

# LOADTEST O-Cell® Technology in Imperia, Northern Italy



Project: **Andora – San Lorenzo, New Railway Project**

Location: Imperia, Italy

Client: RFI Rete Ferroviaria Italiana

Main Contractors: Ferrovial Agroman

Project Description: Expansion and upgrading of the rail system in North Western Italy is a huge commitment to provide reliable public transport for the future. Construction of new railway line can be a difficult process, overcoming rugged coastline requiring multiple rock tunnels and viaducts across river valleys, simply adds to the challenge.



Nestled between the steep faces of the Maritime Alps and the Mediterranean Sea in North West Italy, is the city of Imperia. The city of Imperia was formed by the joining of the two towns of Porto Maurizio and Oneglia. Now a thriving port and industrial base, the need for direct fast public transport is essential for continued growth.

The winding narrow access roads through the villages of Imperia made the small amount of materials needed for bi-directional testing a positive advantage over other methods of load testing.

Ferrovial Agroman have been constructing the new coastal railway section between San Lorenzo and Andora. The project consists of 18.8 km of line with 7 viaducts and 8 tunnels cut through the mountains, 1.4 km of the line is supported on viaducts, the remaining 17.4 km constructed as galleries and tunnels.



Testing of the 2000mm pile at Viadotto Imperia

### Bi-directional load test arrangement:

The testing requirements of the overall project were comprehensive with numerous tests required on piles as small as 1 m and up to 2 m in diameter. Bi-directional load testing was employed on three of the large diameter piles with the highest loads. Two of the auger bored piles were 1.4 m in diameter and bored to lengths of 12 m and 14 m respectively. The third test pile was 2 m in diameter and 24 m in length. All the piles were socketed into the Limestone rock to a length of three diameters. The O-cell arrangements for each pile were placed 0.5 m to 0.7 m from the pile toe.

### Pile Testing:

The 2000 mm pile located at Viadotto Impero, was tested mobilising a maximum load of 12.3 MN in each direction using a single 670 mm O-cell. The second test was an expendable pile beside the working piles at Viadotto Caramagna, and was loaded to 17 MN. The third pile located at Viadotto Prino was loaded to a maximum of 13 MN.

### Summary:

Successful testing of the limestone rock sockets on these three piles was achieved. In addition, the loading and unloading behaviour of the piles was required as if loaded in a traditional manner from the pile head and this modeled successfully using the measured components.



Testing of the 1400mm pile at Viadotto Prino



Testing of the 1400mm pile at Viadotto Caramagna



Artists impression of new railway track at Imperia

