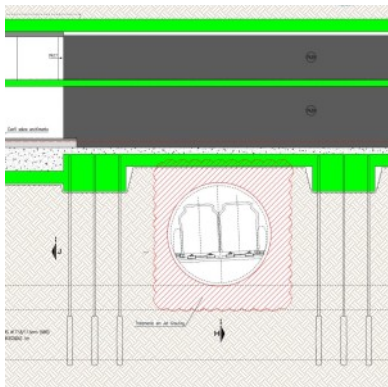
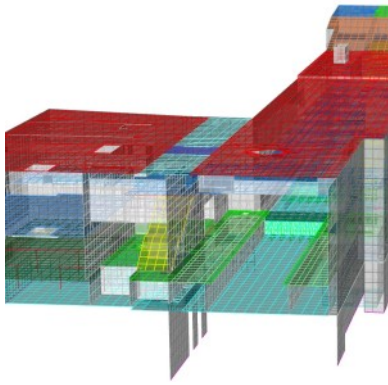


## LIBERDADE / SÃO BENTO STATION - INTERNAL STRUCTURES

PRELIMINARY STAGE, CONCEPT AND EXECUTIVE DESIGN - STRUCTURAL ENGINEERING



**Client:** Metro do Porto – Project Division

**Location:** Porto, Portugal

**Design date:** 2018 - 2019

**Design by:** Daniel P. Sousa / Pedro B. Carvalho

**Services:** Preliminary Stage, Concept and Executive Design - Structural Engineering

**Summary:**

Liberdade Station is formed by its main building and accesses, including an exit to Rua da Madeira and São Bento Train Station, Accesses to Praça da Liberdade and Loios Square, and an underground gallery in connection to the existing metro station of São Bento (Line D).

It is located in a heavily conditioned area due to the Existing D-Line Tunnel (located below) and for being located in Oporto's Historic Centre (classified as UNESCO World Heritage Site).

Given the surface and surrounding conditionings, the station is excavated in Cut & Cover with earth retaining with hydromill slurry wall.

The main structure of the station is executed by the inverted method. The Liberdade-São Bento station occupies a total deployment area of 5,310 m<sup>2</sup> and a gross building area of 16,200 m<sup>2</sup> corresponding to 4 different levels and has a total volume of 51,400 m<sup>3</sup>. It is estimated that the new line will be used on average by about 28,000 passengers / day.

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