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Autor: Tkachenko, Sergei
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Prefabricated Reinforced Concrete Railway Bridges

Ponts ferroviaires préfabriqués, en béton armé

Vorgefertigte Eisenbahn-Stahlbetonbrücken

Sergei TKACHENKO

Cand. of Techn. Sciences
Bridge Design Institute
Leningrad, USSR

1. INTRODUCTION

Prefabricated reinforced-concrete pile railway bridges are constructed mainly in the regions characterized by severe climatic conditions and permafrozen ground. A design of the bridge and the construction technology used depend on the requirements of the particular region and thus are found to represent the following specific features: the use of "pitless" types of foundation; the use of a minimum set of standard-size prefabricated elements; concentration in time of the work to be done on joining individual elements together, thus shaping them to the form of one-piece units.

2. DESIGN

The structural-technological solution of construction of prefabricated bridges is based on the use of supports which comprise the reinforced-concrete piles 80 cm in diameter (the latter installed and fixed in preliminarily drilled wells of 1 m in diameter) and prefabricated reinforced-concrete plates (caps) which join together the piles over the ground surface.

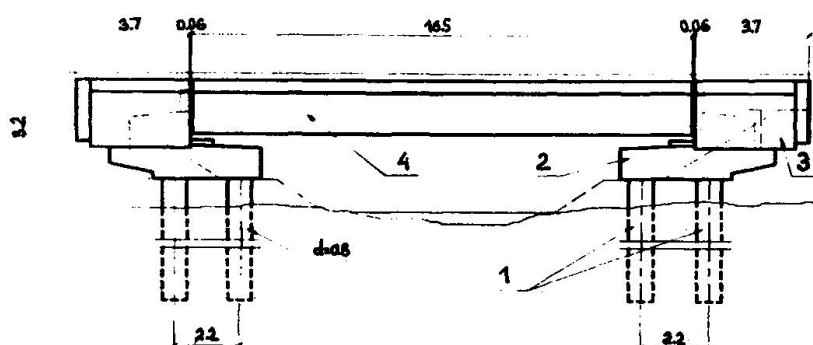


Fig. A bridge with the 16.5 m span



A single-span bridge with the reinforced-concrete span structure of 16.5m (Fig.) is assembled using 14 primary elements of 4 standard sizes: the pile (1), the cap (2), the box-like unit (3) and the span structure unit (4).

The typical designs of bridges with reinforced-concrete span structures measuring from 6 to 27.6 m have been developed. Abutments for span structures of the length exceeding 16.5 m are supported on 6 piles.

All the elements are joined together with concrete poured over free lengths of the reinforced bars. A hollow structure of the box-like units makes it possible to have all the joints jointed together once the assembly of the abutment is over.

3. CONSTRUCTION TECHNOLOGY

The drilling method and the drilling equipment used depend on the hardness and temperature of the ground. Fixing of the piles in wells is one of the important operations in the construction process. As experience shows the most reliable filling of the gap between the pile and the walls of the hole is achieved when the concrete is squeezed out by the weight of the pile as the latter is lowered into the well.

Prefabricated bridges are erected with the help of general-purpose equipment: truck-trailers, drilling rigs, boom cranes with rated load capacity of 30-50 ts.

Under conditions of negative ambient temperature, the elements are made monolithic with help of warming rooms, the structures being preliminarily heated.

The straight-line flow construction of prefabricated bridges is accomplished, as a rule, by teams of workers specialized in performing different kinds of job: well drilling, pile installation, assembling of elements and span structures.

4. CONCLUSIONS

Experience acquired in construction of prefabricated reinforced-concrete pile bridges shows that the use of pitless types of foundations has proved to be most suitable under conditions of permafrozen grounds.

Construction of the above prefabricated bridges under severe climatic conditions involves minimum labour expenditure at the construction site as compared with other technological solutions.