



TRANSPORTS - TUNNELS

Bornes Roadway Tunnel

ABOUT

The Bornes Tunnel, which belongs to the sub-concession of Douro Interior, a regional roadway, in northern Portugal, it is 100 m long, with 3 lanes, 2 ascending and 1 descending and develops itself in a curve.

It is a shallow tunnel, with a maximum depth of 19 m and, so, a cut-and-cover solution was adopted. This solution has inherent financial advantages and is also competitive in terms of safety and environmental impact reduction.

The tunnel is located exactly in a fault zone along the base of the "Serra de Bornes". This fault, *Vilarica* Fault is responsible for the intense tectonized rocks and rock mass heterogeneity, as well for the weak geotechnical characteristics.

The heterogeneous geological conditions, in association with the local tectonic fault, demanded a careful geotechnical analysis and design. The possible occurrence of significant long-term displacements required the adoption of a flexible structure in order to limit the risk of serious structural damages in the tunnel during its expected lifetime.

Though this wasn't a mined tunnel, during the excavation phase, a geological and geotechnical mapping was made in order to verify if the geological model interpretation was, in fact, similar to the real ground conditions.

FACTS

Year: 2009-2010

Client: Ascendi

Services: Detailed design, Structural Engineering, Tunnel Design and Engineering, Geological and geotechnical studies, Environmental and Social impact studies

TEAM

António Campos e Matos

Raquel Pais

Pedro Pereira

LOCATION

Bornes, Portugal

Structural and geotechnical solutions

The structural solution proposed for the tunnel resulted from the topographic geological and geotechnical constraints (along with the geometry of the road layout). These values are very similar to the free width of 16,50 m required to deploy the motorway platform.

From the geological and geotechnical point of view, the existent scenario made it risky and unpredictable to execute large excavation slopes, even if temporary, and clearly pointed to the adoption of intrinsically flexible structural types to minimise the risk of serious structural damage during the life cycle of the tunnel.

With these constraints, the structural solution proposed was a cut-and-cover solution. Reinforced concrete piles make up the walls. They are topped by a ribbed slab and braced by reinforced concrete beams, at an intermediate level.

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