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The complexity and requirement for cutting edge construction technology in Trevi's work on the Grand Paris Express project is staggering

Deep innovations

In construction, nothing goes up before first going down. Mike Hayes **looks at some foundations challenges and their imaginative solutions**

In France, one of the largest and most ambitious infrastructure projects in Europe is ongoing – the Grand Paris Express.

When completed, the new metro network will reduce road traffic in the French capital, improve air quality and, hopefully, make the lives of Parisians a little easier.

The project encompasses the extension of line 14 of the metro and the construction of new lines 15, 16, 17 and 18. Along with approximately 200km of new lines, some 60 new stations are being constructed. In total, the planned investment for the network is more than €35 billion.

CAPITAL SOLUTIONS

Undertakings of this magnitude can only be built on the most robust foundations, which is where the Trevi Group comes into the equation.

The company is undertaking foundation work as part of the construction of the underground stations of Paris' Le Bourget Airport, Aulnay and Saint-Denis Pleyel, set to be the largest of all the Grand Paris Express stations and crossed by tunnels of lines 14, 15 and 16.

Marcello Varese, project director at the Saint-Denis Pleyel station says it is "the main station of the whole Grand Paris project, as it connects four metro lines with two railway lines and is located near the Stade de France [the national sports stadium of France]."

What makes the station unique is its 9000m^2 surface area, as well as the fact that Trevi is undertaking excavation here using the 'top down' method. In fact, in order to allow the 'top down' excavation, it was necessary for the company to add 36 plunge columns, which allow simultaneous superstructure construction and basement excavation.

So, not only did Trevi construct 141 structural diaphragm wall panels, it also fabricated 36 plunge columns, each weighing 90 tonnes and which had to be laid to a depth of 36m. According to Trevi, this is a first.

Trevi is undertaking groundwork across the Grand Paris Express project, with one of the first items on the agenda being land treatment; consolidating the treated soil and significantly lowering the level of groundwater to ensure tunnels can be

Trevi utilising the foundation drilling equipment of its subsidiary company Soilmec during construction work on the Grand Paris Express

excavated safely.

Trevi is also involved in the excavation of a number of service shafts by tunnel boring machines (TBM), which will allow access for rescue and evacuation of passengers, ventilation and power supply.

These shafts run to significant depths and require the construction of reinforced retaining walls through diaphragm walls that can sometimes reach more than 60m in depth.

For these applications, Trevi is using drilling equipment including advanced heavy-duty buckets and hydromills.

Drilling in the digital age

Groundforce's towering achievement