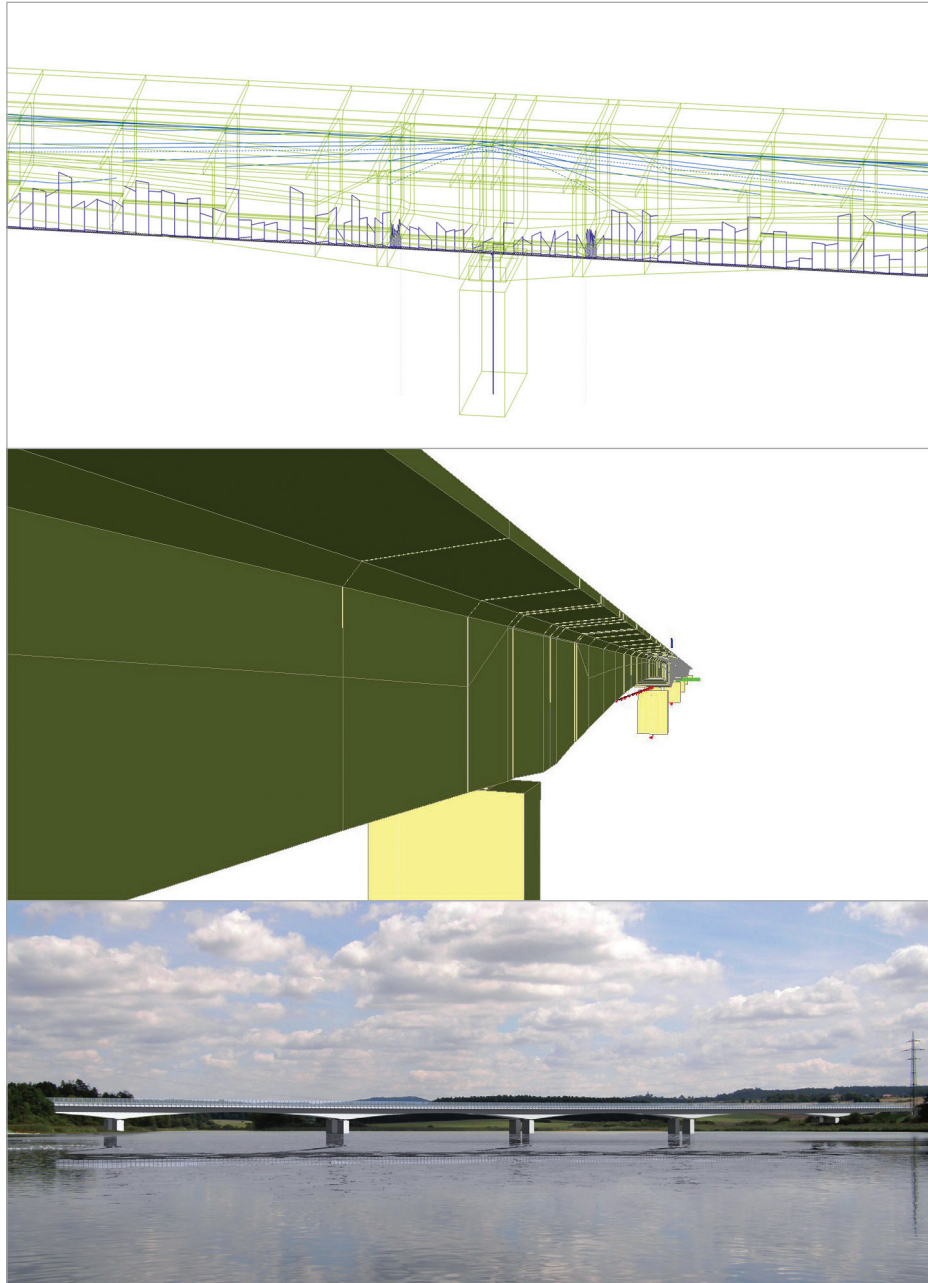


Bridge over Koberný Pond and a Wildlife Corridor at km 87,500 of D3 Motorway - Soběslav, Czech Republic



The Bridge over Koberný lake and a wildlife corridor at the 87,500 km point of the D3 motorway section running from Tábor to Veselí nad Lužnicí, with a total length of 552.8 m (58.4 + 4 x 109.0 + 58.4), is located in a non-built-up area, within the meliorative area of Koberný lake, about 15.4 m above the terrain surface. It is located approximately two kilometres south-east of the town of Planá nad Lužnicí, and about one and half kilometres north of the village of Košice. The valley which is traversed by the bridge is used for agricultural and breeding purposes.

The D 27.5/120 width configuration motorway bridge is set to a right-hand horizontal curve with the radius $R = 1,750$ m and in vertical alignment is on a vertical curve with the radius $R = 35,000$ m. Transversally, the roadway on the bridge is superelevated at 3.5 %.

The C 30/37 XF4 concrete grade pillars, with the cross-section of 8.0×2.5 m, are founded on 19 thirty-metre piles 1.2 m in diameter. The piles are keyed into R3 and R4 paragneiss to the depth of about 1.5 m. Under abutments and in the transition area, the ground is reinforced with gravel piles, allowing for the effect of the settlement of adjacent embankments with the average height of 12 m. According to calculations, the aggregate settlement of the adjacent embankments reaches up to 0.6 m. The abutments are founded on 10 deep piles. Water encountered during drilling for the piles was pumped to settling tanks behind the abutment to be liquidated in an environmentally friendly way.

Two pairs of casting carriages were used for the free-cantilever-method construction of the load-bearing structure of the box girder with the variable depth ranging from 2.69 m to 5.89 m. Casting of the girder proceeded symmetrically from 16-metre long balance arms. The stub was cast at two stages, on a scaffold provided by PIZMO supports. Four temporary reinforced concrete supports with the cross-sections of 1.3×1.3 m were tied for stabilising the balanced cantilevers on each foundation. The stub in the assembling condition was with the foundation for each temporary support in relation to a pair of pre-stressing rods 47 mm in diameter. After the joints of the neighbouring stubs were made monolithic, all the temporary supports were deactivated.

Several mathematical models for apposite computational analysis of the structure during all the stages of the construction process were created in Scia Engineer. Calculations were realised with a global and local finite elements model using beam and (or) plate elements. Because of a great computational demand, or sometimes the poor relevancy of global models, some details of the structure and some phases of the construction have been modelled and calculated in separate models. Two global models were created. The first one - a 3D model, which consists of 1D members in proposed geometry - was made for clarification of the torque, for the assessment of inner forces from support settlement, the superimposed dead load and climatic effects, and for determination of the bearings load. The second one is a 2D flattened model which consists of 1D members. It was made for time dependent analysis. The model reflects the rheology and loading history for the assessment of inner forces and deformations in specific time. For the shape modelling, the 1D member modeller was used with a Variable cross-section, General cross-section and Planar 2D members. Concrete designer modules were used for better time dependent behaviour understanding e.g. Post-tensioned tendons, a Prestress check and Time dependent analysis. The global analysis model is a 3D frame TDA model with beam elements respecting the proposed geometry. Cross-sections that are 1D member are defined as general cross-sections with a linear-variable connection. The piers are 1D members with a constant cross-section. The foundation details are calculated separately and in the global model are represented as an elastic support. The tendons are modelled using a Post-tensioned tendons module aid. Cantilever tendons in the upper plate of the deck and continuous tendons are applied as 1D member in real proposed geometry or in a flattened shape in a TDA model. The bearings are simulated as short 1D member with joints with specific material characteristics. In TDA a relevant displacement is released in a specific time. Temporary supports are rigidly connected to a balanced cantilever and in TDA they are also removed in specific time. The computation of inner forces is carried out with a standard linear calculation.

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Metrostav a.s. is a universal construction company, which commands a leading position in key segments of the Czech construction market and also in market expanses of foreign countries. The company traditionally holds a strong position in underground construction, public and residential buildings, industrial construction and transportation construction. It is a member of the multinational DDM Group.

Division 4 of Metrostav a.s. was founded in 2001 for the purpose of carrying out transport-related construction projects, particularly roads, motorways and railways including associated structures. Since 2003, the division has been collaborating with a bridge production plant owned by Metrostav a.s. on steel bridge structures and steel-composite bridges. An important technological advance took place in 2004, when Metrostav a.s. started delivering highway structures using its own capacities. Since 2006, the free cantilever technique has been developed in collaboration with the world's leading companies in the area of the development of casting carriages.

Project information

Owner	The Road and Motorway Directorate of the CR
Architect	Novák & Partner, s.r.o.
General Contractor	Metrostav a.s. Division 4
Engineering Office	Novák & Partner, s.r.o.
Location	Soběslav, Czech Republic
Construction Period	09/2008 to 08/2013

Short description | Bridge over Koberný Pond and a Wildlife Corridor

The Bridge over Koberný lake and a wildlife corridor at the 87,500 km point of the D3 motorway section running from Tábor to Veselí nad Lužnicí, with a total length of 552.8 m, is located in a non-built-up area which is used for agricultural and breeding purposes.

The motorway corresponds to the category D 27.5/120. The concrete pillars, with the cross-sections of 8.0 x 2.5 m, are founded on 19 30-metre piles 1.2 m in diameter.

Two pairs of casting carriages were used for the free-cantilever-method construction of the load-bearing structure of the box girder with the variable depth ranging from 2.69 m to 5.89 m. Casting of the girder proceeded symmetrically from 16-metre long balance arms.

