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Combined Steel Superstructure

Structure métallique pour un pont mixte rail-route

Stahlüberbau für eine kombinierte Brücke

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The 2x220 m superstructure of the bridge passage across the Volga river in town of Uljanovsk is designed for four motor transport lanes and 2 rail (tram and metro) tracks.

The superstructure is a girder with triangle lattice without posts and suspensions of 12 m in height and 13 m between the girder axes. The traffic is accomplished on two levels: motor transport at the level of the upper chord and the rail transport - at the level of the bottom chord of the main trusses (Fig.1).

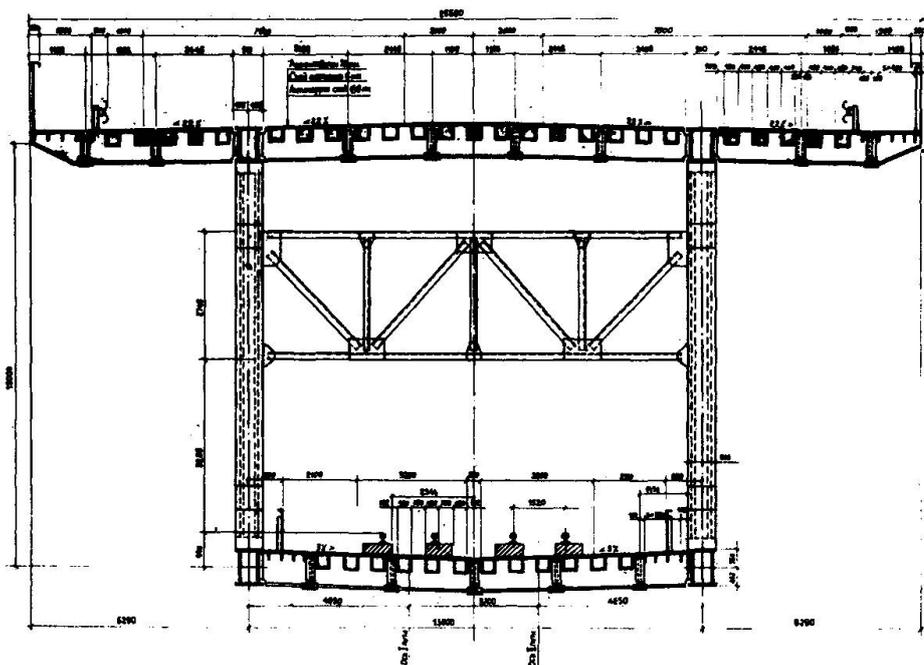


Fig.1 Cross section of superstructure.

The superstructure differs in that, that the roadway for both the motor and rail transport is made in the form of an orthotropic plate engages in a combined operation with the respective chord of main trusses.

The main trusses elements have been hermetically sealed and are not subject to internal surface painting.

The characteristic feature of the unit design is its form of a hermetic welded shaped box, wholly manufactured at the plant. The chords and struts joints are carried away from the unit centre. Elements of the main trusses lattice have overhangs of horizontal sheets for connection with the orthotropic plate. Connection of chords and upper unit shaped boxes with the covering sheet of the orthotropic plate is done through butt welding. The covering sheet of the orthotropic plate is attached to the bottom unit shaped box by means of high



strength bolts.

The erection joints of the upper horizontal sheets of chords and shaped boxes - are butt welded, other erection joints are held with high strength bolts.

The characteristic feature of the orthotropic plate - the longitudinal box cross section ribs of three sheets joined with welded seams.

Such a powerful section of the longitudinal ribs allows a 5500 mm pitch arrangement of transverse ribs along the bridge. In this case, one of every two plate transverse ribs is attached to the main trusses along the vertical axis of the struts attachment unit, while the other - along the chord middle.

The covering sheet erection joints are butt welded, other erection joints use high strength bolts.

Material of main constructions - steel of 15XCHD and 10XCHD grades. Mass of the 2x220 m superstructure - 7640 t or 17.27 t/r.m.

Part of superstructures are assembled on a jig, and brought floating in 220 m spans and mounted on the bearing part. The other superstructures are assembled suspended with construction of intermediate piers.