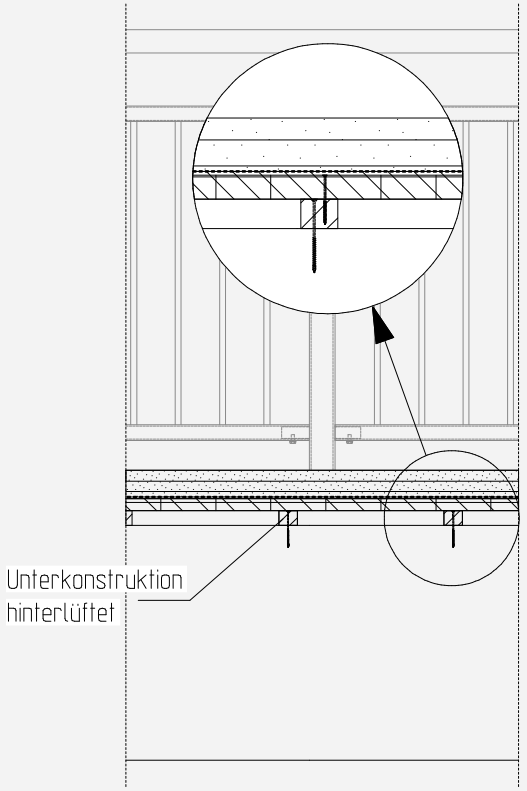
Built: 2005

Asphalt on block carrier

Querschnitt



Ansicht



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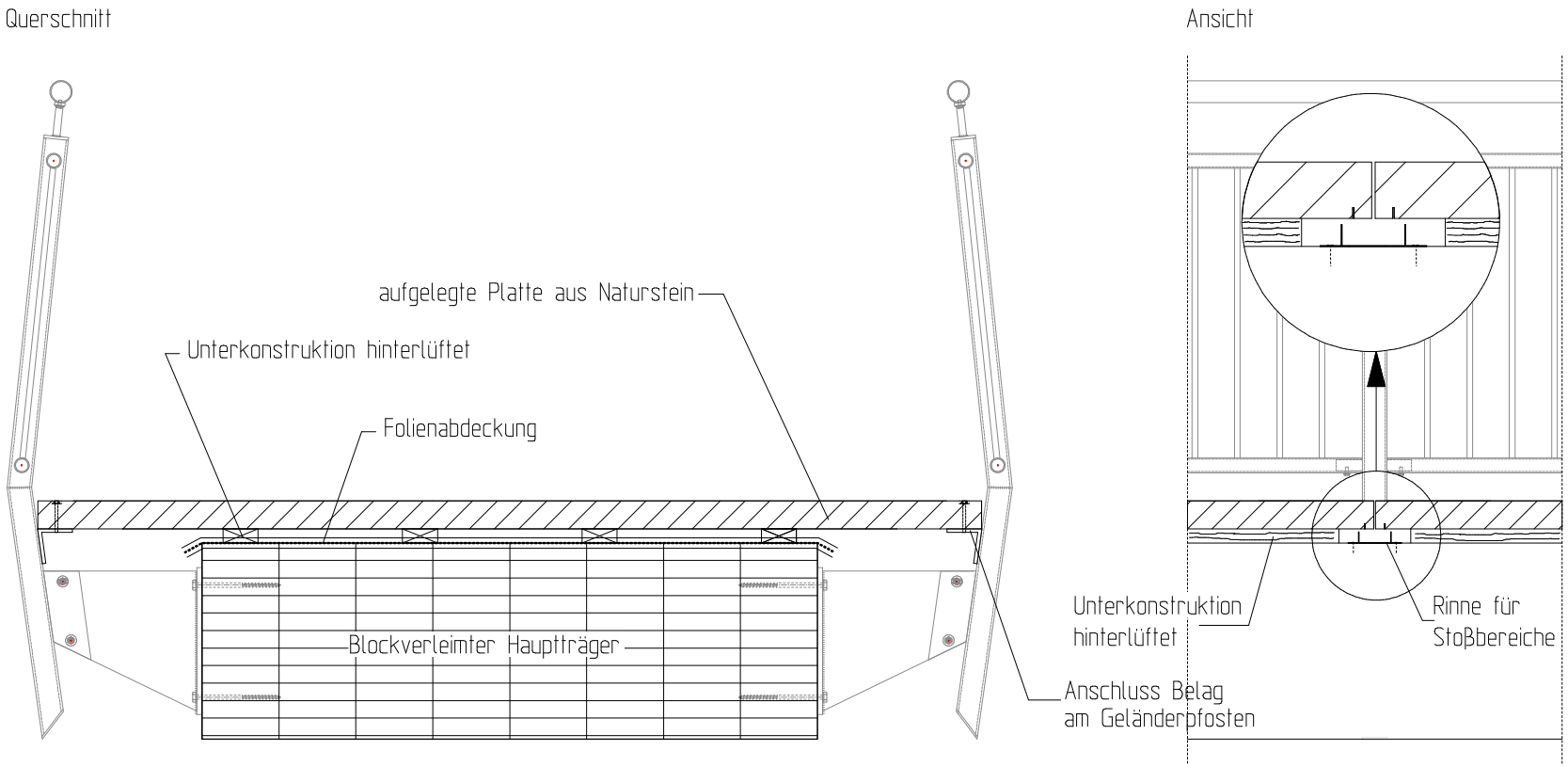
Bridge Schwäbisch Gmünd - D

Length: 28,0m Width: 2,5m Built: 2013

Natural stone on block carrier



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vertical Bloc-Lamination

Bridge Hochstetten - D

Length: 45,5m

Width: 2,5m

Built: 2003

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Bridge Hochstetten - D

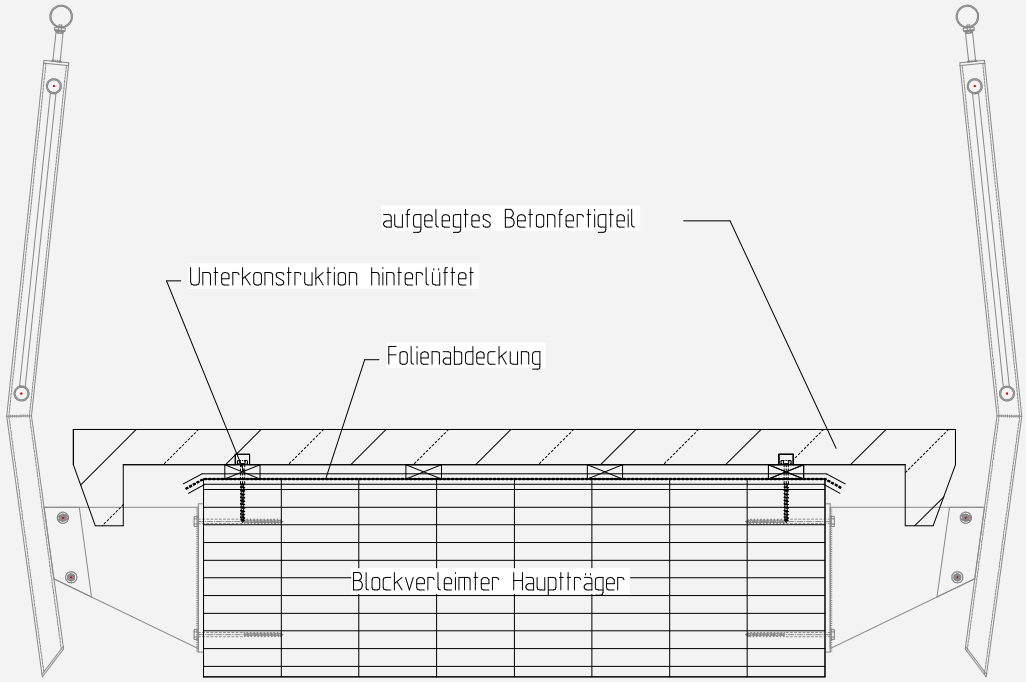
Length: 45,5m

Width: 2,5m

Built: 2003

prefab concrete deck on block carrier

Querschnitt



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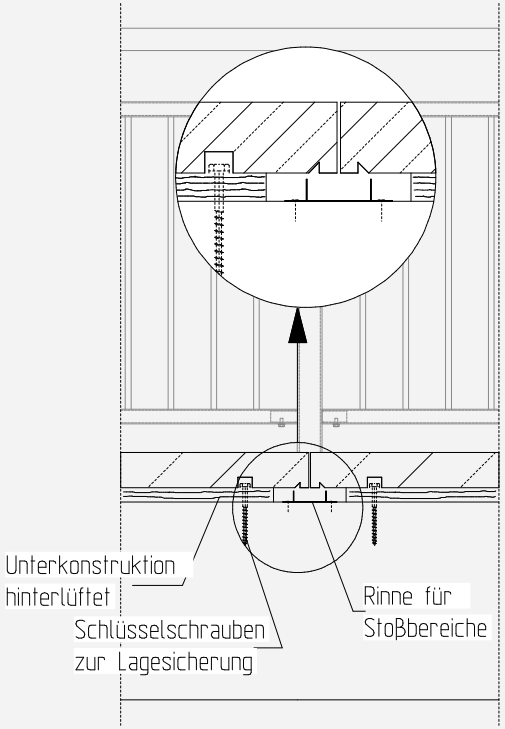

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Bridge Almere - NL

Length: 75m

Width: 3,0m

Built: 2007

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twisted Bloc-Lamination

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Bridge Sneek-NL

Length: 32,0m

Width: 8,8m

Built: 2010

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Bridge Sneek-NL

Length: 32,0m

Width: 8,8m

Built: 2010

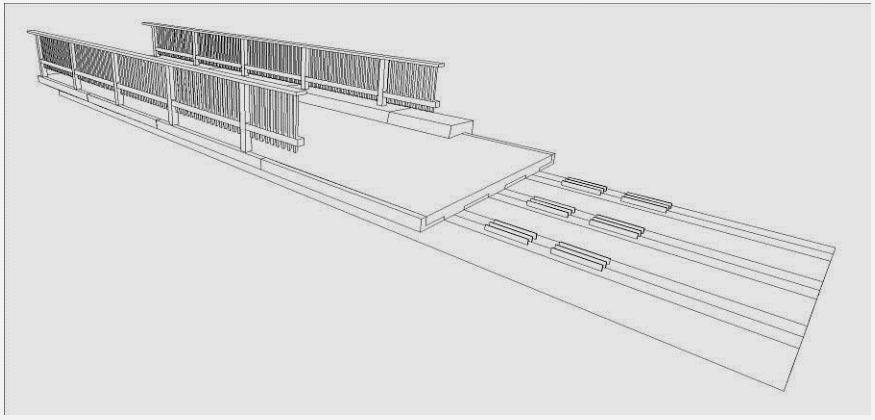
Timber concrete composite

Advantages in comparison to conventional timber bridges:

- higher load capacity with lower height of construction
- good structural wood protection through cantilevered concrete slab on the top side
- optimal load spreading of point loads by the concrete slab
- better cross bracing
- use of proven details in connections to the concrete

Advantages in comparison to conventional concrete bridges:

- lower weight of the superstructure and thus more efficient structure
- fast and efficient installation with high degree of prefabrication without extensive formwork
- cost savings in foundation and the abutment
- improved energy balance and eco-balance, sustainability through CO^2 reduction



Timber conrete composite

Option 1: HBV-Shear connector
bridge Ruhpolding - D

bridge Ruhpolding - D

with glued in metal sheetings

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bridge Winschoten NL

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bridge Winschoten NL

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bridge Winschoten NL

Installation without supporting structure / scaffolding

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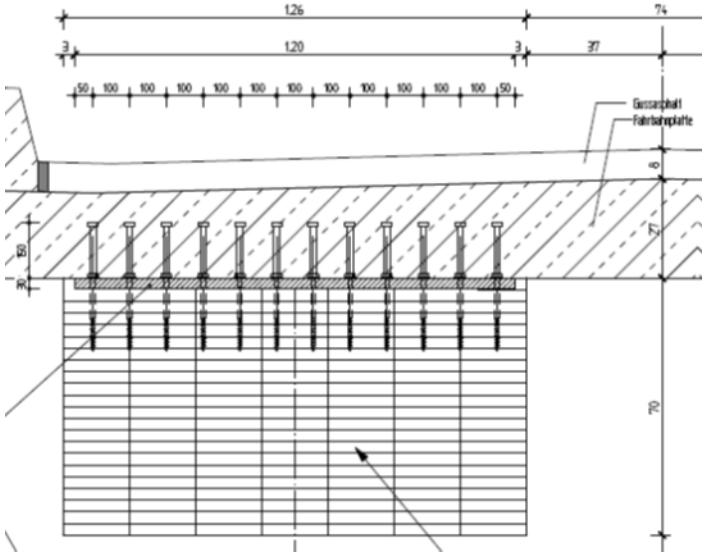
Bridge Winschoten-NL

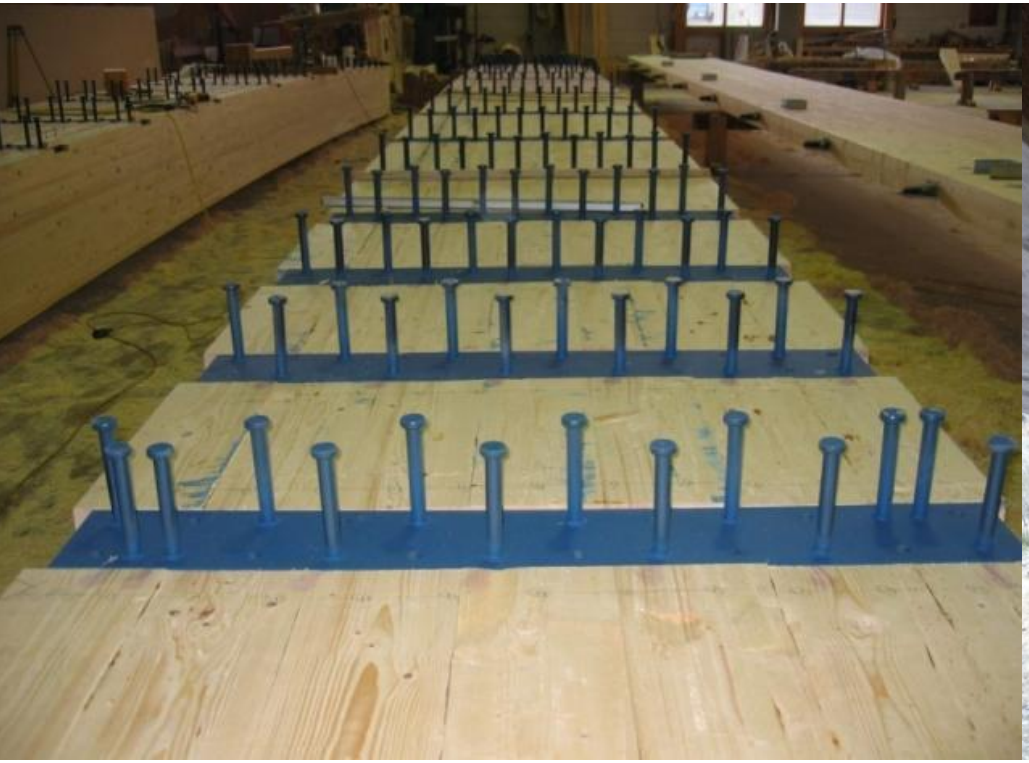
Length: 40,0m (23/17m) Width: 4,0m Built: 2012

timber – concrete – composite (TCC) bridges

Option 2: head bolts



bridge Wippra - D



with shear connector

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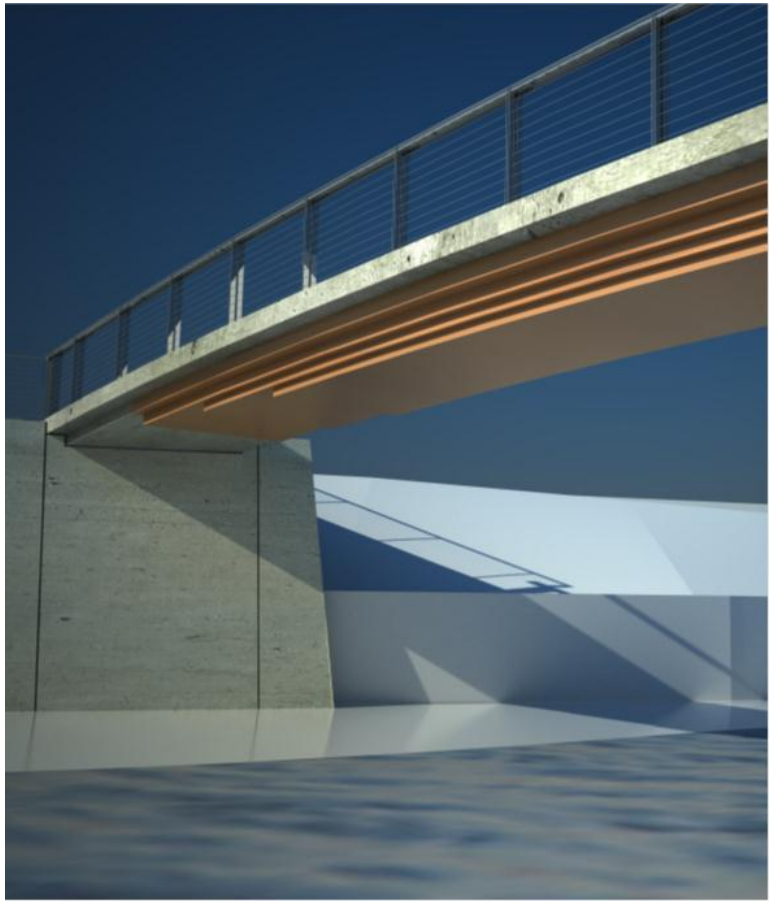
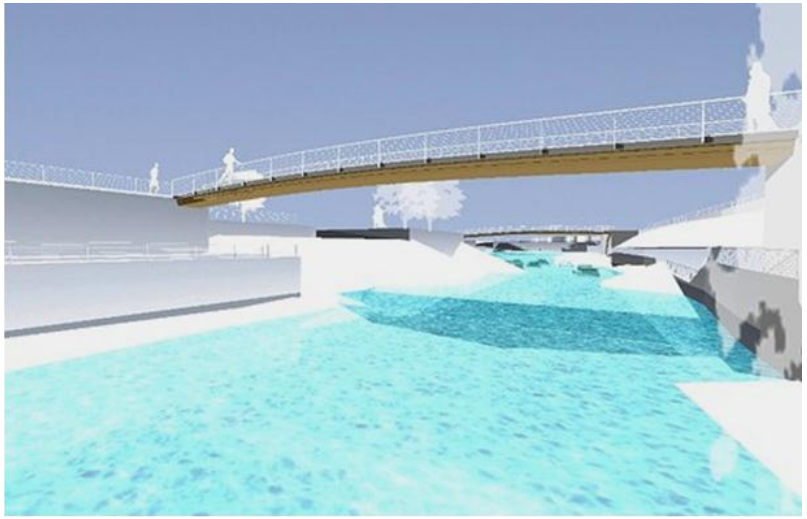
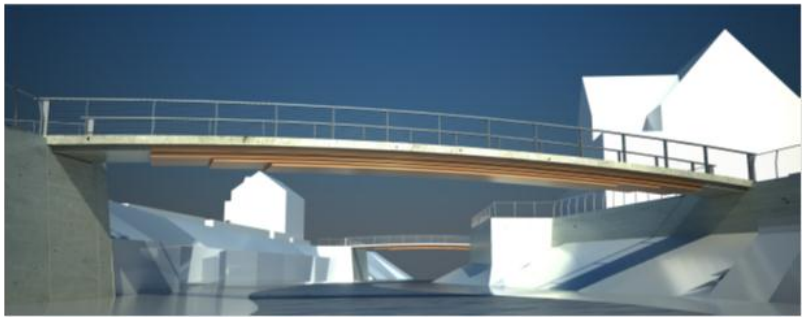
bridge Wippra - D

Timber conrete composite

Option 3: notches and glued in reinforcement bars
Bridges in Schwäbisch Gmünd DE







design: graf ingenieure, Schwäbisch Gmünd - D

bridge Schwäbisch Gmünd DE

Notches with glued in rods (construction steel)

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Bridge Schwäbisch Gmünd - D

Length: 28,0m Width: 3,2m Built: 2013

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Bridge Schwäbisch Gmünd - D

Length: 28,0m Width: 3,2m Built: 2013

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Bridge planning Lohmar- D

Length: 40,0m Width: 4,5m Built: 2013/14

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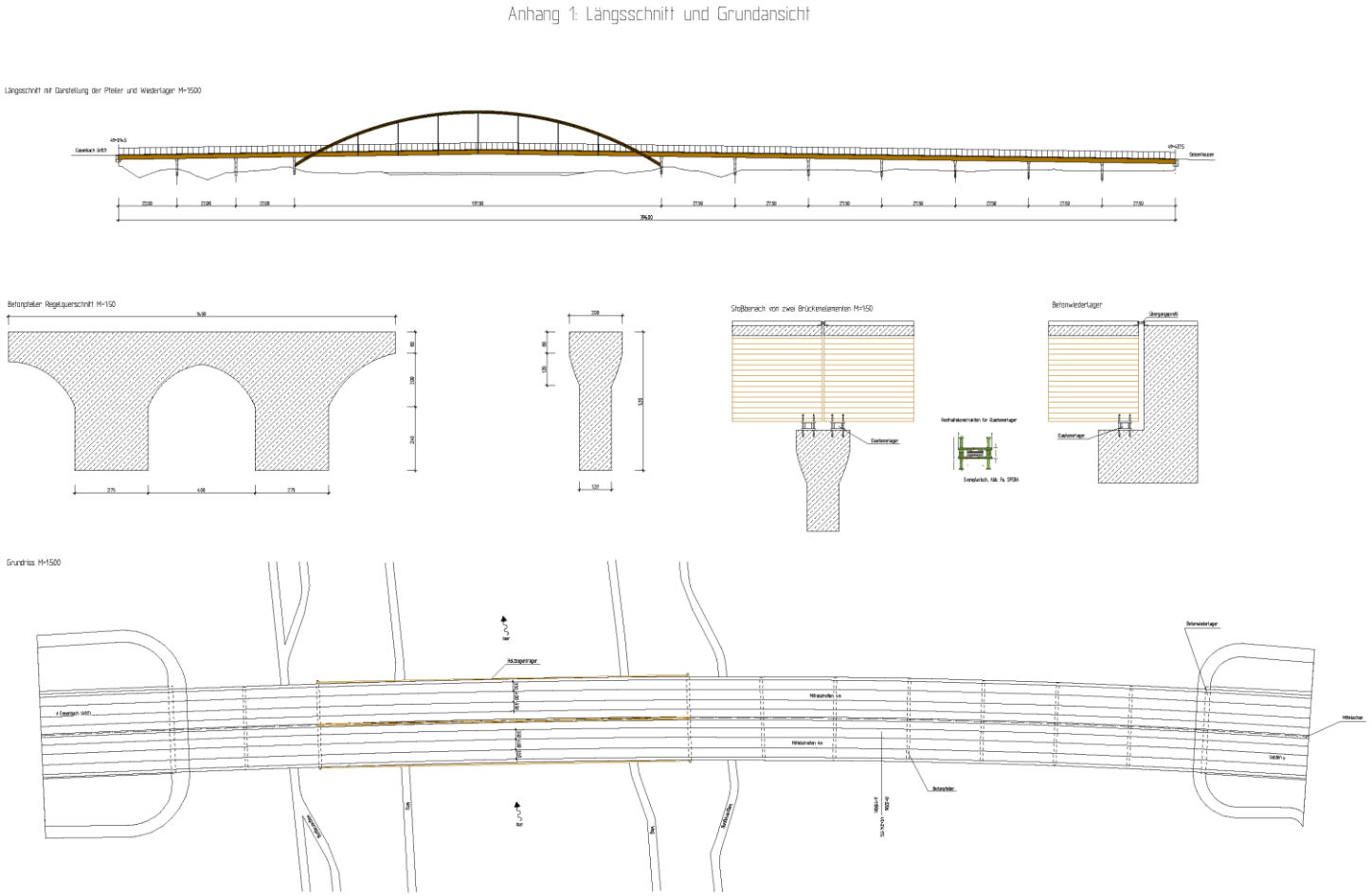
Bridge in progress: Lohmar- D

Length: 40,0m Width: 4,5m Built: 2013/14

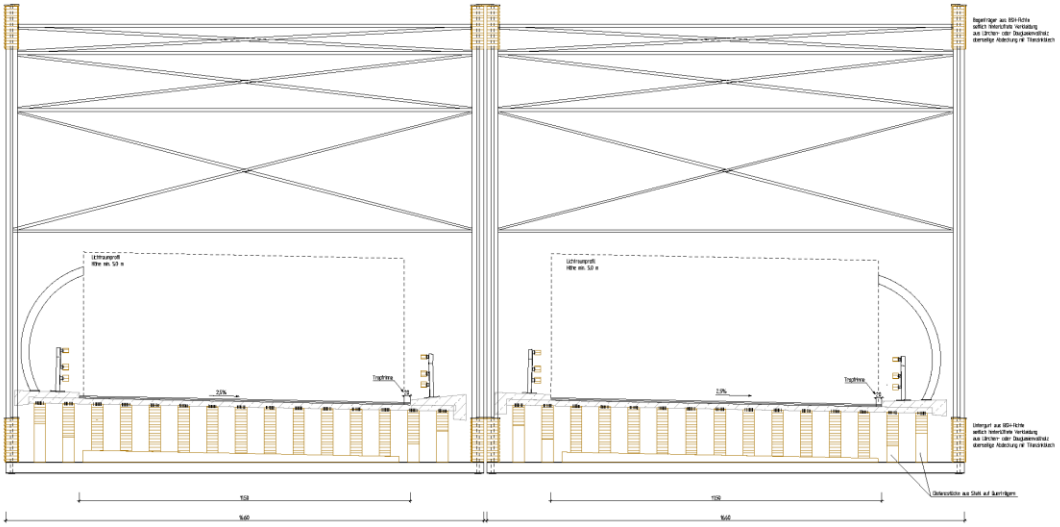
Design for the future?!



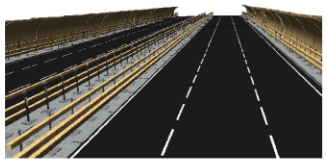
Design for the future?!

Anhang 2: wesentliche Querschnitte der Brücke

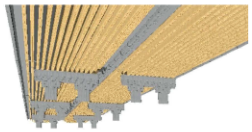
Regelquerschnitt des Brückenelementes mit Bogentragwerk in der Mitte M=1:50



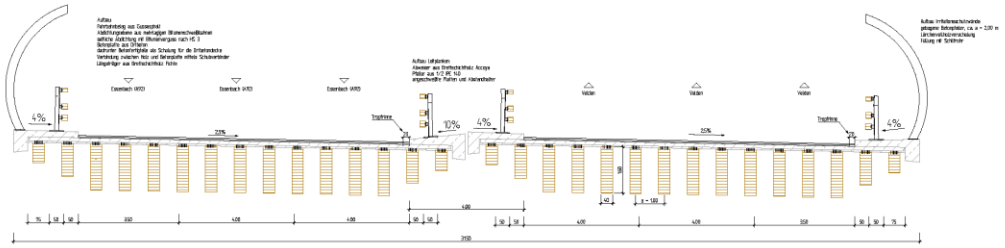
Detailansicht von oben

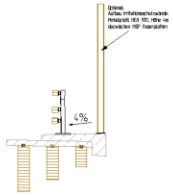


Detailansicht von unten



Regelquerschnitt der Brückenelemente ohne Bogentragwerk M=1:50





Detail Holzsitzbank