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Reconstruction of Buildings with Concrete Filled Steel Tubes

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Summary

This article presents examples of supporting constructions from steel pipes, filled by concrete for the reconstruction of buildings. Concrete filled steel tube is applied as struts, which support building on stories of dwelling houses; for reinforcement of foundations of stuffed piles; for reconstruction of production building as supporting structure. The efficient use of concrete filled steel tubes in the reconstruction of buildings is demonstrated.

1. Introduction

The concrete filled steel tube is the structure of steel pipes, which is filled by concrete. Special properties of steel and concrete are used effectively in these structures. A pipe-case carries out functions as longitudinal, as lateral reinforcing. The lateral pressure of the pipe prevents an intensive development of micro cracks of a break in a concrete core, which bears stress more excellent the compression strength in the conditions of all-round compression. So the steel pipe, filled by concrete, is protected from the loss of stability as local, as total.

The considerable volume of the experimental-theoretical researches of the concrete filled steel tube was conducted last years in the Poltava Technical University [1,2,3]. It allow to receive sufficiently basing methods of the calculation and designing of the concrete filled steel tubular members. In present time the building from the concrete filled steel tube is not recognised in our country, though erecting of these structures is in progress.

2. Report

There are many interesting examples of use the compressed concrete filled steel tubular structures in view of columns as in industry, as in civil engineering. The experience of use of the concrete filled steel tube in special constructions, designed and built by us in different years, presents the indubitable interest. For example: the concrete filled steel tube bearings were built for the transport gallery on the reserve storehouse of ore at the guarres of the mining-concentrated plants in Krivbass (Fig. 1). These bearings bear the large vertical load (more then 1OOOO kN), besides that, the horizontal efforts action on them (wind and pressure of ore at unloading from one side bearing).

Bearings are four-branch multi-storey frame structures. The branches and crossbars are made of concrete filled steel tube. The distance between axes of the branches is 5OOO mm, and between

axes of the crossbars is 6025 mm. As a result of calculation it was taken the pipe of diameter 820 mm at thickness of wallside 8 mm for branches, and for the cross-bars it was taken a pipe of diameter 530 mm at thickness of wallside 8 mm. The depth of the bearing with the head of bearing is more then 15 m. Heads of bearings were used from welding double-T. The members of the bearings were used beforehand. The bearings were erected on building ground. The branches of the bearings were placed at first turn. After that the branches were joined to the crossbars by immediate of adjoining (not fashioned joint) on welding, but the opening, witch was cut out in the wallside of the bearing, were equal to diameter of the cross bar.

For filling the dimensional system, which consist of struts and cross bars, it was used the pressure head concreting from below. For this the openings were cut out in bottom part of the strut and welded on the branch pipes, which were welded on after the termination of concreting.

It was interesting to know about the experience of use the concrete filled steel tube at reinforcement foundations of public and domestic buildings in Krivoy Rog. The irregular settings of foundations happens at the exploitation of the administrative building because of rising the groundwater level .

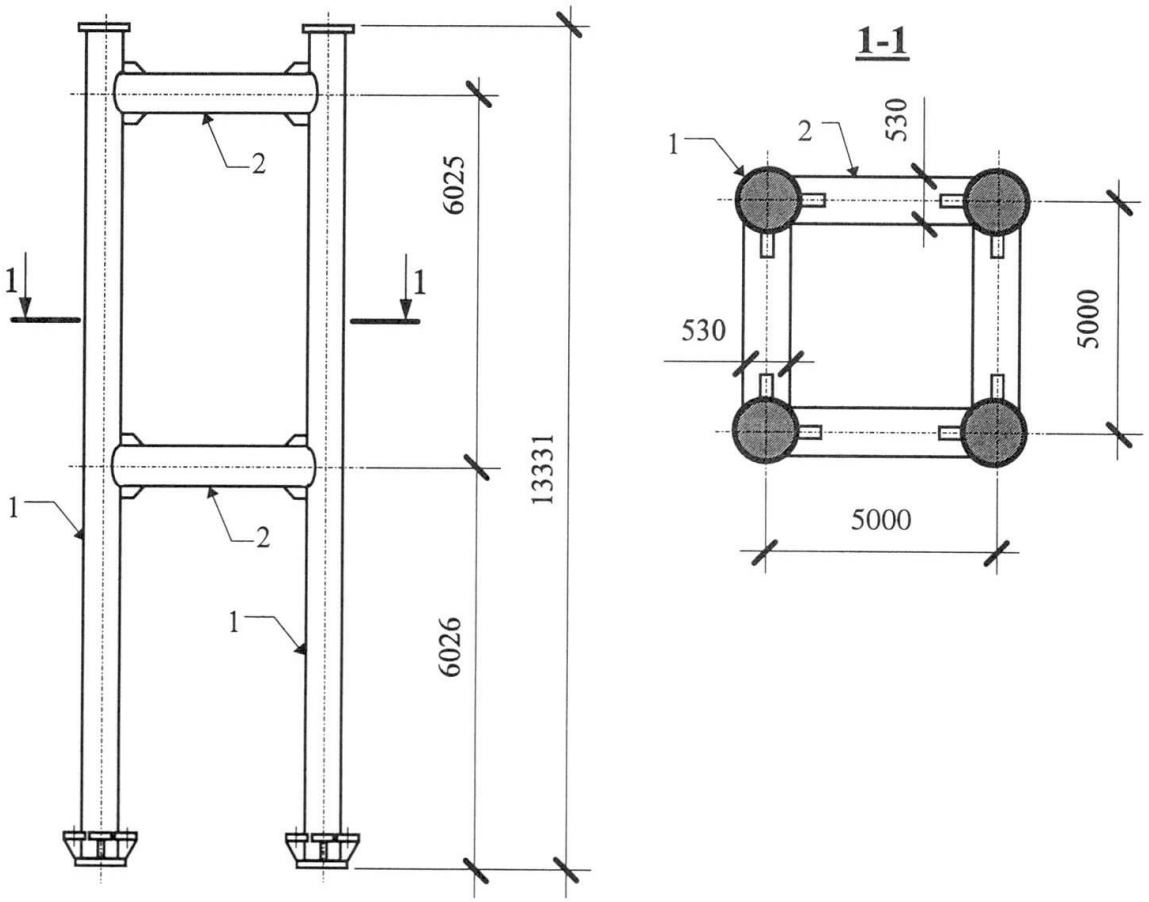

Fig. 1 Bearing of the transport gallery: 1 - strut; 2 - cross-bar

As a result of the prospecting, it was revealed, that foundations lead on the loess settling ground, which thickness was about 6 m. The underlying stratum under loams is the dense red-brown clay. At the moment of building the groundwater level was on the depth before 7 m from surface of the earth, but now the water level is on the depth before 2 m.