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9. German School at Petersham, Surrey (England)

Owner: Bundesrepublik Deutschland, represented by the Bundesbaudirektion.

Planning & Design Architect: Kersten, Martinoff & Struhk (Braunschweig, Fed. Rep. of Germany)

Executive Architects: W. H. Marmorek, Clifford Culpin & Partners

Engineer: Jan Bobrowski and Partners

Contractor: Thyssen (Great Britain) Ltd.

Steel Fabrication & Erection: W. S. Britland & Co Ltd.
Works duration: 3 years
Service date: April 1981

The German School building now nearing completion at Petersham, Surrey, comprises an area approximately 135×80 m and is intended for 600 pupils. A low rise design was necessary because the school is situated in parkland close to historic Ham House near the River Thames.

The complex essentially consists of three primary structural units: (a) the Forum, (b) the main building, and (c) the Sports Hall.

The Forum

The Forum block is a single storey and irregular in plan and has a few internal columns only to allow large column-free area (up to 22×30 m). The columns are polygonal with a circumscribed circle of 350 mm diameter and are constructed in reinforced (dense) concrete. The roof structure is of steel tubular space frame of 1.2 m grid with a depth of 800 mm and the bottom grid being staggered by 600 mm from the top grid. The joints are made of specially designed spheres, which in turn were formed by welding two hemispheres pressed out of steel plate.

The main building

The main building has two storeys, and in addition a part basement. As Fig. 1 indicates, the columns are broadly arranged in a 7.2 m grid, and they are similar to those in the Forum area except that they have mushroom heads at the floor and roof level. The first floor, as well as the roof, is of waffle slab construction

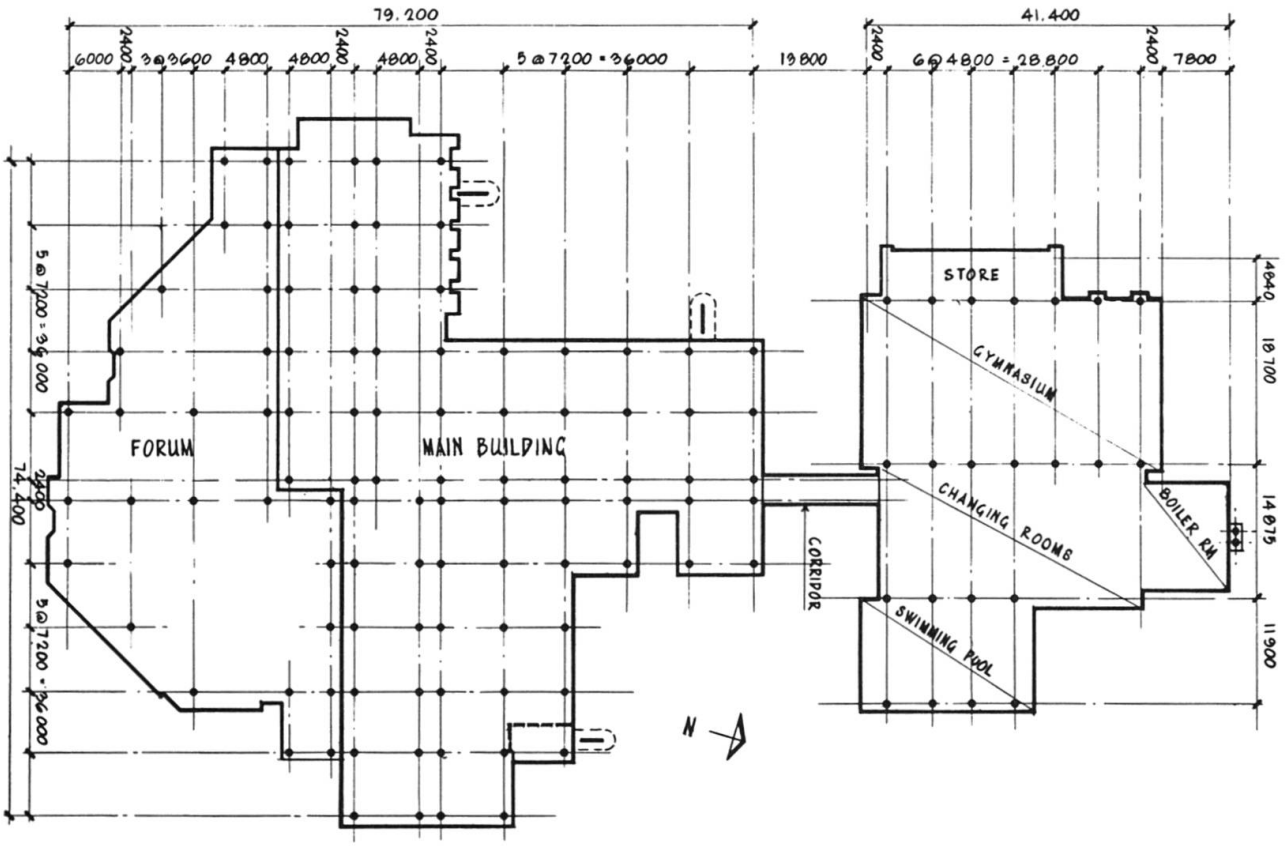

Fig. 1 General plan

in lightweight aggregate concrete having a combination of 2.4×2.4 m, 2.4×1.2 m and 1.2×1.2 m modules in each bay. The use of lightweight concrete was needed firstly to reduce the foundation load, and secondly to reduce the stiffness of the slab compared to that of columns such that the whole system is feasible within the dimensions and parameters pre-determined by the architect.

10 mm Lytag (sintered pulverised fuel ash) was used and the lightweight concrete was pumped using a Thomsen HP 800 series pump with 100 mm diameter pipe.

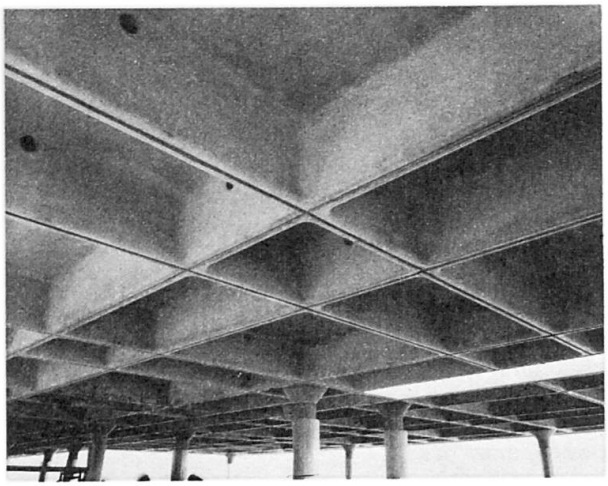

Fig. 2 Lightweight concrete waffle slab of the main building

Fig. 3 Space frame in the Forum area

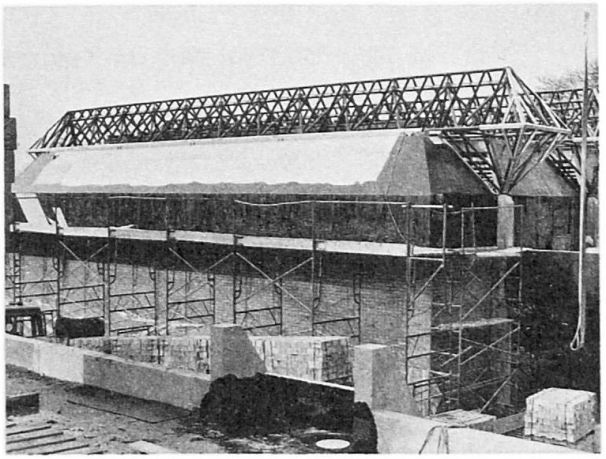

Fig. 4 Steel girder in the gymnasium block

The columns, as well as the waffle slab have no applied finish. Therefore to obtain a high class ex-mould finish a GRP mould was used in both cases and a low water/cement ratio was specified. The latter was also necessary from considerations of reducing subsequent crazing as far as possible. The workability was increased in the case of "column concrete" by using "Melment" super-plasticizer, while for lightweight concrete "CBP Conplast 242" was used.

The specified characteristic cube strength both for dense and lightweight concrete was 30 N/mm^2 at 28 days.

The Sports Hall

In the Sports Hall complex, which is a single storey, the gymnasium and the swimming-pool have triangular-steel trusses on RC columns while the store room, changing rooms and boiler room have Lytag lightweight concrete beam and slab construction.

Services are run through undercrofts.

Although only one or two storey structures, the buildings of the German School are supported on piled foundations because of very poor ground conditions. Altogether 317 bored piles each 500 mm nominal diameter (40-75 t capacity) were used. The sub-soil water table was very near the ground level which necessitated full asphalt tanking to the basement, undercrofts and in fact to all structures below the ground level.

(B. K. Bardhan-Roy)