Rehabilitation and Strengthening of Sylva Bridge at Kungur, Russia

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Summary

Sylva Bridge at the downtown of city Kungur is one of the oldest road bridges in Perm region, the West Urals, Russia. Its erection was begun in 1912 and was interrupted with the First World War and the further events in Russia. The bridge was opened only in 1931. For 75 yeares of bridge operation the most part of bridge constructions have been acquired plural damages, both mechanical and corrosion. After the bridge inspection in 2003 and according to the calculations of its capacity, the decision on reconstruction of the bridge was accepted. The purpose of rehabilitation was to replace the timber deck by steel orthotropic deck with asphalt pavement. A new deck was to be engaged in combined action with the existing metal structures with the help of socles with high-strength bolts. Due to this, the bridge carrying capacity was to be increased as required with the modern standards. In 2006, after tests, the bridge was opened for traffic.

Keywords: Inspection; capacity analyses; strengthening; steel orthotropic deck; socle; anticorrosive protection; testing.

1. The common data on the bridge

The Sylva Bridge (Fig.1) at the downtown of city Kungur is one of the oldest road bridges in Perm region. Its erection was begun in 1912.

By the beginning of the First World War the abutments had been built and the piles of the pier foundations had been driven in. Further construction of the bridge was continued only in 1930 and the bridge was opened for traffic on 07/11/1931.

The total length of the bridge is 136 m. It has 3 spans: 19+87+19 (m). Width of the deck is 8.1m. Sidewalks are 1.15 m in wide.

Piers and abutments are rubble concrete with timber piles foundations.

Steel spans are riveted. Flood spans have 2 main I-girders. The central span has 2 main trusses with circus contour chords and triangle web. The sections of all the elements are composed riveted. Nodes of trusses have gusset insertion pieces with twin butt straps.

The flood spans have mobile one-rollered bearings and fixed sector hinge bearings. The main span has mobile sector bearings with four rollers and fixed sector hinge bearings.

Bridge road consisted of steel structural stand with a timber deck. The structural stand is a cross system of I-shaped section beams (Fig.2). The distance between the longitudinal beams of all the spans is 1.8m, between the transverse beams, 4.65m of the flood spans and 7.2m of the central span.

The sidewalks with a timber deck are located on remote consoles which were ripped to main gerdes and chords of trusses.

During all the period of the bridge operation, the timber of the deck was replaced each 2-3 years (the cost of the work was approximately $100,000). Besides, when necessary, the timber of the

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