

Vienna TwentyTwo

13.08.2020 / Österreich / Christoph Högl

Special competencies



Factbox

Client: ARE/SIGNA

Contractor: PORR Bau GmbH . Spezialtiefbau

Project Type: Specialist civil engineering, including earthworks, geothermal energy and civil engineering

Scope: Planning and realising a ready-to-use temporary construction pit system with three levels

Contract Volume: 10 million euros

Construction Start: 02/2019

Construction End: 01/2020

PORR has built a ready-for-use construction pit for the new multi-functional zone in the 22nd district of Vienna, Vienna TwentyTwo.

The contract involved developing the construction pit ready to use, along with all the foundation work, plus excavating and disposing of approximately 100,000m³ of earth. All the work was done by various PORR departments and subsidiaries.

A new multi-functional zone is being developed on what used to be a car park on Dr Adolf Schärf Platz in Vienna's 22nd district. The multi-use complex, which is being developed by a consortium comprising property developer SIGNA and Austrian Real Estate, will consist of six high rise buildings with 600 residential flats, 420 hotel rooms and apartments, and 18,000m² of office space. The first construction phase involves building a three-level underground car park. PORR was contracted to develop the construction pit ready for use and complete all the deep foundation work. PORR's tasks included extensive diaphragm wall construction, jet grouting and installing bored piles at depths of up to 40m, along with excavating and disposing of approximately 100,000m³ of soil. All the work was carried out under the lead of the Specialist civil engineering department by various PORR departments and subsidiaries.

”

PORR stood out during the acquisition process thanks to a series of customised proposals and alternative processes that led to a shorter construction period and more cost-effective results.

Christoph Högl

Site supervisor, PORR Bau GmbH

A successful innovative approach



PORR was able to shorten the construction period considerably by separating the structural diaphragm wall from the jet-grouted groundwater sealing wall below it. Source: PORR

PORR stood out during the acquisition process with a number of customised proposals. The tendered temporary construction pit system was completely reworked, with alternative quotes for almost every item of work. These were combined in a final quote for a ready-to-use construction pit, which was decisive in winning the contract.

The structural engineering for the construction pit had to be carefully planned, due to the site's location between the U-Bahn, a sewer, an ice rink and a school. To ensure everything was taken into account, the engineers used the 3D finite element method to estimate settlement in addition to their standard 2D programs.

The construction site's position right next to the Vienna International School was a major logistical challenge. Over 1,700 students made their way daily along the perimeter of the site, passing two site access points. That no incidents occurred throughout the one-year construction period is a tribute to the careful planning and great care taken by all project participants.

Divided temporary construction pit system

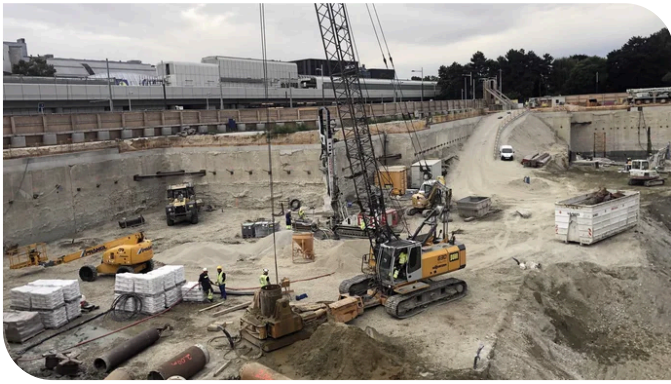


The diaphragm wall was anchored with 183 temporary anchors. Source: PORR

The construction pit covered a total area of 9,000m², with excavation depths up to 12m. Instead of the tendered temporary construction pit system, which had diaphragm walls extending to the impermeable layer, PORR developed a new variant with a purely structural diaphragm wall above a jet-grouted lamellar sealing wall. Since the structural diaphragm wall could be secured with simple grouted anchors, this separation kept construction time down as well as yielding economic benefits.

The structural two-phase diaphragm wall had an area of 9,800m² and 60cm thick walls. The jet-grouted lamellar wall covered 5,000m². The diaphragm wall was anchored with 183 temporary anchors, mostly removable. PORR also installed 483 deep foundation piles using a continuous flight auger and 11 cased bored piles, which will disperse the vast vertical loads from the high rise buildings being developed above the foundation.

Elaborate dewatering



The deep wells for dewatering were made with large bore holes. Source: PORR

The groundwater level outside the construction pit sealing was approximately 8m above the deepest point of the construction pit floor. To ensure the excavation and subsequent basement installation could be carried out in the dry, the groundwater level was lowered through extensive dewatering activities: eighteen dewatering walls were built inside the construction pit, and ten soakaways outside the construction pit. These were constructed as large bore holes with a diameter of 900mm, extending 25m below the original surface. The retaining wall was integrated into the Vienna blue marl (known as tegel) with a sealed joint using very low permeability silt clay, a typical procedure for construction pits in Vienna. It was then possible to lower the groundwater level inside the completed construction pit.

In-house support

The Specialist civil engineering department was able to work with in-house support at almost every stage of the project. Our subsidiary KOLLER Erdbau excavated up to 2,500m³/d, using a bulldozer and two 30t hydraulic excavators, and was also responsible for all the demolition and soil excavation down to the foundation level. Another subsidiary, Wibeba, implemented the reinforced concrete grid above the diaphragm wall.

PORR's geothermal energy competence was another point that won favour with the client. Our customised proposals during the quoting phase included suggestions regarding tendered geothermal activation of bored piles and diaphragm wall – and these were received positively by the client. Vienna TwentyTwo has 94 geothermal wells with lengths up to 160m, making it PORR's biggest geothermal project so far. PORR was also responsible for all the geothermal modelling and submissions.

Summary

The different PORR departments and subsidiaries worked perfectly together. The goal defined before starting construction was decisively achieved – namely, to generate added value for. Approximately

90% of all the construction work for the Vienna TwentyTwo construction pit was done by PORR employees.

Technical data

Excavation	100,000 m³
Construction pit depth	Up to 12m
Diaphragm wall area	9,800m²
Jet-grouted area	5,000 m²
Deep foundation piles	494
Geothermal wells	14,000m
Groundwater wells	28