VHS-SK-PROJEKT, s.r.o.

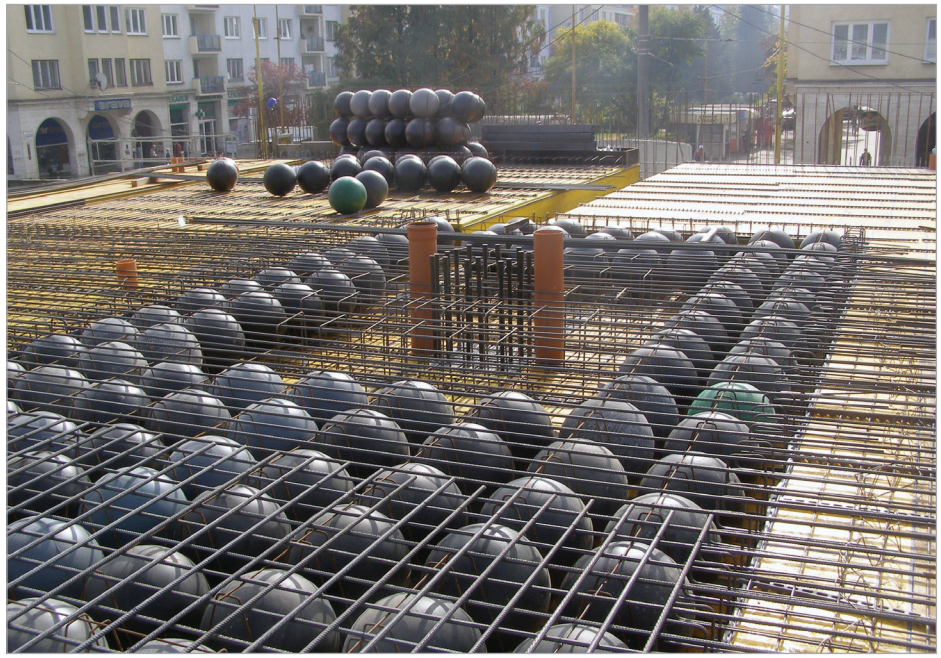
Contact Milan Kadlečík
Address Kysucká cesta 3
01001 Žilina, Slovak Republic
Phone +421 41 7003090
Email kadlecik@vhs-sk-projekt.sk
Website www.vhs-sk-projekt.sk

The company VHS-SK-PROJEKT, s.r.o. was established in 2001 as a part of Váhostav. The Váhostav company was founded in 1954 as a company for construction of water works - power stations and dams - and industrial plants.

The company VHS-SK-PROJEKT, s.r.o. offers:

- Complex architectonic and civil engineering services.
- Buildings and civil engineering activities: design and engineering, structural static and dynamic analysis of reinforced concrete, steel and timber structures. Structural static and dynamic analysis and foundation engineering are prepared using Nexis (ESA-Prima Win), Scia Engineer, Fine.
- Foundation engineering and design.
- Design for reinforced concrete, prefabricates, steelwork and timber structures.

The team consists of experienced senior engineers as well as junior engineers with new ideas. This cooperation is successful. The young staff members feel safe under the wings of their experienced colleagues and at the same time they enrich the experienced with new inventiveness.



Software: Nexis, Scia Engineer

Aupark Shopping Centre - Žilina, Slovak Republic

The Aupark Shopping Centre of Žilina is a multifunctional building with shops, cafés, banks, services and parking in the basement. The whole structure has the length of 216.70 m. It consists of three dilatation units. The block has three underground and four aboveground floors. The height of the building was limited to the height of the surrounding buildings and this could be obtained only by using beamless floors with chaplets and reinforced column stripes. In other dilatation units with a larger design height the beamed ceilings were used. The construction of the building took more time, mainly due to a combination of monolithic vertical structures and precast joist ceilings, which were manufactured and assembled by another supplier.

Description of the concrete structures

The described dilatation block with footprint parameters 63.32 m x 64.90 m is designed as a monolithic reinforced concrete construction. Only the stairs are prefabricated.

The main vertical elements are columns with a modular scheme 15.0 x 7.50 m in the basement and 15.0 x 10.0 m in the upper floors . The maximum cross-section of columns, 700 x 700 mm, transmits a vertical reaction of about 15 MN. The columns gradually change their cross section to 600 x 600 mm in the top floors. The perimeter walls in the basement, with a thickness of 300 mm, spread the reactions from the top of the building and also take the pressure of the surrounding soil to a depth of about 10 m. The building is reinforced in the corners through communication and technological cores with walls with a thickness of 200 mm.

In all floors, ceilings are designed as monolithic reinforced concrete beamless chaplet slabs of concrete C 30/37. This type of ceiling with low height is also suitable for the problematic installation and handling of heavy beam elements. The basic thickness of the slab is 220 mm, the reinforced column stripes are 2.40 m wide and 450 and 600 mm thick. At the places of the columns chaplets are used with a thickness of 850 mm. In the upper floors with larger load and with weakening of the plate with large holes - square with a large skylight 30 x 30 m, plastic lightened hollow bodies of Cobiax were used. Deflections of the ceilings were monitored during the construction and they meet the assumptions of the static calculation.

Foundation and loading data

The foundation in the open dry pit shoring was designed to base pads and strips on the 10 m thick layer of consolidated gravel. During the construction, the increasing load sequentially introduced deformations in the soil. The lower basement slab with a thickness of 250 mm was realized only after the structure had been cast. The design consists of the calculation and evaluation of a number of load cases and their complex combination effect. Besides the self-weight, the following loads were considered: load layers of a floor with the value of 2.50 kNm-2, effective loads for garages on the underground ceilings of 2.50 kNm-2 and for commercial areas a standardized value of 5.0 kNm-2 and on the roof a technology value of 4.50 kNm-2. The climatic loads for snow loading in area III were s0 = 1.0 kNm-2 and for wind loading w0 = 0.45 kNm-2. In addition, the seismicity load of 8° MSK-64 was considered.

Description of the static calculation

The static calculation was prepared as a 3D model with the software Nexis (ESA-Prima Win). The most dangerous combinations were calculated according to STN 730035 in two basic combinations - load-bearing capacity and deformations. The model contains 1.154 macros in 1D and 13.900 macros in 2D. The foundation pads and strips were modelled on elastic foundation with consideration of the real values of the upper construction load on the 3D model.

Deformations of the ceilings

Ceilings for commercial areas, with a span of 15.0 m in place of column strips with a thickness of 600 mm, bending moment 350 kNm and reinforcement Ø20 to 150 mm, had a deflection of 60 mm. After lightening of the column strips with plastic hollow bodies Cobiax Ø450 mm, the bending moment was decreased to 230 kNm and the reinforcement to Ø16 to 150 mm with a maximum deflection of 25 mm. The problem of the deflection of the 5 m cantilever was solved in the same way.

Aupark Shopping Centre

Žilina, Slovak Republic

Project information

Owner	HB Reavis Slovak Republic
Architect	Ing. Arch. Juraj Jančina, Ing. Arch. Igor Mazúch
General Contractor	Skybau, s.r.o. Žilina
Engineering Office	AK Jančina
Construction Period	From 2007 to October 2010
Location	Žilina, Slovak Republic

Short project description

The shopping and entertainment centre 'Aupark' is located between the pedestrian zone and inner ring road of the city. The extensive interior space of the centre with natural daylight created a new covered square and a new street that is the continuation of the pedestrian zone in Žilina. The whole building is divided into three dilatation units, the load-bearing system is a reinforced concrete monolith; vertical elements are formed by pillars as well as reinforced wall communication cores. The ceilings of the aboveground floors, with a span of 15 m, are lightened with hollow bodies of the Cobiax system.