Prodis plus s.r.o.

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Winner

PRODIS

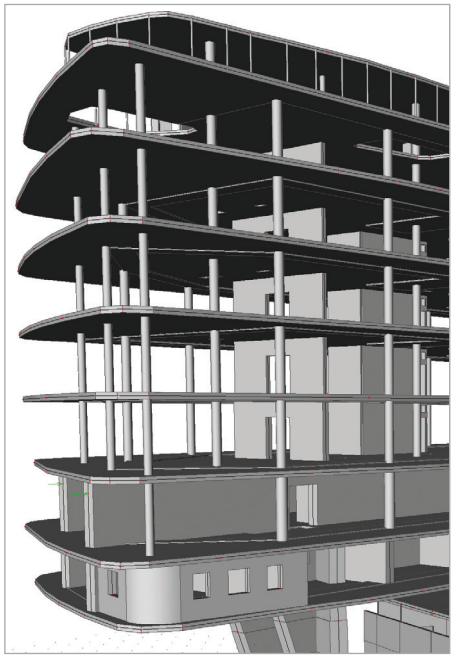
Prodis plus was established in 1991 by Vladimír Kohút as an office specialized in structural engineering and diagnostics of structures. During the following years it was gradually evolving and extending its field of activities. We have experience with a wide range of projects: residential and office complexes, parking garages, technological and storage facilities, television studios and renovations of cultural monuments and listed buildings.

The company employs 7 highly educated employees and provides the following services:

- Complex services related to construction - from feasibility studies to detailed design
- Diagnostics and verification of structures
- Projects of building renovations

The most significant references:

- Tatra Centre, Westend Tower, Westend Parking, River Park, Shopping Centre Albero
- Renovation of British Embassy, Tower 115, Grand Hotel Kempinski in High Tatras, University Library in Bratislava
- Hotel Kempinski Bratislava, Hotel Antares
- Chatam Sofer Memorial in Bratislava



Software: Nexis, Scia Engineer

River House - Bratislava, Slovak Republic

The River House is the main building of the multifunctional River Park complex on the left bank of the Danube River. The complex consists of four blocks which include 203 luxury residences with a magnificent view of the river, above-standard offices oriented towards the castle hill and a five star deluxe hotel. The four elevated blocks have three common underground storeys, 264 x 53 m, in which parking spaces and technical facilities are situated.

Substructure and basement

The foundations of the River House comprise 900 and 1.200 mm diameter bored piles embedded to the stone base (idem for the other three blocks). In the basement a “white tank” waterproof concrete system is applied which has to resist hydrostatic pressure from underground water (average height 4-5 m and extreme height 9.6 m). In areas where the counterweight of the buildings is not enough, the basement slab of the “white tank” is anchored into the stone base by prestressing bars.

Superstructure

The River House has an irregular trapezoidal shape and floors with curved rims. The overall plan dimensions are 104 x 24 mm with one dilatation block. The 3rd - 8th storeys have a conventional bearing structure with flat slabs spanning between columns and cores. As the whole building stands on two cores and a pair of piers, a transfer structure was needed on 1st and 2nd storey. With regard to large spans and cantilever overhangs combined with load from eight storeys, a prestressed concrete structure came across as the most efficient and reasonable solution. A system consisting of two longitudinal and twelve transverse deep beams was proposed to carry the columns of upper storeys. Transverse (secondary) deep beams with the height of one storey (3.100 mm) and thickness of 600 - 750 mm are supported by prestressed longitudinal (primary) deep beams with the height of two storeys (7.700 mm) and a thickness of 750 - 1.000 mm. The largest span of the longitudinal beams is 31.3 m long and the largest cantilever overhang is 15.9 m long. Both of them are prestessed by eight cables consisting of 15 unbonded strands in HDPE ducts. Compressive forces generated by prestressing have affect only on the cantilevers due to high stiffness of the cores and piers. In spans between supports only vertical actions were employed. The application of prestressing has resulted in lower consumption of reinforcing steel and reduction of the thickness of deep beams. In addition its advantageous effect on crack widths and stiffness of the structure is no less significant.
The flat slabs of the typical storeys have a complicated shape with several levels, various thicknesses and spans. The largest bay has the span of 8.80 x 7.35 m, and the largest cantilever overhang is 3.45 m long. For loads on the transfer structure a maximal reduction of the slab thickness was needed, but on the other hand the façade and heavy acoustic partitions posed strict claims on the deflection of the slabs. For these reasons the thickness of the slabs varies from 250 mm to 400 mm.

Building of the transfer structure

The most difficult part of structure was the cantilever above the Danube River for which a special steel supporting structure had to be applied (made-to-measure for this construction). The cables were stressed in two phases to avoid overloading of the structure by vertical actions from prestressing when the counterweight from the upper storeys had not been enough yet.

Monitoring of the deformations

The façade, mainly in the office part, consists of large glass tables with very tight gaps between them. There are rigid and heavy acoustic partitions in the residential part. These constructions are very sensitive to deflections of the load bearing structure. For these reasons long-time monitoring of deflections had been proposed in the most critical parts of the structure. The last measurements show very good accordance with the results of analysis.

Use of Scia Engineer

For the structural analysis of this structure IDA Nexis (ESA-Prima Win) was used. The challenges: optimisation of prestressing and dimensions of the structure, detailed seismic analysis, structural analysis, calculation of deflections, etc. The program allowed us to change the structure often during the design process, promptly and easily. Nowadays we are using Scia Engineer and with this program the design process of the presented structure would certainly be still more effective.

River House

Bratislava, Slovak Republic

Project information

Owner	Bratislavské nábrežie, s.r.o.
Architect	1st phase: Erick van Egeraat
	2nd phase: Juraj Almássy, Peter Bouda, Richard Čečetka, Ivan Masár
General Contractor	Metrostav SK, a.s.
Engineering Office	Prodis plus, s.r.o. (Ltd)
Construction Period	From June 2006 to November 2010
Location	Bratislava, Slovak Republic

Short project description

The River House is the dominant building of the multifunctional River Park complex on the left bank of the Danube River in Bratislava. This remarkable building consists of eight storeys which are carried by a prestressed concrete transfer structure on the level of the 1st and 2nd storey. The transfer structure is supported only by two massive cores and a pair of piers on the bank of the river. The flat slabs of the typical storeys have a complicated shape with several levels, various thicknesses and spans. The largest bay has a span of 8.80 x 7.35 m and the largest cantilever overhang is 3.45 m long.

Quote of the Jury

"The River House is selected because of its irregular trapezoidal shape, cantilever overhangs of 16 m and floors with curved rims, prestressed concrete transfer structure with two building phases. Several software options were applied, e.g. seismic analysis and optimization. Deflections were very important with regard to the glass façade. Long-time monitoring showed good accordance with the analysis results."