Construction system for buildings with composite beams

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Objekttyp: **Article**

Zeitschrift: **IABSE reports = Rapports AIPC = IVBH Berichte**

Band (Jahr): **60 (1990)**

PDF erstellt am: **23.07.2024**

Persistenter Link: https://doi.org/10.5169/seals-46473

Construction System for Buildings with Composite Beams

Système de construction pour les bâtiments à poutres mixtes

Bausystem für Hochbauten mit Verbundträgern

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MOSK'87 constructions system applies for public and administrative buildings with the following parameters:
- structure netwerk dimensions min 3,6/3,6 m and max 7,2/12,0 m;
- storey elevation 3,3 m to 4,8 m at intervals of 0,3 m;
- storey number from 2 to 16;
- vertical limit loads to 20 kN/m²;
- snow load to 1 kN/m²;
- horizontal forces - wind load to 0,55 kN/m², seismic degree 8 according to MSK.

The reinforced concrete core and stiff steel bonds provide spatial building rigidity. The main supporting construction represents a steel skeleton with columns hinged to collar floor beams and foundations. Storey beams and columns are fabricated of welded solid web I-elements. All the members assemble by Brown-Bovery equipment. Floor plates are prefabricated-monolithic. The mounted part represents reinforced concrete prefabricated plates thick 4 - 8 cm. Reinforced concrete plates connect to supporting beams by means of studs welded to the beams by equipment CROMP-ARC. MOSK'87 constructions system makes the most of personal microcomputers IBM "Super 11".

For experimental purposes were chosen the exposition hall, shop and cinema and administrative block of the pavilion "Stroitelstvo" at Plovdiv Fair. The spans of the structure in transverse and longitudinal directions are as it is shown on Fig. 1. The building is designed as hinged-frame. The connections girder-to-column, girder-to-concrete diaphragm are so designed as to bear the vertical reaction forces only (Fig. 2, 3). The overall stability of the building is ensured in both directions by cast-in-situ-diaphragms. The floor slab is of precast and cast-in-situ steel girders. First a precast concrete slab is placed upon the steel girders. It is 8 cm thick. Next a layer of 6 cm concrete is cast over the prefabricated slab. The connection between the two concrete slabs is effected by reinforcing cages. Angle-irons

are built in the the precast concrete slabs. They are welded to the top webs of the steel girders. The combined behaviour of the steel girders and concrete slabs is ensured by connection studs welded to the steel girders. The studs are with diameters 18 mm and height 115 mm.

During the erection of the building the construction demonstrated the following advantages. Lower overall height of the floor construction /higher regidity of the floor construction in vertical direction/. Greater clear spans and shorter time for construction of the precast-cast-in-situ floor slab. Warrant horizontal rigidity of the floor slab as it is erected. The floor slab functions as a horizontal diaphragm and in result the need of horizontal wind bracing is droped. Easier accomplishment of the steel reinforsment jobs and lees labour consuming construction work the need of formworks for the concrete floor slab is dropped off.

CONCLUSIONS

During the construction of the experimental project with composite beams a good experience was aquired, which showed that the reasonable application of steel and concrete in composite structures would result in saving of raw and other materials and energy.

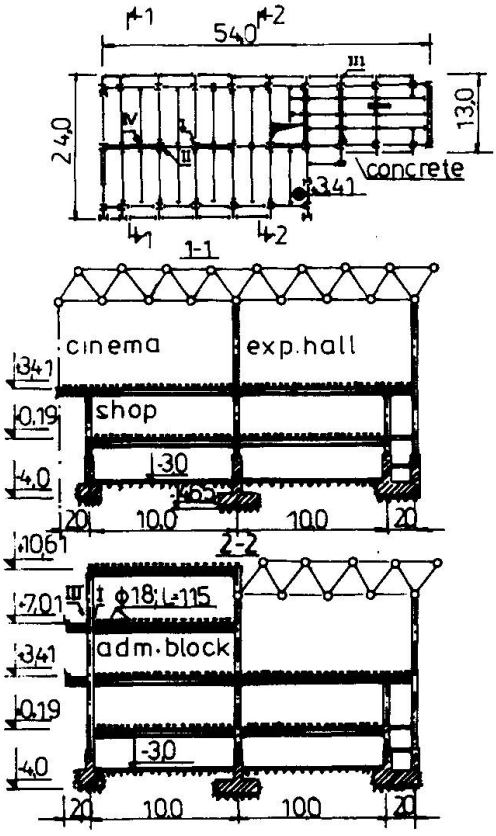

Fig. 1. Plan, Sections and Main Demails

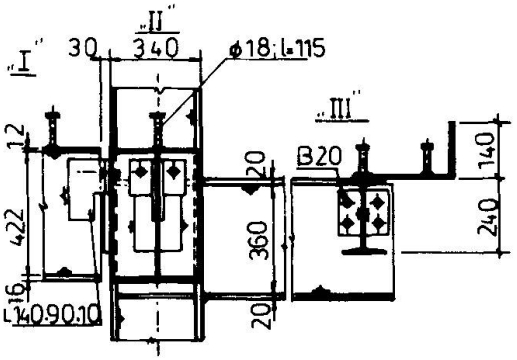

Fig.2. Conection girders to column

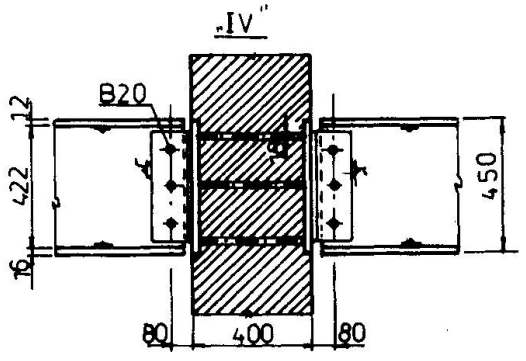

Fig3. Conection girders to concrete