

### Metro Station 11-II “James Bourchier”

The works executed by Geotechmin OOD and Geostroy AD – subsidiaries of GEOTECHMIN – include construction of a metro station (MS 11-II), an adjoining tunnel and a car park above the two facilities. The metro station is located under Cherni Vrah Blvd. It is 208 m long and 18.7 m wide, and the tunnel section is 215 m long and 15 m wide.

In terms of construction technology, MS 11-II is one of the most complicated Sofia Metro projects. This is because it is built at a depth of 27 – 22 meters in the different sections, and because it is executed in compliance with the employer’s requirement not to interrupt the traffic along the boulevard throughout the whole construction process.

The whole structure is entirely underground with three, four or five levels in the various sections. The station, which has two side platforms, is located at the lowest level. The car park is built on three levels above the station and on two levels above the tunnel, and it forms a common structure with the station and the tunnel. Entry to the car park is provided through two access ramps. The facility has a capacity of 615 cars and a total built-up area of 21,400 m<sup>2</sup>.

Various construction methods are used in the implementation of this project. The excavation works to the bottom slab are carried out through the Milan method in the following technological sequence:

- construction of diaphragm walls
- consecutive construction of the left and the right half of the roof slab below the respective boulevard lane, which allows the other lane to be free for traffic
- earth excavation to the bottom slab with parallel strengthening with three rows of anchors
- bottom-to-top construction of the inner structure (floor slabs, walls, columns), which is designed to bear loads jointly with the diaphragm walls

A specific characteristic of this project is the adoption of pre-stressing of the tunnel roof slab and partially of the floor slabs in the tunnel and in the station. This technology is used for the first time in Bulgarian metro construction.