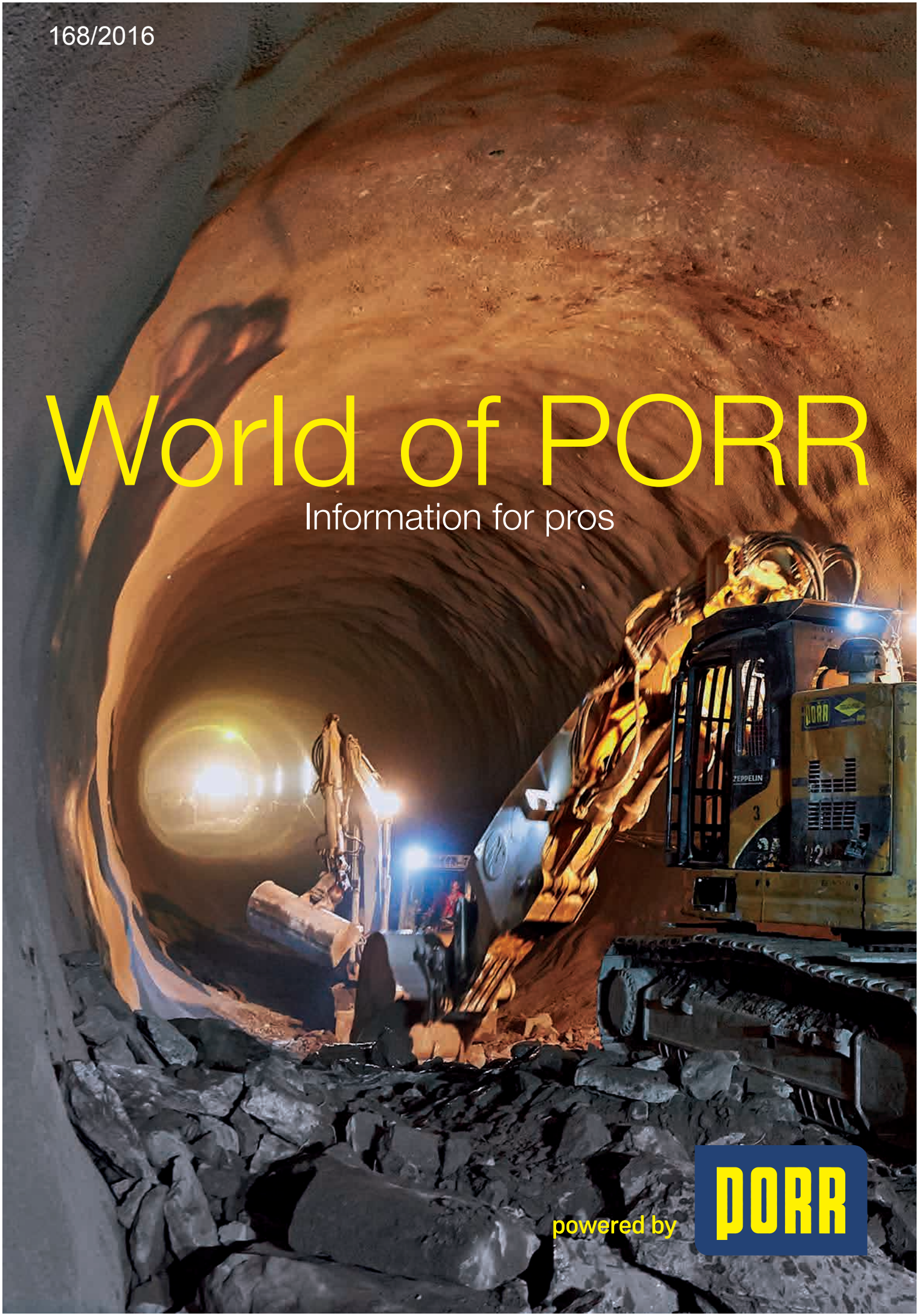
168/2016

World of PORR

Information for pros



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CEO Karl-Heinz Strauss, MBA

CEO Karl-Heinz Strauss
Image: PORR AG

Ladies and gentlemen,
Dear business partners,

Just in time before the summer months, we report back with an update from the world of PORR. You will see: Since our last issue, we have swiftly proceeded down our PORR road. But please see for yourself ...

PORR managed to extend its production output in the past business year. At EUR 3,524 million, it exceeded that of last year by 1.4 %. Our order backlog once again reached record heights with EUR 4,579 million. And our successful strategy continues in this year. At EUR 648 million, we exceeded last year's already high performance level by 9.6% in the first quarter of 2016 and that in the face of persistently difficult environmental conditions. This development underlines our excellent position on the home markets and our strong acquisition activity on our international markets. For the first time, our order backlog has exceeded the five-billion-Euro threshold and allows us to optimistically anticipate the overall result for 2016.

In the past months, lots of things have also happened outside of the world of numbers, however. We have summarised the highlights from this period in this new issue of World of PORR: On the following pages, you will find exciting reports on current projects, accompanied by detailed technical information and impressive images.

We begin in Vienna, where we significantly participated in the construction of Smart Campus, the world's largest building constructed in accordance with passive house standards. We likewise scored points with our building construction expertise during the construction of a sustainable housing complex in Switzerland and in the course of the "Am Kaiserforum" construction scheme in Vienna. However, this issue covers a wide range of topics – from building construction to foundation and specialist civil engineering to bridge, road and tunnel construction. Read, for instance, how PORR successfully tackled the challenge of constructing the new route of the L197, the Arlbergpassstraße in high alpine terrain or how tunnelling for the third section of the Koralm Tunnel through the Koralpe mountain massif progresses. Especially noteworthy are our two reports on our activities in Bulgaria: There, we extensively participated in the modernisation of the Sofia – Istanbul railway connection in the course of the extension of the Trans-European Transport Network (TEN-T).

I wish you an interesting read and – on behalf of the entire PORR team – a lovely summer.

Kind regards,
Karl-Heinz Strauss
CEO

Smart Campus, the new company headquarters of Wiener Netze

The world's largest building constructed in accordance with passive house standards

Jürgen Maikisch

General information

Close to the Gasometer towers in Vienna's 11th district, the consortium consisting of PORR Bau GmbH and Elin GmbH & Co KG erected a new headquarters for Wiener Netze GmbH. The company's new headquarters will provide space for 1,400 employees.

Overview (left – main building, front centre – auxiliary building; top right at the water tower – additional contract "Werxkuchl"; top right corner – Gasometer)
Image: http://www.wienernetze.at

At a total gross floor area (GFA) of slightly more than 100,000m², Smart Campus currently marks the largest building construction general contractor project in Austria and the largest building constructed on the basis of passive house standards in the world.

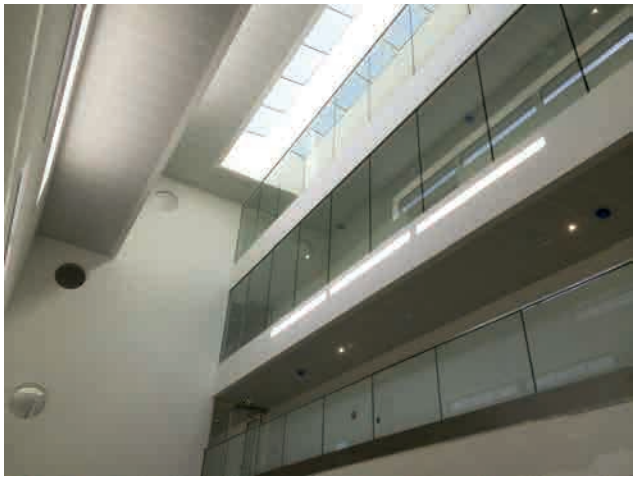
Project description

The project consists of two building complexes. The main building (approx. 95,000m² GFA), which is itself divided into seven building parts and located within a surrounding rectangle some 350m by 130m in size, combines the operational functions in a two-storey plinth. Various administrative rooms were built on top of this two-storey plinth.

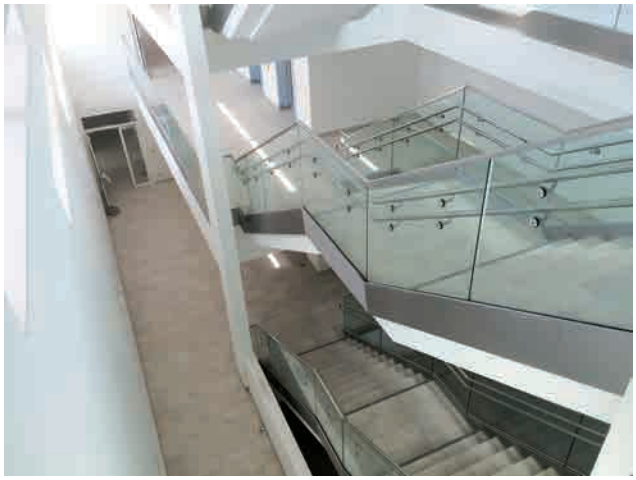
Northern façade of main building (viewed from building element 6 in direction of building element 1)
Image: PORR AG

Northern façade of main building (viewed from building part 2 in direction of building part 5)
Image: PORR AG

A linear acces and communication axis runs across the entire unit from east to west and serves as the building's "backbone" as well as a thoroughfare to which all the complex's functions are connected. A design with generous voids and the grouping of the offices in the shape of "fingers" reaching southward and northward allows extensive and natural light entry into all the building's areas.



Space for natural light
Image: PORR AG



Staircase
Image: PORR AG

The operational management's rooms are located in the unit's lower area (basement, ground and 1st floor). They include parking spaces for company cars, a ramp running from the newly created Nußbaumallee onto the Wiener Netze premises, employee cloak-rooms and HVACR system areas. The future main entrance is situated in the centre of the ground floor.

Main entrance (building part 3)
Image: PORR AG

The ground floor furthermore houses workshops, storage areas on the northern side, delivery zones, storerooms and the loading corridor. The loading corridor is the logistical access area for the storage areas and allows the "longest clear view" in the building at almost 300m.

Located on the 1st floor is a meeting and event room providing space for up to 300 people. Laboratories and training rooms for purposes of apprenticeship training, the fitter pool area and a large part of the HVACR systems will also be located there.

The administrative and office areas will mostly be situated on the floors 2 to 4. Located on the 2nd floor are the offices south, of the thoroughfare since the storage rooms' void is found in the north. Located on the 3rd floor are office units, both in the north and the south, while the 4th floor will feature offices only on the northern side of the access axis. Thanks to their serrated location, the office areas show an eastward to a westward orientation, thus allowing a mostly clear view of the outside from every spot in the room.

Office
Image: PORR AG

Corridor in the office wing
Image: PORR AG

This was one of the reasons why Smart Campus received the best ratings and was awarded the win at the open, anonymous, EU-wide, dual-stage general designer competition. Among other reasons, the expert jury justified their decision thus: "When it comes to work place quality (light, view, access, flexibility and department formation), the project is hard to beat, as it ranks significantly above common standards in the construction of administrative buildings."

The operational management control room is located its place on top of the storage areas, in a two-storey, recessed area on the 3rd and 4th floors.

Control room
Image: PORR AG

The auxiliary building (approx. 5,000m² GFA) which features a maximum size of 120m by 60m houses the motor vehicle workshop, the lorry parking garage, the facility petrol station and various office, HVACR and auxiliary rooms.

Auxiliary building (building part 8)
Image: PORR AG

Smart implementation

Thanks to optimal procedure planning and partial change of the planned systems, the carcass was erected under great logistic effort. Using eight revolving tower cranes, several truck-mounted cranes and with the help of up to 220 commercial employees working at the same time, the carcass could be erected in a record-breaking time of nine months, roughly one month ahead of schedule. In the high-bay warehouse, for instance, semi-finished beams were placed on pre-cast columns at a height of 12m to reduce the formwork and reinforcement efforts at this height. These semi-finished beams sized approx. 16.15m x 1.00m x 0.80m and weighing in at 26t were then simply supplemented with 1.5m-high formwork units and reinforcement allowance, and were thus ready to be concreted.

26 t semi-finished beam
Image: PORR AG

High-bay warehouse with completed semi-finished beams
Image: PORR AG

Pre-cast parts up to 22m in length and weighing up to 40t were installed at building part 8, the auxiliary building. Truck-mounted cranes were used to install these heavy pre-manufactured parts since their weight far exceeded the capacity of building construction cranes. The largest truck-mounted crane deployed to and installed at this construction site had an overall weight of 100t. Its installation took three days. Even the crane sling had to be delivered on its own lorry due to its individual weight. The entire crane accessories required another 24 lorries.

A total of some 11,500t of steel and 95,000m³ of concrete were installed on location during the carcass erection. To put this into perspective: This roughly equals the amount of concrete that would fit into one of the gasometer towers' bell gasholders (90,000m³). But not just the overall volumes sound impressive, also the largest amount of concrete installed on a single day – some 2,800m³ – is quite unusual.

While the carcass has been completed at full steam, the first finishing trades started their work on the façade and the outside facilities. With up to 670 employees at the construction site and some 45 colleagues serving as the consortium's construction management, the Smart Campus grew steadily every day until its final completion on 13 June 2016.

Besides the carcass erection, PORR was able to fully utilise its internal value creation chain during this construction scheme. From work preparation (BIM / PORR Design & Engineering GmbH), surveying (consortium surveying) to sheet pile wall work (PORR Bau GmbH, Upper Austria branch), specialist civil engineering (Department for Pile Driving and Jet Grouting Method), earthwork (PORR Umwelttechnik GmbH), infrastructure (Wibeba Holding GmbH), insulation work (TEERAG-ASDAG AG), outside facilities (Allgemeine Straßenbau GmbH), gardening and marking work (Schatzl & Jungmayr Garten- und Landschaftsbau GmbH / Eisenschutzgesellschaft m.b.H.) to façade work (Alu-Sommer GmbH), all services could be completed by the Group's departments or companies belonging to the Group.

Main building between building part 6 & 7 in the east
Image: PORR AG

In addition, the consortium was contracted for maintenance work and operational management during the start-up phase.

Smart interior

Smart Campus – it's in the name: Respectively elaborate mechanical and electrical engineering control mechanisms are supposed to positively influence user behaviour and, in turn, energy consumption. The largest building in the world built in accordance with passive house standards can boast an annual primary energy demand of under 120 KWh/m², thus reaching a value 70 – 80% lower than the one achieved by other units.

These values can be achieved by means of environmentally friendly energy generation using existing resources at the site. A photovoltaic plant with an annual output of 1100kWh was furthermore installed.

Energy required for heating and cooling purposes is mostly sourced from two giant geothermal/well systems. These systems supply the thermal activation in the offices and the cooling sails in the form of a change-over system. Thereby, the basic temperature is controlled by the thermal activation system while the cooling sails positioned on the façade take care of adjusting the temperature to the set value.

Furthermore, there is a solar power system that prepares hot water and a heat recovery system in all central ventilation systems.

In the thoroughfares, the floor heating system is used for purposes of cooling in summer time. Once again, a

change-over system like the one used in the thermal activation system is employed. Thereby, the same lines that provide cooling in summer are used to provide warmth in winter.

Using this extensive range of measures, some 60% of the building's energy demand is sourced from renewable resources, the rest from green power.
The secret to its success, however, lies in the interplay between three factors: smart construction, the use of smart technologies and smart user behaviour.

The latter is achieved through conscious and thus reduced energy consumption. Smart Campus thereby utilises a user feedback system by means of displays. They, for instance, show whether actions such as "opening windows", "lowering blinds" or "switching on lights" are "smart" or rather a waste of energy.

With all these measures and their implementation, nothing stands in the way of an ÖGNI Gold certification.

Smart cooperation

Following a theme of fair cooperation between all participants, the entire project was implemented under the title "cooperative smart construction".

For the construction site team, this not only includes internal cooperation within PORR but also a fair, open and cooperative interaction between the consortium partners, the client, the contractors, the general planer, the local building supervision, and the project control. This cooperative relationship was important to all participants and only thus could a large-scale project of such complexity and scale be completed in such a short time.

Smart final remark

The record for the longest distance travelled by our foremen, as determined by means of smart phone, was 17km. The "really smart" ones among us therefore didn't walk but used a bicycle.

Staircase
Image: PORR AG

Project data

Client	Wiener Netze GmbH
Contractor	PORR Bau GmbH and ELIN GmbH & Co KG
General planner	Holzbauer & Partner Ziviltechniker GesmbH
Type of project	General contractor (not including temporary building pit supporting system and excavation)
Overal project costs	EUR 200 million
Date contract was awarded	23 June 2014
Construction time	14/07/2014 – 13/06/2016
Building shell construction time	9 months
Gross floor area	Total approx. 100,000m²; approx. 69,000m² above ground, approx. 31,000m² below ground
Outdoor facilities	approx. 30,100m²
Trenches	approx. 3,600m
Façade surface area	Total approx. 34,000m²; Glass 8,000m², fibre-cement 23,000m², ETICS 3,000m²
Gates in the façade	63
Lifts	17
Car parking spaces	686 in the building, 40 in the outside facilities
Bicycle parking spaces	108
Concrete	approx. 95,000m³
Steel	approx. 11,500t
Pre-manufactured ceiling	Total approx. 14,600m²; Hollow-score slabs 14,300m², TT ceiling 300m²; Element ceiling approx. 100m²
Drywall	approx. 22,000m²
Suspended ceilings	Total approx. 22,000m²; Metal ceilings 18,000m², plasterboard 4,000m²
Attic	approx. 5,500m
Light spots	approx. 10,000
Safety lamps	approx. 2,500
Fire detectors	approx. 4,500
Cables laid	approx. 2,000 km
Special features	Largest building built on the basis of passive house standards in the world ÖGNI Gold certification

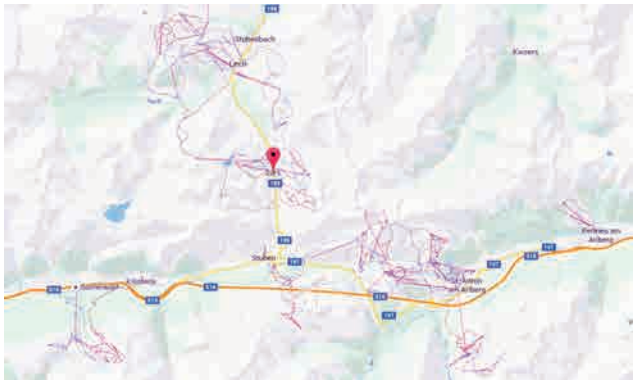
L197 Arlbergpassstraße – Klösterle / Rauz-Stuben

Re-routing in high alpine terrain

Florian Sterner

Introduction

The State Road, the Arlbergstraße, represents the connection between the federal states of Tyrol and Vorarlberg over the Arlberg Pass. Branching off the L197 at the Rauz Junction, the L198 runs over the Flexen Pass. During summer time, this road serves as the main access route to the popular winter sport towns of Zürs and Lech. During winter, it represents the only connection between these towns and the Austrian and European road network.



View of course of the road
Image: 2016 GeoBasis-DE/BKG (20019), Google

In the area between Alpe Rauz and the "Posteck" the Arlbergstraße runs along the orographically right hillside cut of the Rauzbach River. This road section is highly endangered by rockfall, rockslides and slope instability. Comprehensive stabilisation measures were required time and again in the past to secure road traffic to Arlberg Pass and Lech.

Due to the mentioned hazards and to guarantee the safety of road users on the L197 as well as access to the winter sport towns of Zürs and Lech, four re-routing / stabilisation variants were analysed in the course of a survey in 2011. Variant 3, the re-routing of the L197 in the present form, emerged as the best variant from these analyses.

Re-routing in steepest terrain - viewed from Stuben July 2015
Image: PORR AG

Order

In March 2014, the Office of the Provincial Government of Vorarlberg awarded the contract for the construction scheme "Re-routing of the L197 / Klösterle/Rauz-Stuben" to the consortium L197 with considerable support from TEERAG-ASDAG AG.

The scope of the contract included the new construction of the state road L197 between state road L198 at km 0.830 and the existing state road L197 at km 15.140. The re-routing measures were implemented in the form of five corners and intermediate, wide bends or short straights at the north-eastern slope and have a total length of approx. 1.3km. The re-routing roughly follows an alpine route which was used as the Lechtalstraße in the direction of Lech/Zürs until 1942. The new, serpentine-like alignment of the Arlbergstraße exhibits the same character as the existing section between the village of Stuben all the way to the "Posteck". Due to the excessive incline of the slope, the corners could only be constructed with the help of respective support structures or terrain cuts.

Project description

The standard cross-section stipulated a carriageway width of at least 7.5m as well as 1m-wide hard shoulders on both sides. The terrain conditions required the use of support structures. Support walls up to 11m high were erected for this purpose. The uphill support structures in the corners no. 2 and 3 were executed as anchored jetcrete constructions, the downhill support walls in corners 2, 4 and 5 as reinforced concrete cantilever support walls. In order to achieve a uniform appearance in the sense of landscape protection, the support walls were built with projecting natural stone coverings. The downhill wall in corner no. 2 marked an exception since this support wall can not be seen.

In the majority of the contract section, the accruing contaminated road surface water is collected by means of road gullies and led into the recipient via road surface safety shafts.

Furthermore, to guarantee safety for the entire traffic on the L197, rock stabilisation measures as well as 4m high rockfall protection fences were installed above the new route.

Work on this project started in April 2014. In the same year, the rough route including the comprehensive removal and filling work were completed. Furthermore, support wall no. 5 including natural stone lining as well as concreting work on support wall no. 4 were completed.

Support wall no. 2 (without lining) and natural stone lining on support walls no. 1, 3 and 5 were finished in 2015. Once the removal and filling work had been completed, the dewatering lines as well as the cable ducts were laid. This was followed by road construction.

All work could be completed on schedule in October 2015.

Support wall no. 5, shortly before completion, November 2014
Image: PORR AG

Support wall no. 4, under construction, October 2014
Image: PORR AG

Support wall no. 4, under construction, October 2014
Image: PORR AG

Excavation work / road construction

The construction scheme posed a great technical challenge for the consortium. For instance, comprehensive rock removal and slope stabilisation measures needed to be carried out to implement the project. Rock removal was performed by means of blasting. In sections of loose material, an anchored jetcrete wall was installed in the area of the support structures. In parts, the slopes were more than 12m high.

The present carbonates of the alpine shell limestone and Arlberg formations were reused for the processing of the non-cohesive base layers as well as for embankments in the support wall area.

The material required for back filling and embankments in the support wall area could also be processed from the firm clay stones of the Partnach formation.

The excess material was deposited in the "Kendeltole" (downhill trough on the L198). Material processing by means of a crushing-screening plant likewise took place in the area of this disposal site.

Due to the changed traffic routing, the new L197 / L198 junction in Rauz also needed to be converted. The traffic connection in the direction of Rauz was established by means of a T-junction. Left-turning lanes of adequate length were installed on both sides, for traffic coming from Rauz and from Lech/Zürs. In the course of the construction measures, the Rauz connection was extended to a length of approx. 60m. The further extension all the way to the existing crossroads of the L197 / L198 will be built in 2016.

As mentioned before, the carriageway is at least 7.5m wide and the hard shoulders on both sides are 1m wide. In the corners, the carriageway is wider to allow two buses to pass one another safely. Depending on the section, the hard shoulder was executed as a percolation trough or coarse crushed rock, or as kerbs. The new route's longitudinal inclination (difference in height approx. 105m) is 10% at most, in the corner areas approx. 6%. The lateral inclination ranges between 2.5 and 7%.

The following road surface was installed:

- 4cm AC 11 covering, 70/100, A1, G1
- 14cm AC 32 supporting, 70/100, T1, G4

- 20cm unbound upper base layer U2, 0/63
- 40-80cm unbound lower base layer U6, 0/63

Concrete structures

The uphill support structures in the corners no. 2 and 3 were executed as anchored jetcrete constructions with natural stone covering. To finish the structure, a concrete edge beam was installed. The walls were at most 10m high. A 35cm-thick filter concrete layer was installed between the jetcrete construction and the natural stone wall. The natural stone covering was executed as regular layer masonry made from domestic lime stone. The layers' height follows the course of the road. The visible surface of the wall stones were split and rusticated. For every square metre of visible surface, the faced brickwork was back-anchored by means of a connecting piece made from non-corrosive steel.

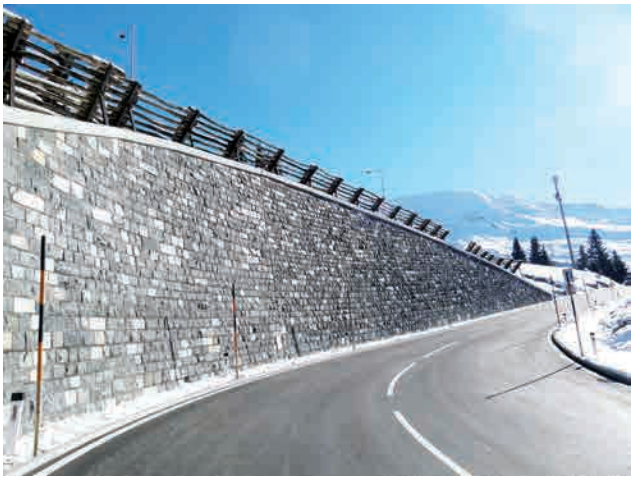
Support wall no. 2, under construction, June 2015
Image: PORR AG

Support wall no. 2 with natural stone cladding, July 2015
Image: PORR AG

The downhill support walls in the corners no. 2, 4 and 5 were executed as reinforced concrete cantilever support walls. The walls were up to 12m high and for statical reasons, up to two slabs had to be constructed depending on the walls' height. At the base and the top, the walls were 90cm and 30cm thick, respectively. Between the foundation body and the rising structure, concrete springs had to be installed in the construction joints. In accordance with the project engineer's specifications, work on the support walls and embankment work in the support wall area could be started 14 days after the respective section had been concreted, at the earliest. Particularly during construction time planning, these specifications had to be taken into account to guarantee problem-free construction progress.

In the sense of landscape protection and under consideration of the appearance of the alpine environment and the already existing covered support wall above Stuben, the support walls in corners no. 4 and 5 were covered in natural stone. This was done at the same time as the installation of the covering on the uphill walls, but in this case no filter concrete was used between natural stone wall and cantilever support wall. To finish the structure, a concrete edge beam was again installed.

The downhill wall in corner no. 2 was not covered in projecting natural stone since it cannot be seen.



Support wall no. 1 with natural stone cladding, October 2015
Image: PORR AG

Final completion of entire route / aerial shot, October 2015
Image: PORR AG

Final completion of bend 2, 3, 4 / L198 connection / aerial shot, October 2015
Image: PORR AG

Final completion view towards valley / aerial shot, Octpber 2015
Image: PORR AG

Final remark

Thanks to excellent collaborations between all project participants – from the client to local building supervision, authorities and residents – work proceeded to the great satisfaction of all those involved and could be completed on schedule in October 2015. The greatest challenges the consortium and all project participants faced were the unreliable weather during summer and winter time, and the local framework conditions and the topographical location of the construction site in high alpine mountains.

TEERAG-ASDAG AG, being an important part of the PORR Group, once again impressively proved its experience and competence in the alpine infrastructure and road construction.

Project data

Start of construction work	April 2014
Final completion	October 2015
Length of project	1.30km
Road surface	10,500m²
Removal/earthmoving	80,000m³
Rock removal	65,000m³
Frost layer	15,100m³
Support wall length	409m
Concrete volume	1,650m³
Reinforcing steel	120t
Jetcrete surface area (15-20cm)	1,500m²
IBO anchors	3,200m
Permanent anchors	600m
Faced brickwork	1,600m²

Winzerhalde residential complex, Zurich-Höngg

Sustainable housing complex in exclusive quarter directly at the Limmat River

Nicolai Mitt / Julius Gegendorfer

Introduction

On 23 April 2014, Zürich Anlagenstiftung, represented by Zürich IMRE AG awarded PORR SUISSE the full-service general contractor order for the residential complex Winzerhalde in Zurich's Höngg district. Included in the contract are the turn-key-ready construction of a total of 67 rental flats and the associated underground car park as well as the design of the entire outside facilities. A prerequisite for the construction of the seven buildings was the demolition of four existing blocks of flats from 1962 including remediation of contaminated sites. Start of construction was scheduled for 1 July 2014. Due to illegal occupation of the buildings to be demolished, start of construction was delayed by four weeks. The turn-key-ready buildings were handed over to the client in stages from 18 March to 22 April 2016.

Winzerhalde housing complex top view
Image: Theo Hotz Partner

Panoramic view from northern direction
Image: PORR AG

Planning and design concept

The architectural office Theo Hotz Partner AG was in charge of the competition draft as well as the entire construction documents phase of the replacement construction. Under consideration of the statutory stipulations, this resulted in a complex of seven multi-family homes that harmoniously blend into the riverside surroundings of the Winzerhalde area. The basic principle behind the architectural concept was the flats' southwards orientation allowing all tenants a clear view of the Limmat River.

The colour and material concept follows the principle of sustainability as well as the uniform structure of the façade by using aluminium wrap-around frames along the window hinges. The predominant colours are subtle greys accented by the bright ochres of the hinges.

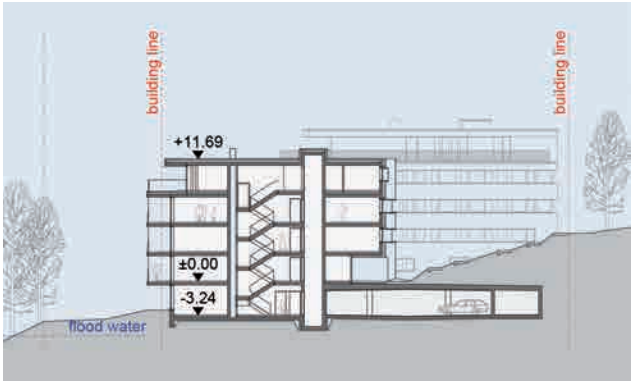
Façade view
Image: PORR AG

Construction pit and carcass

The completion of the demolition work was followed by the construction pit excavation, the slope stabilisation work using nails and pre-stressed anchors as well as the installation of a shotcrete ground support system at the building's northern edge. Thanks to the local conditions, dewatering was not required. On the river side, the building was put on deep foundations constructed using driven piles and shallow foundations were installed on the slope side.

Construction pit
Image: PORR AG

The period from October 2014 to early May 2015 saw the completion of structural work using the monolithic reinforced concrete method with high-tensile pre-cast columns (concrete quality C70/85), supporting walls with staircase and lift core. Due to the stipulations of the sustainability label MINERGIE-P-ECO, more than 90% of the concrete used had to be recycled concrete. As usual in Switzerland, all HVACR system lines were installed in the 25cm-thick reinforced concrete ceilings.



Building A1 section
Image: Theo Hotz Partner

Underground car park ceiling installations
Image: PORR AG

Building envelope

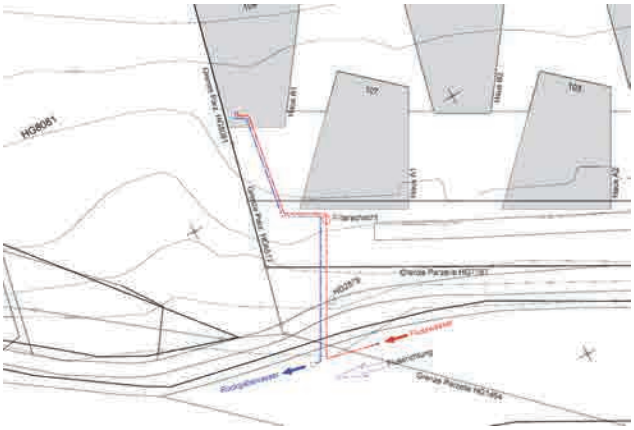
The stipulations of the label MINERGIE-P-ECO, under which the building envelope must meet highest energy requirements, defined the requirements the façade had to fulfil. Triple insulated wood-aluminium windows are a part of the overall system, as is 34cm-thick rock wool insulation. Sealing consists of both plastic foils and bituminous roofs. A special feature of the attic roofs is the use of vacuum insulation. The sealed connection between the full thermal protection façade and the metal frames was executed with special compression tape instead of the conventional sealing joints.

Façade and roofs
Image: PORR AG

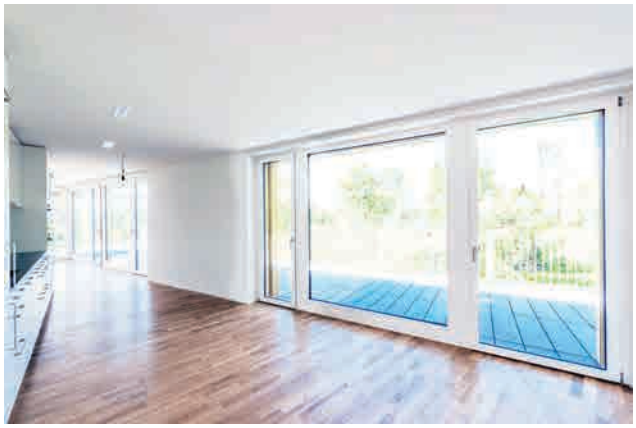
Interior finishes

According to the time schedule, the fit-out trades performed their work in the seven buildings in one-week stages, beginning with applying the screed all the way to completion. The flooring systems used are parquet flooring in all flats and common rooms, stoneware slabs in the wet rooms and sanded artificial stone in the staircases. White smooth plaster and wall coverings, partly with tiles, in the wet rooms characterise the wall and ceiling design. Balconies and terraces were covered with vacuum walkway plates. Floor-to-ceiling wooden door leaves and sliding doors give access to the rooms and generously proportioned portals allow views of the adjacent river in southerly direction. Also part of the finishes were fully equipped kitchens, clothes cabinets as well as combined washer-dryers.

Wet room
Image: PORR AG



River water catchment
Image: PORR AG



Attic flat
Image: PORR AG

Mechanical and electrical engingeering

A special feature included in the criteria for sustainable building (MINERGIE-P-ECO) was the provision of energy from renewable sources. This requirement was fulfilled by means of a river water catchment system downstream from the lot which is used to supply the facility with heat. Both hot water preparation and the floor heating system are supplied via a plate heat exchanger and the downstream heat pumps. The flats were equipped with controllable individual flat ventilation systems. Round openings installed in the underground car park ceiling made both mechanical ventilation as well as smoke extraction obsolete. Both the sanitary and electrical installations were adapted to the exclusive fit-out standards.

Completion of the housing complex

Despite the tense schedule due to the delayed start of construction as well as the unexpectedly heavy contamination of the existing buildings and the additional foundation measures that were required close to the shore, PORR SUISSE managed to hand the project over to the client in April 2016, on schedule, free of defects and after a mere 19 months of total construction time. Thanks to excellent collaborations, high competence and outstanding quality of execution, yet another Zurich IMRE AG project involving the construction of 88 flats on Dufourstraße in Zurich's Seelfeld district could be acquired.

Attic terrace
Image: PORR AG

Project data

Gross floor space	12,300m²
Flats	67 flats in 7 buildings
Outside facilities	4,500m²
Underground car park	63 parking spaces, 2,650m²
Special features	MINERGIE-P-ECO label (highest quality standard regarding sustainability in Switzerland)
Start of construction work	July 2014
Construction time (calculated from carcass completion)	19 months
Carcass construction time	8 months
Completion	April 2016

Construction scheme "Am Kaiserforum", 1010 Vienna

Exclusive living in the heart of the city

Stephanie Locher

Introduction

In March 2014, Real Treuhand Projekt- und Bauträger GmbH, a subsidiary of Raiffeisenbank Oberösterreich, awarded PORR Bau GmbH the contract for the general renovation including attic floor conversion of the building Nibelungengasse/Babenbergerstraße in Vienna's first district.

In its role as a general contractor, PORR was responsible for the demolition and carcass work, façade renovation and interior fit-out. Thereby, the building was restored with meticulous attention to detail as well as outfitted at high-quality and modern standards. 15 premium luxury flats as well as an underground car park, an entrance hall, a wine cellar and a business premise were then installed in the heart of the city of Vienna, in close vicinity of the Museums of Natural History and Art.

Historical facts

The name Am Kaiserforum (German for "At the Emperor's Forum") hints at the location's imperial history. By order of Emperor Franz Josef, the ensemble of the Hofburg Palace was supposed to be combined into one large entity, the Kaiserforum, modelled after Versailles Palace. However, only one part was actually built: the Court Museum, one wing of the new Hofburg Palace and the stately houses bordering the monumental museums. Thus, the building at the corner of Nibelungengasse and Babenbergerstraße also became part of this historical project.

Drawing by Semper and Hasenauer from 1869; Corner of Nibelungengasse and Babenbergerstraße at the right of the image, marked red

The present building was finally built by the renowned architect Ferdinand Fellner in 1869. Its equipment represented a rather high standard for the time. Soon, the generously proportioned residential building was converted to an office building which was first owned by Siemens from 1918 to 1995, later by Wüstenrot, before Real-Treuhand Projekt- und Bauträgergesellschaft purchased it in 2012. The latter decided to re-convert the structure to what the original architectural plans had intended it to be: a premium residential address in the close vicinity of Hofburg Palace.

Project data

Client	Real-Treuhand Projekt- und Bauträger GmbH
Architecture	Holzbauer & Partner
Execution of construction work	PORR Bau GmbH
Location	Nibelungengasse 15, 1010 Vienna
Gross floor space	6,914m²
Storeys above ground	7
Storeys below ground	2
Start of construction work	April 2014
Completion	February 2016
Flats sized between 170 and 250m²	12
Attic maisonettes sized between 210 and 320m²	3
Wine cellar	1
Parking spaces in the underground car park	9
Reception hall	1
Business premise	1

Carcass

The building's rededication from an office building to a premium residential building brought with it a complete redesign of the storeys and rooms.

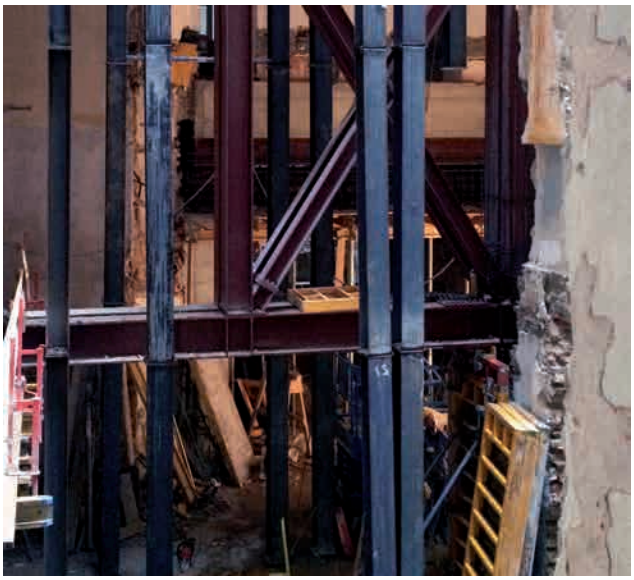
The existing partition walls were removed and the resulting spacious areas were adapted to their future use as flats by means of drywall. New doorways and accesses had to be created, especially in the inside wall. This required the installation of underpinnings in the form of steel frames.

Parts of the existing building had one basement floor, others two. The 2nd, basement floor needed to be excavated in its entirety to make room for the future tenants' new cellar compartments.

The construction of the underground car park and the reception hall posed the greatest challenge during the entire carcass construction phase. For this purpose, large

wall openings were created in the area of the 1st basement floor and ground floor. Massive needling measures were used to support the high loads, in order to be able to remove the walls underneath.

Underpinning of the reception hall
Image: PORR AG



Underpinnings spanning two storeys
Image: PORR AG

Contrary to the original plans, large parts of the existing timbered ceilings on the upper floors were removed. Despite the fact that elaborate preliminary inspections of the existing buildings were conducted, the ceiling joists were located higher than expected in certain areas which meant that the specified installation height in the floor foundation could not be met. This required the installation of new reinforced concrete ceilings. The remaining timbered ceilings were executed as timber-concrete compound ceilings to increase the ceilings' stability and improve their vibration behaviour.

Timbered ceiling removal
Image: PORR AG

Timber-concrete compound ceilings
Image: PORR AG

The plans called for the installation of three maisonettes on the attic floors. For this purpose, the existing first attic floor which had been added in the 1930s needed to be removed. The two-storey attic floor conversion was implemented in lightweight construction as a timber-steel structure.

Attic floor conversion
Image: PORR AG

From the newly designed reception hall, two preserved historical staircases lead to the flats. The staircases as well as the existing stairs and platforms were revitalised with great care. When the construction scheme went underway, only one lift existed at the Nibelungengasse side, which was removed and newly installed. On the Babenbergerstraße side, a new dual-shell, sound-insulated lift was built from pre-cast concrete parts next to the staircase. This guaranteed that all flats are handicapped-accessible.

The relocation of the telecommunications mast on the roof of the Nibelungengasse side staircase presented another challenge. Its function had to be guaranteed during the entire construction phase.

Lift made from pre-cast concrete parts
Image: PORR AG

One of the project's most important aspects was to preserve the Wilhelminian Style building's original appearance. For this reason, its road-side façade was restored in a historically accurate way.

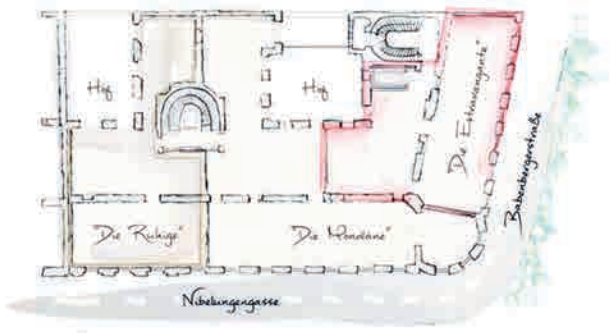
Due to the fact that the rehabilitation of the existing wood frame windows was unfeasible, they were entirely replaced with high-quality replicas featuring brass fittings typical for the time.

Finishes

Since statical specifications in the area of the underpinnings only allowed for partial removal, the construction progress was characterised by simultaneous work on both carcass and finishes. While the steel frames of the underpinning beams were still concreted on the basement floors, work on drywall construction and rough installations for the HVACR systems already went underway on the upper storeys. The ongoing sale of the flats and the accompanying special and additional requests resulted in frequent changes to the construction progress – a fact that demanded a high degree of flexibility and quick reactions from the construction management.

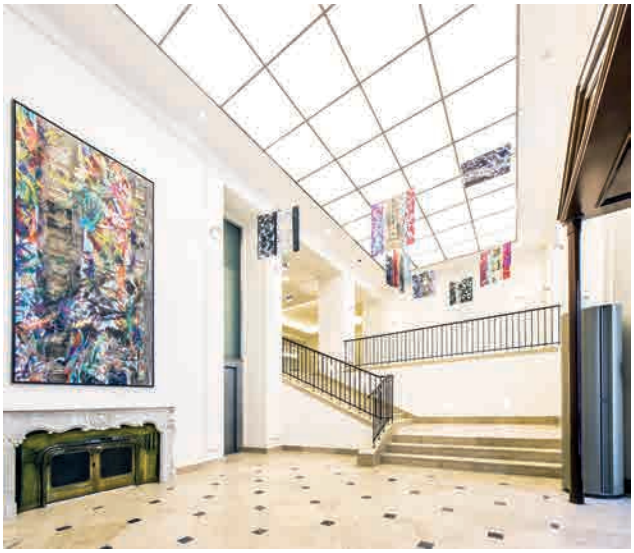
The equipment of the luxury flats with high-quality floor and wall coverings such as timber floor boards, porcelain stoneware and natural stone was the object of elaborate sampling endeavours. Cooling ceilings made from full-surface plasterboard with adjoined stucco frame were installed in the ceiling area.

Against the trend of adorning luxury real estate with an interior characterised by purism and coolness, this project was committed to tradition – not opulent or imperial but a subtle Viennese classical style. This is reflected in the concept used for the flats which were given names such as "The Mundane", "The Extravagant" or "The Calm".



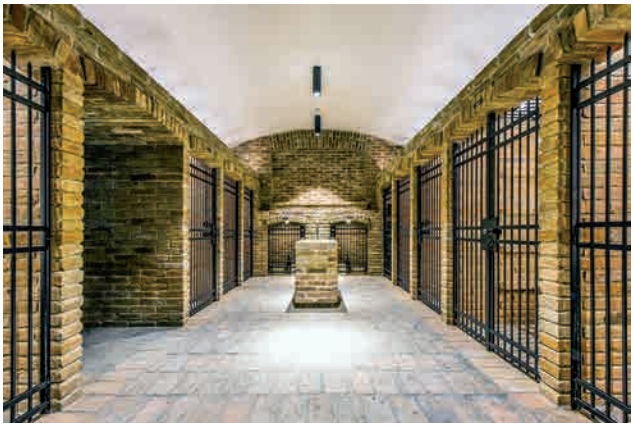
Living concept
Image: Grafik: Real-Treuhand Immobilien Vertriebs GmbH

The magnificent entrance hall is one of the special features of the Am Kaiserforum building. Here, tenants and visitors alike are welcomed in a prestigious fashion.



Reception hall
Image: Simon Klein

The wine cellar on the first basement floor is another highlight. An exclusive vaulted cellar some 50m² in size was installed here. All owners have their own compartment with central tasting station.



Wine cellar
Image: Simon Klein

After a construction period of 22 months, the project was presented and handed over to the fully satisfied client and owners in February 2016.

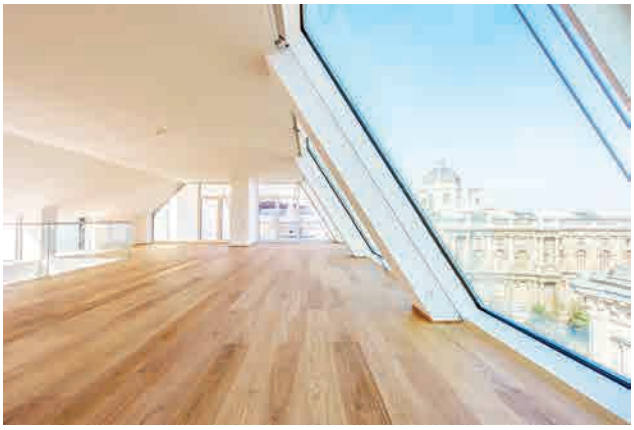
Further impressions of the completed property:

Corner Nibelungengasse / Babenbergerstraße
Image: Simon Klein

Corner Nibelungengasse / Babenbergerstraße
Image: Simon Klein

Entrance portal Nibelungengasse
Image: Simon Klein

Flat no. 8: stylish old building
Image: Simon Klein



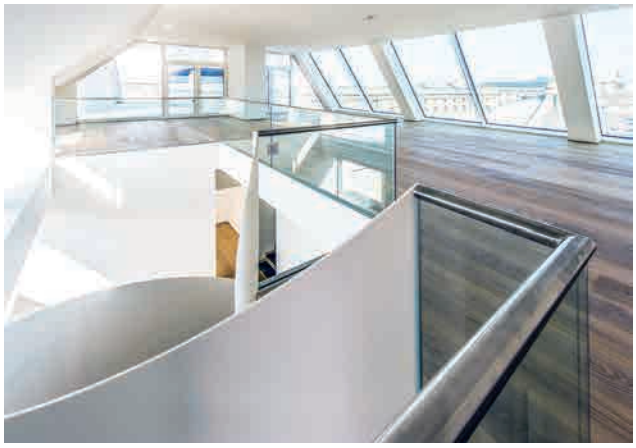
Flat no. 14: attic maisonette
Image: Simon Klein

Flat no. 1: stylish old building
Image: Simon Klein

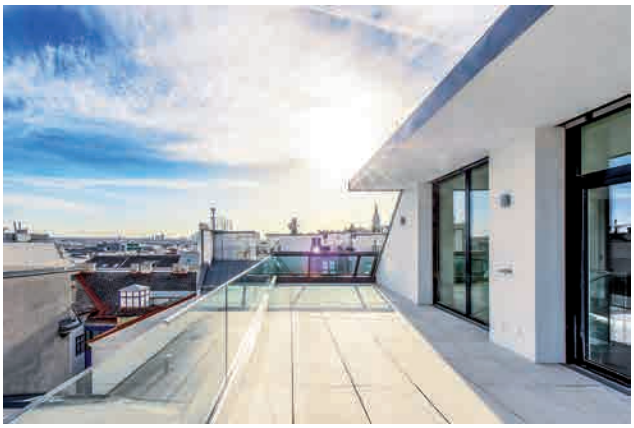
Flat no. 14: bathroom
Image: Simon Klein

Flat no. 8: stylish old building
Image: Simon Klein

Flat no. 15: attic maisonette
Image: Simon Klein



Flat no. 8: attic maisonette
Image: Simon Klein



Flat no. 15: attic maisonette
Image: Simon Klein

Flat no. 13: attic maisonette
Image: Simon Klein

Rotunda with attic floor conversion
Image: Simon Klein

Underground car park
Image: Simon Klein

Underground car park
Image: Simon Klein

Austria Campus – currently Austria's largest geothermal energy project

Christian Marchsteiner, Markus Weiss

General information

On a lot some six hectare in size, located at the former Nordbahnhof train station in Vienna's second district, SIGNA is constructing the Austria Campus, a business quarter offering office real estate, underground car parks, a hotel, a medical and congress centre as well as restaurant and retail premises.

PORR Bau GmbH's Foundation Engineering Department was contracted with concept, design, execution, and monitoring of the overall construction pit.

Utilising the Foundation Engineering Department's broad service portfolio, the client was offered a tailored option for the complex framework conditions which differed from the tendered project. The following construction methods and technologies are used: Diaphragm walls, sheet-pile walls, jet grouting method, pressure-grouted anchors, dewatering, large bore piles, static load tests, shotcrete and injection bore anchors. The components diaphragm wall, large bore piles and bottom slab are geothermally activated.

Work on the diaphragm walls began in February 2015
Image: PORR AG

Project description

The entire property is divided into five development sites and is enclosed by a temporary construction pit system with a developed length of some 1,900 m. In case of four development sites, the construction pit enclosure was executed by means of anchored diaphragm walls with a total size of approx. 20,000m², one development site was enclosed using anchored sheet piling walls. Due to the specified construction period, a total of four large equipment units were used in the construction of the diaphragm walls.

Diaphragm wall work
Image: PORR AG

Diaphragm wall construction

The anthropogenic former use of the premises also showed in the soil characteristics on site. Artificial backfill of up to 6m, mostly consisting of gravels, silts, brick and ash residue presented a great challenge in the construction of the construction pit enclosure. Furthermore, expansive soil layers lacking fine particles were found in the area of the quaternary gravels which resulted in excessive loss of support fluid. However, this challenge could be overcome without causing any further damage using appropriate counter measures.

Development site 8, excavation
Image: PORR AG

Anchor and jet grouted wall installation

The back-anchoring of all construction pit enclosures was executed by means of temporary pressure-grouted anchors, using three anchor boring units which were used simultaneously.

Depending on the excavation depth, one or two anchor horizons were created: The second anchor horizon was located up to 8m below the ground water table outside of the construction pit enclosure. In order to prevent ground water and soil material from entering, the anchor horizon was bored using a preventer.

To maintain the water-tightness of the construction pit enclosure, the connection areas between the diaphragm walls and the sheet pile walls as well as the linkages between the sheet-pile walls and the up to 3.5m-wide and 4m-deep existing sewers were executed using the jet grouting method.

Development site 8, bore pile work protected by the diaphragm wall and sheet pile wall enclosure
Image: PORR AG

Drainage measures

Ground water drainage with constant control of water levels inside and outside of the construction pit included more than 100 sampling and seepage wells. Continuous operation and constant maintenance guaranteed problem-free construction progress.

To avert the danger of hydraulic ground seepage, great attention had to be paid to the tertiary ground water relief as well as to the quaternary lowering of the ground water table. The lowest excavation bottom is located some 13.5m below the original ground surface and approx. 11m below the ground water table.

Location of static pile test
Image: PORR AG

Foundation optimisation

To gather additional information on the soil's load bearing capacity, three static pile tests were conducted. Due to the tight construction schedule, the pile tests had to be conducted from a higher excavation bottom to allow for the conceptualisation of an economically optimised foundation system prior to the pile installation.

Geothermal use of building parts

The large diaphragm wall surface and the large number of piles yielded great potential for geothermal use. To allow for the use of geothermal energy to heat and cool the building, diaphragm walls, bore piles as well as parts of the bottom slab were geothermally activated by means of absorber lines.

For this purpose, geothermal energy lines are conventionally installed in the reinforcement cages of the diaphragm walls and bored piles. An innovative feature in the construction of the Austria Campus was the installation of geothermal circuits in non-reinforced piles by means of a specially developed installation system.

At an overall absorber line length of some 250,000 running metres, Austria Campus currently represents the largest geothermal energy project in Austria and ranks among the largest geothermal energy plants close to the surface in Europe. The components equipped with solid absorbers (diaphragm walls, piles and bottom slabs) produce an overall heating output of some 3000 kW. per year This equals a heating performance enough to heat more than 250 single-family homes. Geothermal energy is also used to cool the buildings.

All specialist civil engineering services were planned and implemented in a record construction time of a mere 10 months. Thanks to planning and execution by a single provider and a highly experienced team, the various and most diverse tasks connected to this complex overall construction pit could be completed to the full satisfaction of the client.

Development sites 5, 6, 7, 8 and 39.2 (November 2015)
Image: PORR AG

Project data

Client	Signa Development Immobilien Entwicklungs GmbH
Construction period	since january 2015
Length of temporary construction pit system	1,800m
Maximum excavated depth	14m
Large bore piles installed	2,000 pcs.
Total length of geothermal energy lines	230,000m
Expected amount of water pumped	3 million m³

Reconstruction and electrification of railway line Plovdiv – Svilengrad

Construction section 2, railway route Harmanli – Svilengrad and Svilengrad to Greek border

Tanya Kostadinova

Project data

Location	Railway route Sofia – Alexandroupolis – Istanbul, Harmanli – Svilengrad section (from km 266+000 to km 297+750) toward Greece and Turkey (South-Eastern Bulgaria)
Client	Bulgarian State Railway Infrastructure Corporation
Contractor	Joint Venture Railway Infrastructure 2011 under the leadership of PORR Bau GmbH
Construction time	04 December 2012 – 15 March 2016

Overview of Plovdiv – Svilengrad route
Image: www.plovdivsvilengradrailway.com

Newly laid tracks and switches as well as newly installed catenaries in Svilengrad
Image: PORR AG

General information

After the finished call for the tenders, the joint venture Railway Infrastructure 2011 under the leadership of PORR Bau GmbH was awarded the contract for the project "Reconstruction and Electrification of the Railway Route Harmanli-Svilengrad (from km 266+000 to km 297+750)" at the end of 2012. The contract also included the rehabilitation / new construction of the railway stations Harmanli and Svilengrad as well as all railway stations and stops in between. The project area encompassed a length of some 34km and also included the reconstruction and electrification of the railway line Svilengrad to Greek border at a length of some 4km.

The project's client was the Bulgarian State Railway Infrastructure Corporation.

Bulgaria has been a member of the EU since 1 January 2007 and has thus access to European funds and programmes aimed at modernising railway infrastructure. The railway line Plovdiv – Svilengrad including the section from Harmanli to Svilengrad is the most important railway line in Bulgaria and part of the European corridors No. IV and IX as well as the subsidy programme Transport 2007 – 2013.

The railway line's modernisation guarantees the connection to Greece and Turkey.

Project description

The project's objective was to modernise the single-track, non-electrified railway line with its length of some 38km. Furthermore, new catenaries with a length of 60km were installed in the framework of the project. The line's new routing allows for a travelling speed of 160km/h for passenger trains and 200km/h for tilting trains.

The project was implemented by dividing the railway route Harmanli – Svilengrad into six sections which were constructed independently from one another.

Newly laid tracks and switches as well as newly installed catenaries in Svilengrad
Image: PORR AG

Contract volume

In accordance with the conditions of the call for tenders and the contract, the consortium performed the following services:

- Geological, hydro-geological and hydrological surveys
- Creation of planning submission design including coordination with local authorities on the project's submission to the Ministry for Transport, IT and Communication
- Project development and implementation of stabilisation measures
- Construction of bank and embankment reinforcements
- Overhaul and rehabilitation of existing structures along the railway route
- Construction of railway, road and pedestrian overpasses
- Removal of existing tracks
- Laying of new tracks according to European standards
- Electrification of the entire railway line with new catenaries
- Installation of signal and telecommunication systems in accordance with the project plan
- Creation of technical documentation for purposes of handover to client and commissioning by the Bulgarian authorities

Construction works

Excavation	1,145,012m³
Fill	1,318,000m³
Frost protection	137,600m³
Drainage channels and drainages	75,188m
Noise protection walls	2,441m
Number of relocated and rebuilt utility crossings	103
piping	36,560m

Superstructure

Removal of existing tracks	41,500m
Newly laid tracks	52,400m
Newly laid sleepers	91,700m
New track ballast	127,926m³
Newly installed catenaries	60,600m

Additionally, the following services were performed in the course of the project:

- Reconstruction of four buildings with a total floor space of 570m²
- Modernisation of three railway stations
- Rehabilitation of a steel bridge
- New construction of three buildings with a total floor space of 920m²
- Construction of two new halts
- Construction of ten new reinforced concrete bridges

All newly constructed buildings meet the requirements of the Eurocode and were designed to allow for a future extension of the line to a double-track line.

Bridges, road overpasses and underpasses

The road overpasses were mainly built from prefabricated girders supported on Neoprene bearings which were supplemented with a reinforced concrete track slab. This construction method allowed for quick and simple progress with the least possible impact on traffic.

To build the railway bridges, the courses of rivers had to be altered in places and bridge foundations had to be secured with gabion walls and recycled concrete sleepers.

One of the largest bridges along the line is the one at the River Biserska at km 284+720. 18 bored piles with a diameter of 1m were used for its foundation.

Another striking structure is the new reinforced concrete bridge at the River Harmanlijska at km 268+800. 25-m-long prefabricated girders weighing 85t which were manufactured on site were used for its construction. The bridge crosses the river at an angle of 45°. The river had to be temporarily redirected to install the piers. Sheet-piling boxes and more than 4,000m³ of concrete were used for the piers' shallow foundations.

85-t prefabricated girders are lifted into place
Image: PORR AG

During the construction of an underpass within the city limits of Lyubimez, the construction pit and the tracks which had to remain open for traffic were secured by means of Larssen type sheet pile walls. Due to the high ground water table and the unfavourable geological conditions, these had to be installed to a depth of 20m. The underpass is furthermore equipped with a pumping station for purposes of storm water drainage.

Another thing worth mentioning is the 250-m-long pedestrian underpass which was installed in Harmanli, below the existing, likewise fully operational railway route.

Svilengrad cargo station

In the project's framework, a new cargo station was constructed in Svilengrad. Due to difficult soil conditions, the entire station had to be built on a embankment constructed from geosynthetic materials, geotextiles and geogrids with an underlying layer of rough rock material. The embankment's entire volume amounts to approx. 200,000m³. The station which serves as a border railway station between Bulgaria, Greece and Turkey, needed to meet EU standards and those of the Schengen Agreement. Respective barriers, video monitoring systems and the like were therefore installed.

Svilengrad cargo station
Image: PORR AG

Challenges

Without a doubt one of the biggest challenges was acquiring all permits required for the construction permit of the railway route. This could only be achieved through direct and close contact with the local authorities.

However, surprises awaited us throughout the entire execution of the project. Apart from numerous unknown underground utilities, which had to be protected in the end, archaeologically valuable sights were discovered which halted construction in the respective area for several months.

Several floods exceeding the HQ100 point flooded parts of the construction site and caused major damage during the execution phase.

The adjacent nature reserve Natura 2000 also had a significant impact on the execution of construction work.

All construction work had to be performed while ensuring the railway line's full operability. This meant that the project could only be implemented in stages and individual sections were immediately opened for traffic.

State-of-the-art and innovative construction and stabilisation methods were used to overcome the mentioned difficulties:

- Use of innovative products made from geosynthetic systems and gabions to stabilise unstable soil
- Hydro-seeding – use of a special mix of grass seeds as a further means of slope stabilisation in the area of sandy and clay soil
- Use of concrete sleepers to stabilise slopes and secure railway embankments against erosion, especially in the event of floods; concrete sleepers were also used in the erosion-free execution of river redirections and channels.

Embankments and box-cuts up to a height of 10m each were constructed in the course of the construction scheme.

Modernised Svilengrad station
Image: PORR AG

Conclusion

Regardless of the operational limitations to maintain the railway line's operability and the enormous extent of the construction work involved, all services could be performed within the contractually agreed time and to the client's full satisfaction.

A number of unforeseen events such as archaeological discoveries, the complete re-design of a railway station due to newly defined design parameters, floods exceeding HQ100 levels and more have caused a delay of 19 months.

All required exceedances of the original construction period were agreed upon in advance with the engineer and the client. Fully in line with cooperative project handling, this fact reflects the excellent cooperation between and professional execution of the project by the Bulgarian railway team, the engineer and PORR.

Our employees' individual dedication resulting from their identifying with the project made it possible to successfully overcome all difficulties on site.

Together with numerous prominent guests, the route was finally opened on 15 May 2016 by Prime Minister Boyko Borissow.

Our project manager Saso Kostadinovski's speech during the opening ceremony
Image: PORR AG

Modernisation of railway line Septemvri – Plovdiv

Construction Section 3, railway route Stambolijski – Plovdiv

Tanya Kostadinova

Project data

Location	km 138+755 to km 154+564 of the Stambolijski – Plovdiv Railway Line (Central Bulgaria)
Client	Bulgarian State Railway Infrastructure
Company Contractor	PORR Bau GmbH
Construction period	5 December 2013 – May 2016
Excavation	241,000 m³
Noise barriers	2,500 m
New track length	35,000 m
New overhead power line	38,360 m
Bridge refurbishment	5
New reinforced steel bridges	4
Refurbishment of underpasses	1
Construction of new underpasses	2
Construction of new Station halts	2
Construction of new railway stations	1
Footbridges	2
New buildings	1

General information

After completion of the tendering procedure, PORR Bau GmbH was able to secure the project contract for the "Modernisation of the Septemvri – Plovdiv rail track - part of the trans-European rail network" in 2011.

The construction section 3, Stamboliyski – Plovdiv, extends from km 138 + 755 to km 154 + 564 and connects directly to Plovdiv station. Plovdiv is the second largest city in Bulgaria, after Sofia, and a major transport hub due to its central location in the middle of the country.

The Sofia-Plovdiv railway line is part of the trans-European rail network (TEN) and its modernisation is one of the designated priorities of the EU-funded expansion program of the trans-European network "Transport 2007-2013". The implementation of the Plovdiv – Svilengrad connection (to the Turkish and Greek border), similarly described in this issue as well, is also part of this track widening program.

The track section from Sofia to Plovdiv is a double-track railway line and was already electrified in 1963. As it connects the two largest cities in Bulgaria with each other, it is also the busiest railway line.

Project description

The project includes the modernisation of 15.81 km of double track railway, including the preparation of the planning submission and the implementation planning. Since the completion of the construction work in May 2016, passenger trains can now travel along the route at speeds of 160km/h (+10%). The permissible speed limit for tiltable carriage sets (tilting trains) is 200 km/h (+10%), while freight trains normally travel the route at 120 km/h.

Todor Kableshkov station
Image: PORR AG

Scope of contract

In accordance with the tendering specifications and the participation conditions, PORR Bau GmbH has carried out the following construction and services:

- Geological, hydro-geological and hydrological studies
- Preparation of planning submission including coordination with all local authorities for submission to the Ministry of Transport, IT and Communications.
- Design and construction of stabilisation work
- Repair and refurbishment of existing buildings on the old railway line
- Construction of rail, road and pedestrian crossings
- Dismantling of all existing track systems and their foundation
- Production of new railway tracks to European guidelines
- Replacement of overhead lines and signalling and telecommunications equipment
- New construction and complete equipping of the "Proslav" power substation

- Preparation of technical documentation for project acceptance by the customer and commissioning by the Bulgarian authorities

Construction works

Excavation approximately	241,000m³
Track fill	12,400 m³ (volume of earth)
Frost protection blanket	115,500m³
Drainage canals	24,800 m
Noise barriers	2,500 m

Superstructure

Demolition of existing track systems and their reconstruction	35,000 m
Sleepers	58,800
New track ballast	93,800m³
Dismantling the existing overhead lines	31,620 m
Installation of new overhead lines	38,360 m

Bridges and underpasses

In addition, within the project five bridges were refurbished and four rebuilt.

The bridge at km 143 + 013 had to be constructed under difficult circumstances, as the water level of the river that flowed under had significantly increased due to a recently built hydroelectric power plant.

Using island beds of ballast,18 piles were bored to a depth of 28 m (24 m + 4 m) and four piles to a depth of 16 m. The adjacent, in-service track was secured with a pit lining of the type "Berliner Verbau".

Work on the bridge at km 143 + 013
Image: PORR AG

Another challenge that was successfully mastered, despite the difficult geological conditions, was the construction of new bridges at km 147 + 271 (track 1, track 2 and the station platforms). Initially, driven piles should have been used for the erection of the bridges carrying the platform tracks. However, the soft soil layers encountered required the use of piles bored to a depth of 13 m. In addition, piling works were formed during construction to secure dams and embankments.

At km 150 + 022 (track 2) the old steel bridge was dismantled and replaced by a newly built reinforced steel concrete bridge with driven piles.

For safe and trouble-free crossing of the railway line, a footbridge including elevator was also built in the suburb of "Proslav" at km 150 + 800.

Footbridge in the suburb of Proslav
Image: PORR AG

A further construction of note is the concrete underpass between the Tsarevets and Mudar roads, which was produced in sections under the tracks while still in operation, using diaphragm walls to depths of 24 m and 29 m.

Construction of the new Todor Kableshkov station with platforms, roofing and underpass to the village of Zlatitrap was also included within the scope of the construction work. The entire electrical equipment also formed part of the contract.

Todor Kableshkov station
Image: PORR AG

The newly built substation at Proslav was equipped with the latest technology. It is the first plant in Bulgaria, which is equipped with modern 110 kV heavy duty systems.

Proslav substation
Image: PORR AG

Summary

Despite the challenges of the construction process, due to the large scope of the construction works carried out and the need to constantly maintain rail traffic, the work could be completed within the contractually required time and to the complete satisfaction of the customer.

Due to a delay in the award of the construction supervision by the Bulgarian Railways, the start of construction was set back by 17 months. Unusual weather phenomena delayed the construction work further. However, any extensions to the original construction time had been already negotiating in advance with the Chief Engineer (construction supervision) and the client and completed in the form of supplementary agreements.

This procedure illustrates how much the Septemvri-Plovdiv project benefited from the excellent cooperation between the Bulgarian Railways, the Chief Engineer and PORR.

Housing complex Berliving

A home between Ku'damm and Grunewald

Michael Fischer

General information

The housing complex BERLIVING was constructed in the sought-after neighbourhood of Schmargendorf, located in the triangle formed by Hohenzollerndamm, inner-city motorway and Fritz-Wilding-Straße.

Spaciously designed residential units with many conceptual variations are offered to families, couples and singles of all age groups.

The first completed flats were handed over to the tenants in May. The entire complex's completion is scheduled for late July 2016.

Order

In March 2014, PORR Deutschland GmbH's Berlin branch was awarded the contract for the turn-key-ready construc-tion of four structures consisting of three city mansions and a multifamily home including underground car park and outside facilities.

The construction scheme is implemented as a project development. Apart from its execution, object design, superstructure design, technical building design as well as verification of noise and heat insulation, and the design of the outdoor areas are part of the general contractor agreement.

Berliving completed
Image: PORR AG

Project data

Client	Bauträger GmbH Alex-Wedding-Straße 7 10178 Berlin
Contractor	PORR Deutschland GmbH, Berlin branch, Building Construction Division
Start of construction work	September 2014
End of construction	July 2016
Gross floor space	20,000 m²
Flats	136
Parking spaces in the underground car park	104
Concrete	6,400 m³
Reinforcements	800 t
Façade size	7,000 m²

Project description

The complex consists of four structures (A, B, C, and D) including three city mansions and one multi-family home. The scheme was implemented on a single lot in two staggered construction stages.

Structure A was tackled first, followed by structures B, C, and D. All structures are combined in an ownership community. Together, the construction stages form an independent quarter.

Every building section features a main entrance with a representatively styled foyer.

Foyer
Image: PORR AG

Rear entrance
Image: PORR AG

A total of 136 freehold flats which are sold in the framework of part ownership were built. All buildings share a continuous underground car park with a total of 104 single car parking spaces and an entrance and exit structure. The basement floor furthermore houses the flats' cellar compartments, drying and push-chair rooms, bicycle storage rooms as well as janitor and utility rooms. Additionally, the building efforts include the construction of the outside facilities in accordance with the landscaping plan. Apart from the common underground car park, the buildings are connected to each other via a greened courtyard featuring paths, benches and playgrounds.

Sustainability and optimal resource utilisation were part of the design and permit planning, and further optimised and implemented during the execution planning.

Thus, the buildings are erected as "KfW energy-efficient building 55" in accordance with EnEV 2009. Annually, such buildings use 45% less primary energy than a comparable new building according to EnEV 2009.

Construction progress

Structure A was to be built first, followed by structures B, C, and D in the second stage. The division into two construction stages was made deliberately to allow for flexible reaction in case of delays in the sale of the flats. This, however, necessitated to plan and implement design and construction progress in such a way that, once structure A was completed, the areas of common use were as well, even though they did not immediately effect structures B, C and D.

Examples are the foundations of all buildings, the completion of the underground car park and the outside facilities including integrated fire brigade parking spaces.

Foundations

Down to a remaining excavation depth of 30cm, the construction pit had been excavated by the client. Due to residual foundation elements left over from a former Gasometer facility, parts of the foundation level needed to be re-compacted by means of a pulse method.

Construction pit of structures A and B
Image: PORR AG

Construction pit of structure A
Image: PORR AG

Overall, the following services were performed in the course of foundation work:

- Removal of old building substances
- Soil improvement
- Partial excavation pit sheeting for purposes of securing an adjacent building

For this purpose, some 3,200t of soil with different degrees of contamination were excavated and disposed of.

Once the foundations for all four buildings had been completed, work on the carcass of structure A started in September 2014. Work on buildings B, C, and D began in January 2015.

Laying of the foundation stone on 13 November 2014
Image: PORR AG

Ground floor carcass, structure A
Image: PORR AG

Special agreements

Due to the large number of residential units (136) a wide range of special requests had to be fulfilled. These mostly involved tiles, floor coverings and changes to the room division.

The objective was to meet all special requests without impeding the construction progress. Nevertheless, this challenge was mastered perfectly by all involved in the project.

Specially requested equipment
Image: PORR AG

HVACR systems

The selection of the HVACR systems, too, fully conformed to the requirements of modern living in an energy-efficient building:

- District heating – low temperature heating
- Central hot water heating
- Energy-saving floor heating system with independent thermostat control
- Radio-controlled electronic metering
- Demand-based, decentralised controlled residential ventilation
- Bathrooms and toilets with single room ventilation

Service lines with inlet at floor level
Image: PORR AG

Residential space design

The spacious design of the rooms allows for transparent and individual equipment options.

Spacious window apertures, above-average ceiling heights of some 2.82m, loggias, balconies and terraces provide lots of light in all residential areas as well as a warm and bright atmosphere.

Living and dining room
Image: PORR AG

Living room
Image: PORR AG

Façade

The façades were equipped with a thermal insulation system (ETICS) with structured surface in accordance with the requirements of EnEV 2009 - KfW 55.

For purposes of façade division, the ground floor was covered in natural stone plates all around based on the architect's suggestions. Horizontal cornice strips and division elements based on the ETICS system including flashing with preweathered titanium zinc were used inside the façades. From the point block's first to its fourth upper floor as well as on building A's first floor, the window sills were also executed using flashing with preweathered titanium zinc all around.

Façade of structure A, courtyard side
Image: PORR AG

Final remark

The building ensemble Berliving convinces with its timeless, modern and bright architecture perfectly blending in with the local district of Charlottenburg-Wilmersdorf.

Structure A, inner courtyard
Image: PORR AG

Structure A, design of side entrances
Image: PORR AG

Koralm Tunnel, construction stage KAT 3

Andreas Karlbauer

The Koralm railway line (Graz – Klagenfurt section)

Together with the new Semmering base tunnel and the Vienna main train station, the Koralm railway line forms part of a key project along the Baltic-Adriatic Corridor. The objective of the corridor is to connect the individual regions and emerging economies between the Baltic and Adriatic regions together.

Koralm tunnel overview
Image: ÖBB

The Koralm tunnel

The Koralm tunnel is 32.9km long and crosses the Koralpe mountain massif at depths of up to 1,200m and connects Deutschlandsberg in Styria with Lavanttal in Carinthia. Two tunnel tubes run parallel to each other at a distance of about 25 to 50m apart and are connected to each other every 500m with cross passages. Completion is expected in 2023. Trains will then be able to travel under the Koralpe at a top speed of 250km/h.

Construction stage KAT3

The KAT3 construction stage consists of two tunnels which are being driven using different construction methods and extend from the Carinthian side of the construction from 73km + 772 to km 63 + 200.

Geology

Geologically, the KAT3 Koralm tunnel is divided up into different zones:

- Neogene sediments (alternating clay/silt/sand/gravel)
- The main Lavanttal fault
- Crystalline (fine grain gneiss, mica schist, marble)

South tube (cyclic boring)

The south tube is driven over the entire length using cyclic tunnel boring. This includes widening the existing exploratory tunnel (ET) along a length of 7,209m. The remaining tunnel, up to the construction stage border with KAT2, was driven over a length of 2,728m at full profile. In the area of the KAT2 construction stage border, a disassembly cavern was dug out at the end of 2015 for the KAT2 TBM.

The cyclical boring in the south tube consists of the following boring components:

- Neogene widening ET South (581m)
- Neogene widening MI South (4,075m)
- Crystalline widening MI South (2,513m)
- Crystalline full breakout MI South (2,728m)
- Dismantling cavern (40m)

Bench cutting south tube
Image: Toni Rappersberger

Dismantling cavern south tube

The size of the dismantling cavern for the TBM from the KAT2 construction stage was optimised together with the client during construction. By using two hanging rails with hoists mounted in the transom, as an alternative to a gantry crane, the cross-section could be reduced from 354m² to 170m².

Exploratory boreholes

To explore the ground water conditions, exploratory boreholes were drilled over a length of 250m. The boreholes were drilled, after moving the standpipes, using a blow-out preventer from niches outside of the standard cross-section.

Boring drainage for the TBM

In drilling the neogene, 26 drainage holes, each with a length of 30m, were bored from the face of the dome of the exploration tunnel in the direction of the north tube. These holes serve to lower the ground water for TBM boring. The starting point, direction and inclination of the boreholes was adjusted to prevent blow outs during excavation of the north tube.

North tube (continuous boring)

The north tube is predominantly drilled by machine. Only

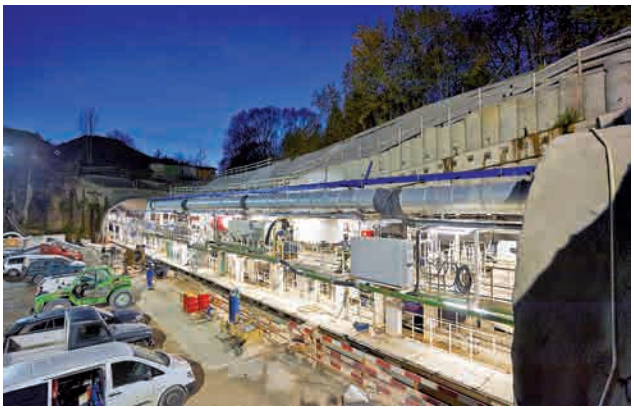
the exploratory tunnel (568m), and the TBM launch tube (70m) are drilled conventionally.

Works acceptance TBM
Image: PORR AG

TBM boring using a multimode TBM

TBM boring is divided into the following geotechnical areas which are driven using different modes of boring:

- Sedimentary rock layers of neogene with loose rock behaviour (silt / sandstone)
- The main Lavanttal fault zone – marked fault tectonics
- Crystalline complex with predominantly hard rock properties (gneiss / mica / marble / amphibolite)



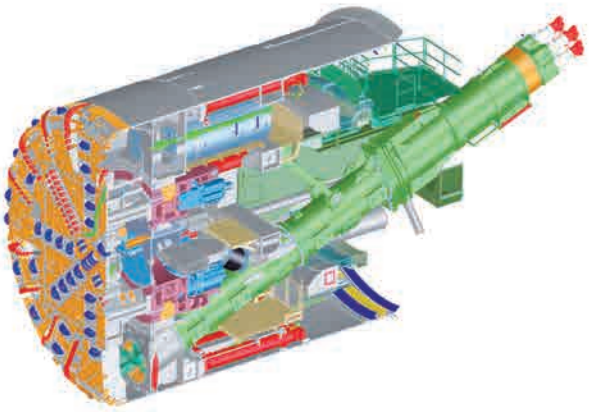
TBM
Image: Toni Rappersberger

The 240m long boring machine was equipped for all the predicted conditions in the mountain, such as:

- Bridge, length of about 55m for the installation of sole elements, track extension and drilling equipment carriers
- 14 trailer units
- Length: 240m without towing points, total length of the plant 430m
- Weight: 2,475t
- Equipment for all round mortaring and filling the ring arch gap with pea gravel
- Equipment for multimode and hard rock mode
- Rapid switch over of modes with auger conveyor
- Drilling equipment for radial boring and longitudinal boring along and through the shield

The mountain section of the neogene, to 4,444m length, (sedimentary rock and the main Lavanttal fault zone) is bored using multimode operation. The fault zones will be excavated in earth pressure (EPB) mode.

Front view of tunnel boring machine (TBM)
Image: Toni Rappersberger



TBM model
Image: Herrenknecht

TBM: View towards trailer
Image: Toni Rappersberger

After completion of the EPB section, the TBM is converted and the remaining 7,530m is driven in hard rock mode with a muck ring conveyor and belt discharge.

Machine data

Machine name	S-857 - "KORA"
Machine type	TBM with EPB components / single shield convertible to hard rock mode
Nominal diameter	9,940mm
Plate length	10.760m
Installed output / drive output	7,200 kW / 4,200 kW
Nominal torque12,800 kNm	
Nominal boring force / max. bore force	98,000 kN / 120,000 kN
Number of forward thrust cylinders	26 individual presses
Length TBM + trailer	approx. 250m and approx. 430m total
Weight TBM + trailer	approx. 2,475t

Inner shell and lining

Waterproofing and drainage

The south tube is designed as a drained tunnel, whereby arch drainage is dispensed with and a system of surface drainage and drainage holes is installed instead.
The cyclically tunnelled part of the north tube is finished as a water pressure-tight tube in the region of the exploration tunnel and the TBM launch tube. The remaining tube is lined with a pressure waterproof shell.

South tube inner shell

The tunnel lining consists of an in-situ concrete shell with outer sealing system, which is drained by full bores in the arch base to the centre drainage.

North tube inner shell

The inner shell of the TBM tunnelling routes consists of a single shell tube lining with a sealing layer that is subject to particularly demanding requirements. In some areas of the neogene, the main Lavanttal fault zone, and the transverse divisions, and in the fault zones with high ground water pressure, the tubing must be reinforced by in-situ concrete for static loading reasons.

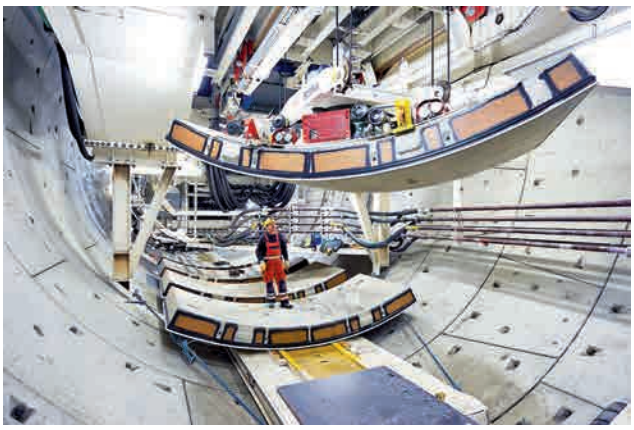
Challenges in the tube design

- High pressure loads on the seal (up to 5.9 bar)
- Sealing width 36mm
- Tunnelling forces (max. 120 MN) at a specified tube wall thickness of 35cm
- Force transfer width 180mm

The tube segments are manufactured to the highest quality requirements in a specially built field production unit with a circulation system.

Tubing factory and store
Image: Toni Rappersberger

Tubing factory and store
Image: Toni Rappersberger



Tubing installation
Image: Toni Rappersberger

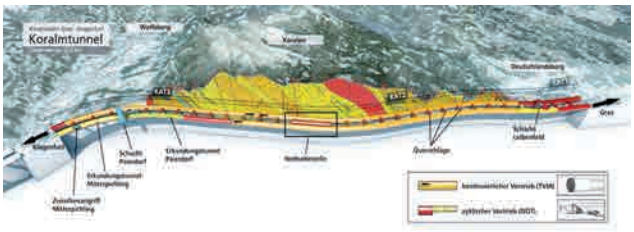
Tubing system base data

Number of rings	approx. 6,250
Ring division	6 + 1 and sole element
Tubing system	Universal ring, sealed
Number of slabs	43,750 tubing slabs, 6.250 sole elements
Tubing width	1.90m
Tubing thickness	35cm
Ring OD	9,500mm

Ring ID	8,800mm
Tubing weight (max.)	Tubing slabs 7,350kg, overall ring 48,000kg, sole elements 14,000kg

Sole plate, walkway and verges
After completion of the drainage system, the main tunnels are then fitted with RBS plates (crack resistant sole plates), walkway and verges.

Completion of the tunnel is scheduled for 2020.



Owerview Koralmtunnel
Image: ÖBB

Project data

Client	ÖBB-Infrastruktur AG
Contractor	Porr Bau GmbH
Total contract award net	EUR 297,124,006.56
Contract signed	09/09/2013
Start of construction work	04/11/2013
End of construction	20/07/2020
Length of cyclic tunnelling south tube	9,937m (of which 7,209m widening)
Length of cyclic tunnelling north tube	638m
Length continuous tunnelling north tube	11,974m
Cross tunnels	22 units (at 500m spacings)

General refurbishment of the A4 Ost Autobahn, Neusiedl am See to Mönchhof section (from km 44.00 to km 52.50)

Jürgen Wagner

Client	ASFINAG Baumanagement Gmbh
Contractor	TEERAG-ASDAG Consortium
Project location	A4 Ost Autobahn, km 44.00 – 52.50 (Neusiedl to just before Mönchhof)
Contract award	13 February 2015
Contract value	EUR 24.75 million
Construction time	07 March 2015 to 09 November 2015
Project completion	09 December 2015

Overall quantity of asphalt laid	158,000 t
Earth movement water containment measures	22,000 m³
Unbound road base layers	39,000 m³
Carriageway ablation / recycled material	34,000 m³
Drainage ditches	6,350 m
Relief of cement stabilised layer	210,000 m²
Surfacing of concrete surfaces	8,600 m²

General information

The A4 in Burgenland, which was built about 20 years ago, had reached a state that required appropriate refurbishment, due to the former type of construction and its heavy usage – on weekdays around 45,000 vehicles travel along the section in area near Parndorf.

The A4 GE 2015 Consortium was award the contract by ASFINAG for general refurbishment of the motorway section km 44 to 52.50 and the Gols motorway feeder with a length of 8.5 km (total 17 km). The contract included the following main tasks:

- Removal of the existing road fittings (crash barriers, guide posts), partial careful ablation due to the relocation of crash barriers
- Removal of the box gutter and new construction of a monolithic drainage channel for longitudinal drainage in the central reservation
- Securing the central reservation
- Milling of bituminous road structure to a depth of about 15 cm
- Generation of the new surface structure by milling and relief of the cement stabilised base layer (milling depth 5 cm)
- Laying of a new bituminous structure (total thickness of 25 cm)
- Connecting and making up verges
- Supply and installation/moving and repositioning of the entire motorway fittings (crash barriers, guide posts, reflectors)
- Applying the final road markings
- Various repairs to bridge structures
- Application of surface protection
- Small area concrete repairs, refurbishment of joints and cracks, renewal of drainage pipes etc.
- Tactile milling
- Compaction of the reflectors (crash barriers / concrete barriers)
- Refurbishment and adaptation of the drainage and water containment systems
- Rehabilitation of hollows, troughs and drainage wells
- Lighting of the main carriageway and entrance and exit ramps from km 43.80 to 45.00

The reasons behind the refurbishment

The following factors played an important role in the choice of the refurbishment method, of the using milling of the entire bituminous structure and relief of the cement stabilised base layer:

- The stabilised base layer, in certain areas, had a higher compressive strength than a concrete slab. This had resulted in a disc formation due to the occurrence of cracks.
- The overlying asphalt structure was very hard and inelastic due to its rigid and high bitumen content.

These two factors restricted the elastic deformation in the upper layers, such that cracking of the road surface was visible after only a few years.

Relief using a shearing blade
Image: PORR AG

Surface after relieving stresses
Image: PORR AG

Road surface before refurbishment
Image: PORR AG

On this basis, ASFINAG decided to relieve the stabilised base layer. KAB was commissioned by PORR to carry out the relief work. This was performed with a shearing blade, whereby the drop height and the distance of shearing was varied according to the hardness of the layers. Verification of the stress relief was carried out by continuous compaction control (SCCC).

Construction measures

Drainage channels

Due to the wear and tear over the years, the existing drainage channels on the central reservation were no longer suitable, and the bolted system no longer functioned effectively. A total of 6.5 km of monoblock gutters had to be moved and connected to the existing and partially renewed drainage system in two phases of work totalling 13 days.

New relocated drainage gullies
Image: PORR AG

Earthworks

The existing soakaway pits, which in part had not been maintained over the years, had to be changed to meet statutory water requirements and a new calculation basis for sizing (due to the various occurrences of flooding away from the motorway).

In the area of the construction plot 6/53 the basin VB 45.62 had to be enlarged and the existing basin floor had to be raised.

The basins at km 45.800 and between km 48.722 and km 50.555 were abandoned and filled up to the existing ground level.

The former connection duct to the containment basin 13 was adapted and the bottom filter body of the containment basin renewed. All soakaway hollows on the A4 eastern motorway from km 48.970 to km 50.100 had to be widened.

Earthworks on soakaway pits
Image: PORR AG

Earthworks on soakaway pits
Image: PORR AG

Concrete repair
The total construction stage included four green bridges, which after examination by ASFINAG only showed isolated defects – despite being erected in the early 90s.

The bridges were refurbished as follows:

- Leaking cracks were closed by injection grouting.
- To a limited extent, existing corrosion damage to small areas of the reinforcement was repaired.
- The existing coating in the lower region (first 2 meters from the curb) on all vertical surfaces was removed completely by high pressure jet spray.
- Subsequently, a levelling layer was applied and then an acrylic coating was applied over the entire structure.

To avoid the individual tasks interfering with each other, the coating work was carried out using tunnel carts, and not with scaffolding as specified in the tender.

Small area rehabilitation measures
Image: PORR AG

Applying the coating
Image: PORR AG

Lighting and conduit
The contract also included equipping the Neusiedl am See industrial zone, section 43.8 to 45.0 km, with highway lighting conforming to current standards.

This included the four exit and entry ramps for the industrial zone intersection and the two ramps in the direction of Vienna at the Neusiedl am See intersection to the B50. Each ramp was fitted with 9 m high lamp posts and high pressure sodium lamps. The main carriageway was fitted with 12 m high lamp posts and the same type of light fittings.

In the course of excavation work for the lighting, it was found that the conduit needed to be renewed. This required the construction of 900 m of new conduit at depths of up to 2.50 m in just a few days.

Earth works for lighting including lamp post foundations
Image: PORR AG

Traffic management and asphalt paving
The execution of the construction work took place in four major phases. First of all a preparatory stage was carried out in March, in which the appropriate extensions and widening of all ramps and exits were made in order to be able to carry out the necessary re-routing of traffic.

A major challenge was the overlapping of construction phase 1 with construction phase 2 and the simultaneous refurbishment of the Gols / Weiden feeder road.

With these three areas coming together at the same time, 52,000 tonnes of asphalt had to be laid within the month of June. This was only possible through the collaboration of several asphalt plants, which also had the additional task of handling daily business.

Laying asphalt
Image: PORR AG

Laying asphalt
Image: PORR AG

Laying asphalt
Image: PORR AG

Summary
Despite the very tight construction period, the contractual bonus scheme for earlier completion could also be claimed for ten days. In this regard we also benefited from the good weather conditions in 2015.

Al-Wakrah stadium in Qatar

Largest contract in building construction history

The letter of award we received on 8 December 2015 made it official: PORR had been awarded the contract for the design and construction of the Al Wakrah Stadium by the Supreme Committee.

For PORR, this project marks the largest building construction contract in the company's history and is worth the equivalent of EUR 600 million.

Following more than one year of extensive processing in cooperation with our local partner Midmac and the Belgian Sixconstruct corporation, we managed to land this attractive contract with a range of value engineering suggestions that involve comprehensive advance services. After the project had been processed by PORR Qatar Construction, the Department for Large-Scale Building Construction Projects and PORR Design & Engineering were both heavily involved in processing.

Designed by celebrity architect Zaha Hadid, the stadium with its distinct roof construction will provide seating for some 40,000, its construction time will be 34 months and, as usual, it will feature respective rooms as well as VIP and VVIP areas. The contract also includes a dedicated power house.

Image: Supreme Committee for Delivery & Legacy

Romania: Finalization of the Beach Protection Measures at the Black Sea Coast

The project covering the rehabilitation of the Romanian shore of the Black Sea in the area between Constanta City and Mamaia South aims to implement the beach protection measures increasing dissipation of wave energy across the submerged and emerged cross-shore profile.

The beaches were consolidated with breakwaters in order to diminish the wave erosion force. The project started with the execution of designed sea-coast structures, made of massive crushed stone (between 50 kg and 8.5 t per piece), using over 90,000 tons of stone. Two existing breakwaters were rehabilitated and extended by 295 m and 205 m, respectively. Also, a 341 m long connection dike was built, as well as a 200 m long main groyne connected to the shore. One groyne is connected with the beach and six more groynes, each 85 m long and constructed from sand-filled geotubes, are buried within the recharged beach.

After the construction of the breakwaters and groynes ensuring the protection of the shoreline in Mamaia South area has been completed, the most important stage of the project started in September 2015: the sanding of beaches along a length of 1.2 km, extending their width by 140 m. The beach sanding was performed in only 9 days, working around the clock.

For this purpose, a trailing suction hopper dredger was used. The dredger was loaded with up to 11,000 m³ of sand – extracted at a distance of 10 km to the shore – per charge, then it sailed to the area with sinker lines.

Using the underwater piping with a diameter of 800 mm and a length of 1.4 km, the cargo was pumped ashore, where it was taken in and levelled by the equipment. The entire loading-unloading process of a charge lasted about 4.5 hours. In total, a quantity of 410,000 m³ of sand was brought from the sea.

With one of the first five projects for coastal protection in Romania co-funded by the EU, PORR succeeded to enter a new construction field, promising new opportunities for the future.

Image: PORR AG

Image: PORR AG

Image: PORR AG

Image: PORR AG

High-rise foundations – engineered by PORR

After PORR had successfully installed foundations for many high-rise buildings in Austria in recent years, the Foundation Engineering Department in 2015 has once again managed to land a range of foundation engineering contracts in this sector. The fact that it could acquire projects outside of the Vienna metropolitan area, where the most high-rise buildings are constructed, gives cause for even more joy. Thus, the Department could, for instance, successfully implement the project “Pema 2” in a difficult location next to the Westbahn railway tracks in Innsbruck. There, a tower 49m in height stands on three basement floors.

Shortly after that, we have started foundation work on the 55-m-high Perron high-rise building at Salzburg's new main station. Highly unfavourable lacustrine clay soil required the use of diaphragm wall excavation supports as well as foundation piles with a diameter of 150cm and a length of 58m on the foundation of what will become Salzburg's tallest building.

In Vienna, PORR's Foundation Engineering Department received the contract for specialist civil engineering work on the 102.5-m-high “Orbi Tower” by Swiss Town Consult. Highly "modest" soil and space conditions on location close to Prater junction on the A23 motorway which is currently under construction required a range of ingenious technical solutions.

The comprehensive foundation work on the two residential high-rise buildings at Monte Laa were also completed in summer. A common underground car park with up to five underground storeys supporting the two high-rise towers 65m and 100m tall are currently constructed at the building sites of S&P / GPA and ÖSW.

In the direct vicinity of Vienna's Main Station, we are currently completing the foundation work on the projects “A01 – The Icon” (88m) and “A05 – Park Apartments at Belvedere Palace” (60m) for our client Signa.

This vast number of technically superior high-rise projects once more underlines how extensive technical know-how combined with economical, value-creating solutions ensure sustainable success in the specialist civil engineering sector.

Perron high-rise building at Salzburg Main Station: Difficult diaphragm wall construction in direct vicinity of the platform
Image: PORR AG

Walking a technical borderline – Orbi Tower construction pit in the triangle between underground, flight control and motorway. Piles, jet grouting, anchors, steel reinforcements, dewatering system, project planning: everything from a single source.
Image: PORR AG

PORR SUISSE is awarded general contractor work on Bühlstrasse complex

After PORR had completed the first phase of the construction of the New Apostolic Church in Zofingen it received a contract for the construction of two modern residential buildings in the heart of Zurich by the same organisation.

The New Apostolic Church is active in Switzerland and dedicated to replacing old churches in need of renovation with modern and pretty buildings. Sometimes, when individual parishes are merged, they just utilise the lots, which is exactly what they will do in this case.

The project designed by Guignard & Saner Architekten from Zurich stands out by generating ample open-air space in addition to unique flat ground plans despite building on a space-restricted lot in an urban quarter with polygonal ground areas.

The two five-storey buildings (base storey, ground floor, 1st and 2nd floor and attic) will be constructed from concrete and clinker using the conventional mixed construction method. On the basement floor, an underground car park connects the two buildings. Grouped around a reinforcing staircase core made from concrete including a lift shaft with roof structure, one finds the entrance areas and, on the inside, the sanitary modules as well as the flats' storage rooms.

The project includes 34 flats and will encompass a construction volume some 10,000m³ as well as a floor space of 2,800m². Construction takes 17 months and started in January 2016.

Visualization
Image: Guignard & Saner, Zürich

Rumania: Expansion and Modernization at Oradea Airport

On 12 November 2015, as the first plane travelling the route Bucharest – Oradea landed, Oradea Airport was reopened.

The airport had been closed for traffic for 59 days, during which works were executed in a rate of 24 hours per day. The existing take-off and landing runway was entirely demolished and replaced with a new concrete structure.

The newly built runway is 2,100m long and has a width of 45m. The work rate was 2,000m³ of concrete per day, using two finishers especially designed for the laying of concrete slabs. A total of 300,000m³ of earthworks were executed and 60,000m³ of concrete were poured.

The runway is provided with turnaround platforms in both operating directions. The taxiways have a width of 18m and are framed by two shoulders of 3.5 m each. The boarding-landing platform is 266m long, 118.5m wide and provides the space necessary for the simultaneous stationing of 6 aircrafts.

The movement areas, such as the runway, the ALFA and BRAVO taxiways and the boarding/landing platform are all fitted with category II lighting systems. For gathering the rainwater from the runway surfaces, a new drainage system with a total length of 11,000m was designed and implemented.

An electrical substation was also built in order to serve all airport facilities and systems. By delivering the works in excellent quality and on time PORR ensured full client satisfaction.

Image: PORR AG

Image: PORR AG

Image: PORR AG

New Holiday Inn Express, Berlin-Alexanderplatz

In September 2015 the civil engineering department of the Berlin branch of PORR Deutschland GmbH received the contract from Münchner Grund Immobilienträger GmbH to build the new Holiday Inn Express Berlin Alexanderplatz at Klosterstrasse 48, corner Stralauer Strasse, in central Berlin. The hotel is being built in one of the oldest quarters of Berlin opposite the Stadthaus (Old City Hall), the Rotes Rathaus (Red City Hall), the Dutch Embassy and the Spree river, and not far from the last remains of the Berlin city wall.

As the general contractor, PORR Deutschland GmbH will erect this hotel with a total floor space of 7,070m² in 14 months. A total of 186 hotel rooms will be built on the upper floors. The ground floor will house the reception, a patio, a bar and a gastronomy area. The basement will have 13 parking spaces for cars and also be used for deliveries.

PORR Deutschland GmbH started construction work in February 2016 with the handover of the construction pit. The project is scheduled for completion by the end of March 2017. The building will be erected as a turnkey project apart from the building of the construction pit (incl. special underground work) and the furnishings.

The rectangular plot, 1,117m² in size, will be completely built over. An arcade passage will be built on the ground floor along the Stralauer Strasse to make the building fit into the streetscape.

A tunnel for the underground and protective structures are in the direct vicinity of the Holiday Inn Express. The tunnel runs along the plot boundary. This presents a special challenge to the site team in terms of the complex logistics.

The hotel building will close another space between buildings in Berlin, taking into account the pre-existing historic architecture and the conditions laid down by the Denkmalamt (office for the protection of historic monuments).

Visulisation Holiday Inn Express, Berlin-Alexanderplatz
Image: Visualisierung HIEX / ALBA / www.brainstormdesign.at

PORR SUISSE with substantial role in Zurich's new landmark

Realising another Europaallee lot at Zurich Main Railway Station

In January 2016 PORR Suisse has secured a major new tender: the planning and construction of lot F of Europaallee in Zurich as the design-build contractor for SBB Immobilien, one of Switzerland's most important property developers. Last year PORR was already entrusted with the realisation of the two lots B and D. Work on lot F has started in April, with the turnkey handover anticipated in March 2019. The tender is worth CHF 155m (around EUR 140m).

"The fact that our client has once again opted for PORR Suisse confirms the success of our ongoing cooperation so far – it is a true vote of confidence. It also shows that we have established ourselves as a powerful construction company in Switzerland", said Karl-Heinz Strauss, CEO of PORR AG, on the significance of the project. "Europaallee will be a trailblazing landmark for Zurich. We are realising three lots from a total of eight. This is an exciting project which once again allows us to showcase our experience and the quality of our work".

A closer look at lot F

The prestigious project has a gross floor area of around 47,000m² and a construction volume of 160,400m³. The basis is a project by Boltshauser Architekten, whose design emerged as the winner in a two-stage architectural competition. It involves a building complex with high quality architecture which does justice to all of the requirements of the central location in the heart of Zurich. In addition to a freestanding tower with 16 storeys, there will be a second structure with a four-storey base and two residential towers above it with six and ten storeys respectively. A total of 172 apartments as well as service areas, retail and restaurant space is set to come to life from April 2019.

All three of the lots B, D and F are being realised by PORR Suisse for SBB Immobilien. They are situated in a row along Europaallee between the Europa and Gustav-Gull squares. Together they form an attractive complement to the railtracks of Zurich Main Station.

Lots B, D (left back) and F (right front) form an attractive complement to the railtracks of Zurich Main Station.
Image: SBB Immobilien

The two structures of lot F offer space for 172 apartments, as well as service areas, retail and restaurant space.
Image: SBB Immobilien

PORR Polska Infrastructure to improve one of Poland's most important traffic arteries

Today the Polish General Directorate for National Roads and Highways (GDDKiA) signed an agreement to build a 16km section of the S8 with a consortium consisting of PORR Polska Infrastructure and Unibep. The construction project involves expanding the former road into a 2 lane expressway. Investment is around PLN 404.5m – equivalent to around EUR 92m.

"With this tender, PORR Polska Infrastructure has once again underlined its renowned technical expertise in infrastructure", said Karl-Heinz Strauss, CEO of PORR AG. "In addition to modern road construction, which is one of PORR's most important international export products, our specialists on the S8 will also demonstrate their expertise in related areas – this is the value added we offer our cus- tomers as a leading full service provider".

The S8 – more than just a road

The long-anticipated new construction of this section will close a gap in Polish road traffic. The S8 is one of the country's most important routes and, with an entire length of 560km, it links the major cities of Wroclaw, Lodz, Warsaw and Bialystok. While the old highway 8 was one of Poland's most dangerous stretches due to the high volumes of traffic, the new S8 should play an important role in transit traffic as part of the international traffic artery, the E67 from Prague to Helsinki.

During the projected construction period of 25 months, PORR Polska Infrastructure will also build two junctions, various crossroads, access roads, pavements, exits, hard shoulders and bus bays in addition to the 16km-long expressway. Added to this are bridge building works – a total of 21 structures, one of which has a length of 103m. The road construction will be complemented by a drainage system for the surface and recesses, rainwater drainage, sanitary sewage, noise barriers, anti-glare barriers, protective railings, elements for vertical and horizontal signage, fenced enclosures and road lighting.

Project data

Project type	Road section
Length	16 km
Tender volume	PLN 404.5m (around EUR 92m)
Tender awarded	02/2016
Contractor	PORR Polska Infrastructure and Unibep
Construction start	02/2016
Construction end	03/2018

Scope	Construction of approx. 16km expressway with 21 civil structures

After the successful construction of expressways in Poland PORR Polska Infrastructure S.A. will realize another exciting project with the 16km section of the S8.
Image: PORR AG

New apartment complex in Leipzig

12,000m² on seven storeys

A residential and commercial building comprising consisting of 70 rented flats and 2 business units is being built near MDR Media City in the popular Southern suburb (Suedstadt) district of the up-and-coming city of Leipzig.

The 7-storey building with a gross floor space of about 12,000m² will have an underground car park underneath the entire building. For the foundation work, the neighbouring existing gable end will have to be braced using high-pressure injection, in addition to the temporary ditch support using the so-called Berlin lining technique. In the shell construction, reinforced concrete will be used for the basement structure and limestone masonry from the ground floor upwards, except for the stairwells and lift shafts.

Large dormer windows will be a prominent architectural feature of the maisonette floor. The facade comprises a light-coloured thermal insulation composite system with canted elements which taper towards the window openings, giving the facade a vibrant overall appearance.

All the flats have patios leading onto the inner courtyard, balconies or rooftop terraces. The quiet inner courtyard located at the rear will be designed similarly to a garden and will provide play areas and benches as well as furnishing of an old tree population.
The Thueringen-Saxony branch of PORR Deutschland GmbH has been commissioned as the general contractor to carry out the turnkey construction work including the excavation pit.

Thanks to patios and balconies, every single apartment comes with its own feelgood factor.
Image: Marina Stankovic Architekten Berlin

“Am Mauerpark” – PORR Deutschland builds a new district in central Berlin

The Berlin branch of PORR Deutschland GmbH has been awarded three general contractor orders for the construction of a new district near the traditional Berlin Wall area in central Berlin.

In summer 2015 PORR Deutschland was awarded the first general contractor order for the construction of block E in the building zone “Am Mauerpark” in central Berlin. On 11th December 2015 PORR signed two further general contractor orders for blocks C and D.

Following intensive discussion and coordination we are extremely pleased that the three general contractor orders were signed within the context of cooperation commitments as agreed between client and contractor. The overall net volume for blocks C, D and E is 43 million euros.

Construction work on block E has started in January 2016, and work on blocks D and C has started staggered during the 1st and 2nd quarters of 2016. A total of 284 flats are being built, to different quality standards, as well as 193 student apartments. The new residential area also includes blocks A and B which are currently still under development by the investor. The overall development of the project is realized by the Groth-Group Berlin, which is also responsible for all the site development and road building measures.

Completion of the first blocks and the student accommodation is scheduled for August 2017.

Starting in January 2016 PORR Deutschland builds 284 flats and 193 student apartments in the new district.
Image: Fuchshuber Architekten GmbH

PORR Deutschland wins contract for the construction of the “Schlossquartier” in Kiel

In mid-December 2015, the property development company Norddeutsche Grundstücksentwicklungsgesellschaft commissioned PORR Deutschland GmbH to construct 82 rental flats and 131 owner-occupied flats in an exquisite location in the city of Kiel. The contract covers the turnkey construction of the residential buildings as well as the excavation pit and the execution planning. The volume of the order is around 40 million euros.

The plot is located between the historic Schlossstraße Kiel Castle and St. Nikolai’s church. Six residential buildings, with six to seven storeys each (including a stepped storey), are to be constructed on the 7,560m² plot and will enhance the attractiveness of Kiel city centre. Offices and commercial units are planned for the ground floor.

The group of buildings with a gross floor space of approx. 27,740m² will have an underground car park of about 6,467m² in size, providing 185 parking spaces.

The facing chosen for the interlinked building, comprising two buildings designated for rental flats and three for owner-occupied flats, makes it blend in harmoniously with its surroundings in the old town of Kiel. The solitary tower at Schlossplatz (“Castle Square”) offers space for a further 36 generously sized owner-occupied flats. In addition, the flats will have balconies or loggias or patios on the ground floor or rooftop terraces on the stepped storeys, which significantly enhance living quality.

As far as sustainability is concerned, the residential buildings will be built in accordance with the energy standard Efficiency House 70. In addition, the building project will fulfil the LEED gold certification requirements (Leed Core Shell 2009 V3 – Group Certification on Campus).

The project is scheduled for completion by the end of November 2017.

Until November 2017 82 rental flats and 131 owner-occupied flats will be built in the city centre of Kiel, located between Kiel Castle and St. Nikolai´s church.
Image: bloomimages

Sustainable buildings – powered by PORR

PDE has established itself as a leading expert in the field of sustainability

PORR Design & Engineering's Sustainability Group sees itself as a solution-oriented provider in the field of green & blue building services. With more than 70 projects in different performance phases, PDE has firmly established itself as one of the largest service providers in this sector.

Green & blue buildings are supposed to reduce the effect of built-up areas on human health and natural surroundings. They stipulate the conscious handling of raw materials, energy, water and other resources and focus on protecting the health of the building's users, their comfort as well as on improving productivity. They furthermore offer tools to reduce waste volumes, environmental contamination and effects on the surroundings during the construction activities.

While certified speculative large-scale projects amounted to some 15% in 2012, their portion had risen to well over 20% in 2014, when almost every fifth Euro was invested in sustainable real estate. Apart from the usability of the rentable area itself, these audits increasingly effect real estate values.

In this context, certification systems such as DGNB, ÖGNI, SGNI, LEED, BREEAM, TQB, minergie or klima:aktiv are used as measurable and presentable indicators.

The Sustainability Group currently has a team of six auditors and consultants for the DGNB family (DGNB, SGNI, ÖGNI), LEED, BREEAM, TQB or klima:aktiv and accompanies projects as early as the design phase. To support sub-contractor and general contractor projects during construction, a sustainability management system has been installed.

Three accredited CMVP professionals are available for commissioning – the systematic commissioning of HVACR systems – which is constantly growing in relevance. The regional distribution of the 10-strong team across the locations in Vienna, Berlin, Prague, Linz, Graz and (de facto) Munich is a major advantage when it comes to mass affluent business.

Besides the required specialist knowledge such as ecological material management for construction, renewable energy, environmental accounting or dynamic simulations of energy, comfort or daylight, the focus is on close and timely collaboration with construction operations.

Apart from system development work groups, the Sustainability Group is present in the specialist, certification and education committees of the ÖGNI (DGNB in Austria), constructively participates in the system development of SGNI (DGNB in Switzerland), is responsible for the technical and content-related interests of BREEAM in Austria and, being one of five selected companies, translates the American LEED System for the German-speaking regions.

PORR Polska Infrastructure to build new section of S6 in Poland

Tender worth around EUR 149m

Early March 2016 the Polish General Directorate for National Roads and Motorways (Generalna Dyrekcja Dróg Krajowych i Autostrad) has hired a consortium led by PORR Polska Infrastructure to build a section of the expressway S6. The tender relates to a bypass of the towns of Koszalin and Sianów; the tender volume is around PLN 645m (around EUR 149m). The planned construction period is 22 months.

“Along with the agreement signed just a few weeks ago for the 16km section of the S8, this tender is further proof of how much the authorities in Poland value the expertise, execution quality and adherence to costs and deadlines of our Polish colleagues”, said Karl-Heinz Strauss, CEO of PORR AG.

After the successful construction of expressways in Poland PORR Polska Infrastructure S.A. will realize another exciting project with the 21 km section of the S6.
Image: PORR AG

21km of road and 25 civil structures for the S6
The tender involves a section of expressway with a length of around 21km and with two lanes in each direction. In addition there will be five intersections, extensions of the neighbouring road network, service roads, passages and green bridges. 25 civil structures will be built in total, one of which will have a length of 70m.

In addition to the road construction, the consortium will also be responsible for noise barriers, environmental protection measures, telecommunications shafts, surface drainage systems, drainage ditches and rainwater basins. Complementary works relate to the lighting, safety features, traffic control systems and incorporating various existing pipes and cables.

Project data

Project type	Road construction
Scope	New construction of a four-lane bypass as part of the S6; 25 civil structures and complementary works
Tender volume	Around EUR 149m
Client	Poland’s General Directorate for National Roads and Motorways
Contractor	Consortium of PORR Polska Infrastructure and Polbud Pomorze
Construction start	March 2016
Construction period	Around 22 months

U4 modernisation on track

PORR Bau GmbH's Railway Construction Department wows with competence in all sectors

Construction work for the central piece of the U4 modernisation project: the main construction section, route section West 2016 – starts on 4 April 2016. These modernisation measures are necessary to bring this more than 100-year-old line and its station building up to date. Once completed, the U4 underground line will be more modern and reliable.

When it comes to volume, deadlines, the construction site's exposed location (sunken location of the tracks between the main artery Vienna west access and Vienna River) and the multi-trade scope of performance, the contract section U4 modernisation, track section West 2016, poses a special challenge.

In negotiations lasting several months, PORR Bau GmbH's Railway Construction Department could convince the client with its renowned performance capabilities, the best logistics concept, its extensive experience in handling complex infrastructure projects and the required competence in all sectors.

On behalf of Wiener Linien and under our leadership, the following construction measures are performed:

- Renewal of the track superstructure on the entire track section
- Installation of additional track connections
- Renewal and improvement of the track superstructure on the entire track section
- Cable work and drainage work
- Bridge construction work – arch rehabilitation Hütteldorf ramp
- Stations Ober St.Veit, Unter St.Veit, Braunschweiggasse, Hietzing and Schönbrunn (Renewal of platforms and platform edges, rehabilitation of staircases, rehabilitation and construction of new operating rooms)
- Renewal and adaptation of turnaround system Hietzing and the operation catwalk

This work requires a total closure of the area between Hütteldorf and Hietzing between 30 April and 1 July 2016 and additionally to Schönbrunn between 2 July and 4 September 2016.

Besides the contracted construction services, traction work (conductor rail) and the required installation work for controls and operation will be performed in the framework of this total closure. Once completed, Wiener Linien will start its trial operation.

The main part of the contracted construction measures is to be completed within just 13 weeks. That's why it is necessary to perform construction work in continuous operation (Monday to Sunday, around the clock) with several work peaks with all trades. At peak times, more than 300 workers will be present at the construction site.

Image: Wiener Linien / Johannes Zinner

Image: Wiener Linien / APA-Grafik

Image: Wiener Linien / Raimund Appel

Österreichische Betondecken Ausbau GmbH founded as subsidiary

New concrete slab construction

In order to be able to completely cover all services regarding concrete slab construction, Österreichische Betondecken Ausbau GmbH (ÖBA) was founded as a subsidiary of PORR Bau GmbH.

Österreichische Betondecken Ausbau GmbH is and has always been deeply involved in the development of different application methods of concrete slab construction on Austria's roads.
Furthermore, ÖBA possesses vast expertise in other areas of concrete construction. Its broad scope of services includes concrete slab construction, soil stabilisation, grouting, repair and surface technology as well as special concrete construction in the whole of Europe.

Concrete slab installation on A9 Pyhrnautobahn motorway in Austria
Image: PORR AG

Its various sections offer the following services:

Concrete slab construction

- Concrete slab construction (mechanically and manually) in the road construction sector and in the outside facilities building construction sector
- Curb construction using the slip forming method
- In-situ concrete guide wall using the slip forming method as well as rehabilitation
- Side walkways / invert concrete in tunnel construction using the slip forming method (poss. with troughs)

Soil stabilisation using the mixed-in-place method

- Using binding agents (cement, base layer binding agent, Cinerit, bitumen, lime, etc.)
- Mixing the subgrade with the existing asphalt overlay

Grouting, repair and surface technology

- EP-Grip
- All kinds asphalt and concrete grouting tasks
- Joint sealing using hot casting compound, cold casting compound and joint profiles
- Grinding
- Grooving
- Grout rehabilitation
- Rehabilitation of cracks in concrete pavement and asphalt pavement
- Concrete pavement rehabilitation
- Rehabilitation of crushed asphalt
- Fast-reaction concrete (2 hours to 6 hours) in road construction
- Stiffening ribs

Berlin: tunnel rehabilitation underneath Alexanderplatz

Complete overhaul and conversion in the course of new U5

In February 2016, the Berlin Transport Authority (BVG) awarded PORR Deutschland's Berlin Infrastructure and Construction Engineering Department the contract for the complete overhaul and conversion of the existing U5 tunnel under Alexanderplatz.

In the course of the reconstruction of the U5, the existing tunnel (“Alextunnel”) between the underground station Alexanderplatz (in service) and the newly built underground station Berliner Rathaus needs a complete overhaul and afterwards it will be converted on two levels.

The balloon loop and positioning system adjoining the underground station Alexanderplatz had been built in the 1930s as a four-track tunnel hall.

The tunnel structure is some 15 metres wide, between 4.7 and 8.9 metres tall and some 350 metres long. At the end of the existing tunnel structure (Jüdenstraße), the system is directly connected to the new station Berliner Rathaus (BRH), closing the gap.

This station will feature two track levels: the upper level with the platform and the sectional tracks (BRO) and the lower level with a four-track alignment facility (BRU).

The contract worth EUR 11.1 million includes the following services:

- Dismantling the existing positioning system and revitalisation of the existing structure including all conversions required for the track switch installation
- Installation of a ramp/platform table construction to branch the tracks onto two levels as well as construction of new track and catenary systems
- Repairing the surface of the existing structure in the area of the future ramp/platform table construction through removal, reinforcing and re-surfacing of the walls and tunnel floor

View inside the existing tunnel
Image: PORR AG

Project data

Company	PORR Deutschland GmbH, Berlin branch
Type of project	Transport route construction
Start of construction work	April 2016
End of construction	December 2018
Client	Berlin Transport Authority (Berliner Verkehrsbetriebe – BVG)
Location	Germany, Berlin

Railway construction in Vorarlberg – Comprehensive modernisation of Lustenau´s railway station on track

A consortium consisting of TEERAG-ASDAG AG and PORR Bau GmbH's Railway Construction Department was awarded the contract for the reconstruction of Lustenau´s railway station. The contract volume amounts to approx. EUR 8.5 million.

The groundbreaking ceremony on 22 February 2016 marked the official start of construction work. By late 2017, Lustenau will have a contemporary and handicapped-accessible mobility hub pooling all modes of traffic at the railway station.

As one of the first tasks, the northern platform area will be equipped with a new underpass. Additionally, three passenger lifts, one each on the western and eastern side of the underpass and a third giving access to the new platform, will provide handicapped-accessible ways. At the same time as construction of the underpass starts, work on the future centre piece of Lustenau´s railway station – a 160 m-long new island platform 55cm above the rail level – will also begin. A 620m-long noise protection wall built on the side of Bahngasse will protect Lustenau's residents from excessive disturbance.

As one of the first steps, however, the old platform must be demolished in parts. Starting in 2017, a temporary platform will be built and will allow ongoing railway services with about 56 trains stopping at the station every day. Furthermore the entire station area will be equipped with a tactile guidance system for blind and visually impaired people. Once completed, passengers will find a new bus terminal with five stopping spaces – three of them roofed – for the local bus transport system. Bicycle riders will enjoy one bike & ride facility each on the western and eastern side of the station providing a total of 170 parking spaces, of which 50 are lockable bicycle boxes. Furthermore, the new station will feature a park & ride facility with 34 car parking spaces for its customers.

Project data

Project	Reconstruction of Lustenau´s (Vorarlberg) railway station
Client	ÖBB Infrastruktur AG
Order volume	approx. EUR 8.5 million
Start of construction work	February 2016
Overall completion	December 2017
Construction measures	160m-long platform with two platform edges, Weather-proof waiting areas equipped with benches, 55m-long pedestrian underpass as well as three passenger lifts, Bus terminal with five stopping areas for regional bus transport system, Two roofed bike & ride facilities for 170 bicycles, 620m-long noise protection wall

Groundbreaking ceremony at the end of February – the official start of the reconstruction of Lustenau´s railway station. Provincial Councillor Johannes Rauch, ÖBB Head of Infrastructure Franz Bauer and Mayor Kurt Fischer (from left to right) attended.
Image: ÖBB

PORR Polska Construction awarded two new railway construction contracts

PORR Polska Construction's Railway Construction Department has managed to land two new contracts with PKP PLK (a state-owned company responsible for maintaining and modernising the Polish railway network).

Within just three days, PPC was awarded two contracts worth some PLN 42 million (approx. EUR 10 million).

The construction contract concerning the replacement of the signal box "Biała Rawska" on the LK 4 main line connecting Warsaw with the metropolises of Katowice and Krakow in Southern Poland was signed on 16 March. Besides the complete replacement of the signal box building, the scope of services includes all control and safety systems, the installation of four R-1200 switches including base layers and catenary adjustment. The challenging switch installation work is to be carried out during a 5-day closure in August, whereby the pre-installed switches are supplied by an Austrian manufacturer on special switch transport cars.

The construction contract covering modernisation measures on another section of the 272 line was signed on 18 March in Poznań. In the last two years, PORR has already successfully implemented two projects worth some PLN 240 million (approx. EUR 57 million) on this line that connects Poznań with the metropolitan region of Upper Silesia. The current contract worth PLN 24 million includes the renewal of 15km of track superstructure, the rehabilitation of five railway overpasses, the construction of three platforms as well as catenary regulation.

All services are performed in the framework of "Design & Build" contracts. In the relatively short railway construction history of PORR in Poland, these new contracts already bear the numbers 19 and 20. Since October 2011, PORR has successfully implemented projects worth PLN 810 million (approx. EUR 193 million) for the Polish State Railways.

Since the Polish State Railways are already developing plans for further large-scale investments in the coming six to seven years, supported by EU funds amounting to PLN 67 billion (approx. EUR 16 billion), one can hope that the Polish railway construction landscape will continue to develop positively.

Since October 2011, PORR has implemented railway construction projects worth PLN 810 million (approx. EUR 193 million) for the Polish State Railways.
Image: PORR AG

PORR has already implemented 18 railway construction projects in Poland and this positive trend is expected to continue.
Image: PORR AG

Major order at Vienna International Airport

TEERAG-ASDAG, lower austria branch, overhauls runway system 11/29

In the course of a multi-stage negotiation process by Vienna International Airport, the services specified in a call for tender to carry out works in the course of the general overhaul of the 11/29 runway system were awarded to a consortium under the commercial leadership of TEERAG-ASDAG, Lower Austria branch, a few weeks ago. The tender's net worth is around EUR 20 million.

The first section of the 11/29 runway was built at the end of the 1940s and expanded eastwards in the 1960s. The runway has a total length of 3,500m. After a training of all 1,600 staff members and subcontractors involved in the construction, the resurfacing work on the 210,000 m² surface has started on 6 April 2016 and lasted until 24 May 2016. As airport operations are ongoing, the majority of the work will take place when there is no traffic. Specifically, work will be carried out on 30 nights between 9pm and 7am as well as on six weekends from Friday 9pm to Sunday 4pm, with full closure of the runway. In total around 100,000 t of asphalt will be used.

Following the successful works "Overhaul of runway 16/32" in 2013, the "Freight apron" in 2014 and the "Fillet broadening Lima – Mike/overhaul Mike" in 2015, TEERAG-ASDAG has succeeded in acquiring another major order in airstrip construction.

Runway overhaul
Image: PORR AG

PORR Deutschland to build “La Tête” office building in Düsseldorf

Following a bid phase of just three months, on 18 April 2016 the Düsseldorf branch office of PORR Deutschland has been awarded the tender for the design and turnkey construction of the “La Tête” office building by Aurelis Asset GmbH. The building will have a gross floor area of around 37,000 m², with completion planned for the end of October 2017.

“This interesting project continues the series of pleasing building construction tenders in Germany which we have recently acquired. The short bid phase proves that PORR understood the client’s intentions right from the outset. The deciding factor was the professional and innovative interplay of the Düsseldorf branch office for the complete construction works, together with our Group subsidiaries PORR Design & Engineering for optimising the building’s technical fittings and features, and ALU SOMMER for building the facade”, said Karl-Heinz Strauss, CEO of PORR AG.

The “La Tête” office building completes Düsseldorf’s “Le Quartier Central” in the heart of the city.
Image: Aurelis Real Estate GmbH & Co. KG

Completing Düsseldorf’s “Le Quartier Central”
“La Tête” will be built on the final construction lot in “Le Quartier Central”. It will have two basement floors and eight full storeys above ground – and it’s already got impressive credentials: there are plans for a “Skygarden”, a generous foyer, a casino and a landscaped inner courtyard. What’s more a company kindergarten will be realised for the main tenant – the Handelsblatt publishing group. A genuine eye-catcher has also been planned for the sculptural facade – an info screen measuring around 80 square metres should soon broadcast the latest business news from Handelsblatt.

The Georg von Holtzbrinck School for Business and Finance Journalism will also be housed in “La Tête”.

Project data

Project type	Building construction
Scope of services	Construction planning including detailed design of an office building with two basement floors and eight storeys above ground with a gross floor area of 37,000m²
Client	Aurelis Asset GmbH represented by Aurelis Real Estate GmbH & Co. KG
Contractor	PORR Deutschland GmbH / internal service team of the Düsseldorf and Stuttgart branch offices
Construction start	April 2016
Completion	October 2017

ÖBB-PORR slab track system for the Koralm railway

Success with our own technology

The Austrian Federal Railways (ÖBB) continue to rely on the railway construction expertise of PORR Bau GmbH. Under its leadership, 3276m of railway line will be installed using the “ÖBB-PORR elastically supported slab system”.

Construction work on the slab tracks of line 1 in the Hengsberg Tunnel and the Weitendorf FW12 underpass, Oberbau 66.03 section has started on 5 February 2016. Line 2 was built also under the leadership of PORR Bau GmbH in 2010 as a slab track and has been operational since December 2010.

The following concrete and surface works will be carried out for ÖBB:

- Line 1 slab tracks
- Track cover with load bearing sound-absorbing slabs
- Switch in slab tracks
- Light mass-spring system in the Weitendorf FW12 underpass
- Load distribution slabs
- Pre-ballasting on the connecting line

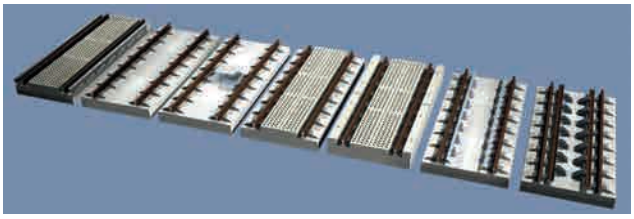
The main construction work on the slab tracks will be carried out over a 7 week period from 11 July to 26 August 2016 during which time the tracks will be closed. The work will mainly be carried out on rails in shifts.

This construction work is a part of the new Koralm Railway Line project between Graz and Klagenfurt. Construction of the Koralm Railway Line began in 1999. The new 130km-long line will be completed in 2023. The rail journey from Graz to Klagenfurt will then only take 45 minutes, with trains reaching speeds of up to 230km/h.

The PORR Bau GmbH Railway Construction Department is currently also carrying out engineering and gravel surfacing works on other sections of the Koralm Railway, such as the Koralm tunnel KAT3 and 70.12 Althofen-Klagenfurt construction projects.

The ÖBB-PORR slab track system is the control system for Austrian Federal Railways. PORR Bau GmbH was chosen as the system supplier for the production of track support slabs for another contract.

The ÖBB-PORR system has been used for metro, local and regional transport projects in the following countries: Austria, Germany, Slovenia, Slovakia, Czech Republic, Great Britain and Qatar.



Different types of ÖBB-PORR track support slabs
Image: PORR AG

ÖBB-Porr slab tracks with load bearing sound-absorbing slabs
Image: PORR AG

Track support slabs in storage, ready for immediate use
Image: PORR AG

PORR enters UK

Joint venture of Skanska, PORR and A.Hak to realise Humber pipeline project

By the end of May 2016 National Grid has awarded a joint venture comprised of Skanska UK, PORR Bau GmbH and A.Hak, the contract to design and build a replacement high pressure gas pipeline within a tunnel, underneath the River Humber from Paull to Goxhill, replacing the existing pipeline which lies on the riverbed. The joint venture will provide full design and construction of the 5km tunnel, inserting a single string of 42” steel pipe and connect into the above ground installations (AGIs) at Paull and Goxhill. The three year project is estimated to cost around GBP150 million (approx. EUR 186 million). The contract has been let, subject to planning consent for the replacement pipeline from the Planning Inspectorate, which is due in September 2016.

Karl-Heinz Strauss, CEO of PORR, said: “The tender is a huge vote of confidence – after all, the Humber Pipeline is an exciting large-scale project requiring extensive knowhow and technical expertise. The requisite competencies are perfectly bundled in our joint venture. Here we see decisive added value for our client, National Grid. The pipeline is our first project in Great Britain. Our cooperation involves strong local partners – a strategy which has paid off and also opens up opportunities on an attractive new market on our PORR map”.

Phil Croft, National Grid’s senior project manager said, “This pipeline will be the longest gas pipeline in a tunnel, inserted in a single string in the world. To do this we need partners with experience and a proven track record. The joint venture of Skanska, PORR and A.Hak was able to demonstrate their expertise and knowledge throughout the tender process, giving us the confidence that this was the right company to build this tunnel and pipeline in such an environmentally sensitive and commercially busy river.”

On behalf of the joint venture, Colin Nicol, Operations Director, Skanska said: “We are delighted to be awarded this contract. The joint venture was formed to bring together international expertise to deliver, in an innovative, sustainable and collaborative way, a tunnel that will protect the pipeline for the long-term, helping National Grid to provide a vital service to millions of people.”

The pipeline in detail: a 5.4km long connection between Paull and Goxhill

The River Humber pipeline is part of the national transmission system – connecting the import terminal at Easington, on the East Yorkshire coast, to the wider network and delivering gas to millions of customers throughout the UK.

Over time, the tidal patterns of the River Humber have eroded the river bed covering the existing pipeline, leading to parts of it becoming exposed. An innovative short-term engineering solution to protect the pipeline by covering exposed areas was put in place in 2010. Because of the importance of the pipeline, National Grid is now looking to construct a new pipeline in a tunnel underneath the River Humber from the above ground installations (AGIs) at Paull, east of Hull and south of the river at Goxhill, as a long-term replacement.

The pipeline will connect to the existing National Grid AGI sites at Paull and Goxhill and will be 3.63 miles (5.4km) long, of which 3.18 miles (5km) would be tunnelled.

It is anticipated that it would be up to 42" (1055mm) in diameter and that it would transport natural gas at a pressure of 70barg.

Project data

Length of pipeline	5.4km / 3.36 miles
Diameter of pipeline	42 inches (1,055 mm)
Length of pipeline tunnelled	5km / 3.18 miles
Depth of tunnel	35 m
Width of tunnel	3-4 m
Length of construction	35 months (approx.)
Length of time spent tunnelling	12 months (approx.)
Gas pressure	70 barg

Albania: PORR'S Foundation Engineering Department at lofty heights – challenging work on vertical wall

After PORR Bau GmbH's Department for Foundation Engineering had already completed comprehensive jet grouting work on the power station project Komani Dam which is executed by PORR Bau GmbH's Infrastructure Department by order from KESH Sh.a. Albania Power Corporation last summer, our Rock Technology Department this year secured the two rock faces at the dam's base.

Based on a concept created by a Swiss planning office, we offered and finally implemented an alternative solution in cooperation with the engineering office Brandner. The rock support measures included rock stabilisation by means of wire nets up to a height of some 30m using a high-performance GEOBRUGG mesh system in combination with GEWI system rock nails 3 to 9m in length.

Thanks to excellent collaborations with the experienced PORR employees on site in Albania, all bureaucratic and customs-related hurdles could be taken and work started on schedule. Once the fixed points for the safety cables had been drilled, our experts used a drilling lorry with a reach of more than 30m to drill, install and press- fit the rock nails. Subsequently, the net rolls were hooked up and lowered, the nail heads were mounted and the border cables were tightened. All these jobs were carried out by our specially trained personnel while hanging from ropes at heights of up to 50m.

In closing I would like to stress that cross-departmental cooperation worked flawlessly and that the client was highly satisfied with the project's execution, with regards to both technical implementation and deadlines.

Rock stabilisation by means of wire nets at BVH Komani Dam in Albania
Image: PORR AG

Creation of fixed points for safety cables
Image: PORR AG

Creation of drill holes for the rock nails by means of drilling lorry
Image: PORR AG

Creation of drill holes for the rock nails by means of drilling lorry
Image: PORR AG

Creation of drill holes for the rock nails by means of drilling lorry
Image: PORR AG

Completed hihg performance net
Image: PORR AG

Completion of rock stabilisation by means of wire nets – working while suspended from ropes
Image: PORR AG

Completion of rock stabilisation by means of wire nets – working while suspended from ropes
Image: PORR AG

PORR to build prestige project in Poland with Józef Piłsudski Museum

Order volume: EUR 16.5m

The Józef Piłsudski Museum in Sulejówek and the PORR subsidiary in Poland signed a contract for the continuation of the project and the construction works for the museum and educational centre on 23 May 2016. PORR has guaranteed completion within a 18-month period, which will allow the handover of the modern museum and educational centre at the beginning of 2018. The project, which is financed by the Multiannual Government Programme, not only includes the new construction of the museum, but also the restoration of the heritage-protected Willa Bzów and the revitalisation of the green areas. The tender is worth EUR 16.5m.

Karl-Heinz Strauss, CEO of PORR AG: “The tender for the Józef Piłsudski Museum shows that PORR enjoys huge confidence in Poland. PORR has already shaped Warsaw’s cityscape with buildings such as the Hotel Intercontinental or the Warsaw Finance Centre; this new project gives us the opportunity to prove our multifaceted skills and expertise once again”.

The design & build tender involves the construction of the museum and educational centre with three floors of utility underground and three storeys above ground. The overground area of the building consists of two cuboids of identical height. Work on the permanent exhibition for the new museum building is underway parallel to the construction works.

Visualization of the interior of the exhibition
Image: RALPH APPELBAUM ASSOCIATES INC., WXCA Sp. z o.o., PLATIGE IMAGE S.A.

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Koralm Tunnel, construction stage KAT 3, © Toni Rappersberger

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