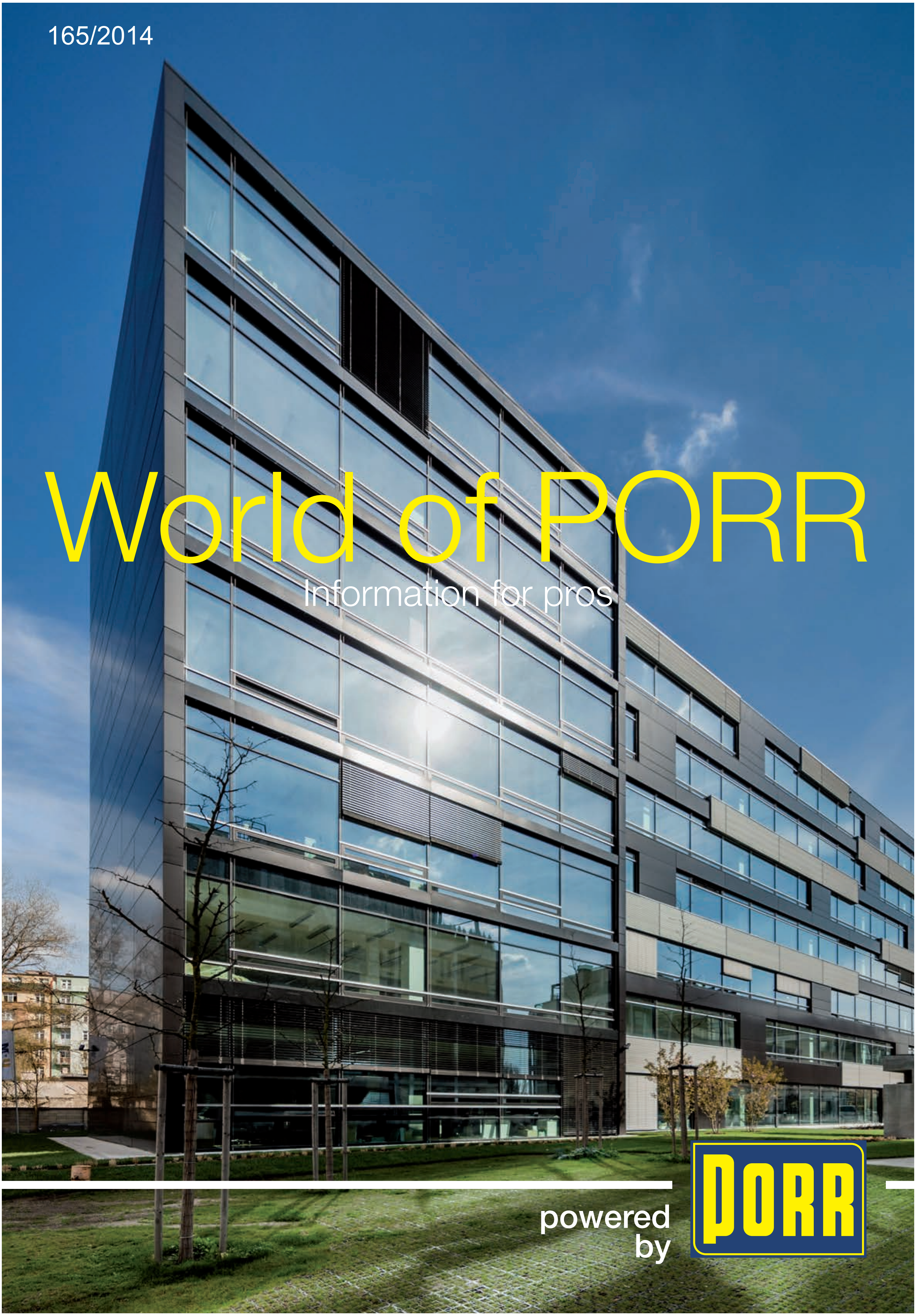
165/2014

World of PORR

Information for pros



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PORR Updates

CEO Karl-Heinz Strauss

CEO Karl-Heinz Strauss
Image: PORR AG

Dear Readers,
esteemed Business Partners,

Welcome to the "World of PORR"!

As another year draws to a close, I am happy to once again have the honour to present to you the latest issue of our specialist journal. This time, our editorial team has deliberately chosen a broad range of different projects. From building and bridge construction projects to foundation engineering projects: Fourteen new projects and nineteen update reports on existing ones are being presented to give you a comprehensive overview of the technical challenges our employees face every day. Furthermore, they showcase our approaches to finding solutions and how we master even the most complex tasks as a perfectly attuned team.

I must admit that I am looking forward to every new issue of "World of Porr". Not just because it is interesting for me to see our most important projects displayed in a compact and professional way. But also because each issue marks a true joint effort: More than thirty male and female PORR experts have participated as authors in this year's edition. Considering the fact that the task of writing their specialist articles added time to their already highly busy workdays, our male and female colleagues' extraordinary commitment and dedication fills me with great pride. I would like to take this opportunity to most cordially thank all male and female authors who have contributed in the past and will do so in the future.

But what exactly awaits you in the latest issue? For example, you will read how PORR's construction of the new storage reservoir in Vienna's Simmering district will protect the residents of the Simmeringer Haide neighbourhood from future floods. Or, how PORR forges entirely new paths in apprentice training with the "PORR apprentices' construction site" project in Styria and how the company was awarded the Anton-Benya-Award for it by Werner Faymann. As you can see, exciting reports await you.

I wish you an interesting read and, in the name of the entire PORR group, a peaceful end of the year and a happy, successful New Year!

Kind regards,

Karl-Heinz Strauss
CEO

Consortium main station B.02

Construction of the underground car park (G7) as basis for two residential buildings (G3 and G4)

Andreas Samer

Commissioning

In April 2013, the consortium main station B.02 – made up of Porr Bau GmbH (commercial management) and the former Alpine Bau GmbH (technical management) was commissioned with the construction of several buildings. It received the order to construct a three-storey commercial underground car park by B.02 Garagenvermietungs GmbH. Additionally, Gemeinnützige Bau- u. Siedlungsgesellschaft MIGRA Gesellschaft m.b.H. and Wohnbauvereinigung der Gewerkschaft öffentlicher Dienst gemeinnützige GesmbH (WBV-GÖD) placed an order for two residential buildings with a total of 113 privately financed rental and freehold apartments with the consortium. The property is located at Gerhard-Bronner-Straße in Vienna's 10th district, opposite the entrance to the newly constructed Vienna main railway station.

The underground car park (building unit G7) with a length of 100 m and a width of 45 m, extends across the entire site and includes 324 parking spaces on three storeys.

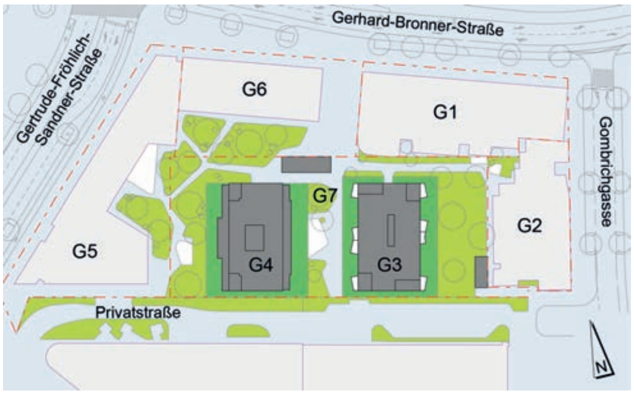
The residential buildings situated above (building units G3 and G4) consist of a ground floor and seven top floors, feature 113 apartments (2 to 4 rooms) and were conceptualised as low energy buildings. The apartment size ranges from 50 m² to 100 m².

Project participants

Prior to the first work deployment to the construction site, site management was made aware of the initially complicated client structure. This problem, however, took a turn and blew over in the course of the building process. As early as from the first project meeting, the site management had to deal with the task of having to collaborate with three different clients, three different architecture offices, two different building service equipment planners and two different electrical consultants. Only the statical calculations and their planning for all building units were performed by one and the same civil engineering office.

Building site

The consortium main station B.02 also needed to familiarise itself with the confined spatial conditions: to the south, the building site is surrounded by a private road we were prohibited from using. On the other sides, it is surrounded by other building plots which meant that access and storage were a logistic problem that had to be solved as quickly as possible. Thankfully, an adjacent plot's storage grounds could be rented due to delays which provided a solution for both the access and storage issues. Since work on the building units G1, G2 and G6 commenced more or less at the same time at the building site, constructing in tight spaces was inevitable.

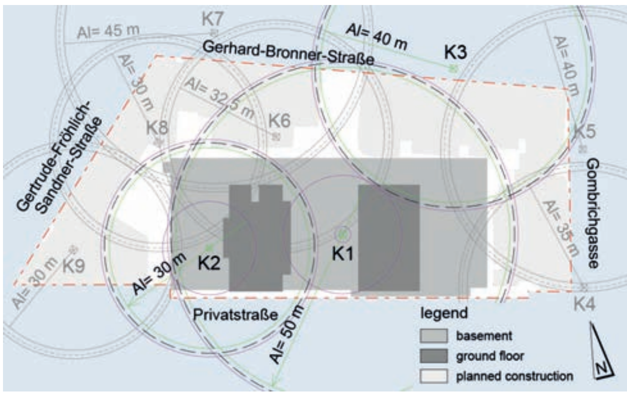


Position plan: Construction site conditions at building site B.02
Image: PORR AG

Also the contractual situation, initially caused the site management quite a headache since an "extensive" servitude agreement of approx. 400 pages existed between all the clients operating at building site B.02 in which both the interfaces on the one hand and the intermediate and completion deadlines on the other hand were determined.

Crane concept

In order to satisfy all general contractors and clients present at the site, it was necessary to work out a crane concept and to subsequently synchronise it with all the general contractors at the site to achieve their safety distance and assure their optimal efficiency. Finally, nine cranes were positioned in an area of 10,000 m². The individual cranes had to be installed correspondingly high and their installation was highly complex.



Crane concept
Image: PORR AG

Execution of construction work – underground car park

Turnkey construction of building units G3, G4 and G7 could begin on 8 April 2013.

After a short building time, the consortium was confronted with another challenge involving the construction pit support system. Contrary to all predictions, an anchoring of the bored pile wall along the private road was not possible. Also in this case, an economical and time-saving solution for construction pit support had to be found at short notice.

Swiftly, concrete reinforcements for the bored pile wall were envisaged which were finally executed by means of the cut-and-cover method. For this purpose, it was necessary to lower the soil level to the level "ceiling above second basement floor" and to subsequently manufacture an approx. 615 m² area of the ceiling above the second basement floor which was supported with auxiliary supports. Additionally, this ceiling was supported by means of a so called "Erdberme" (an earth wall) along an approx. 13 m wide section. After completion of structural work, the auxiliary supports were completely removed.

Construction pit reinforcement by means of concrete grates and protruding platforms
Image: PORR AG

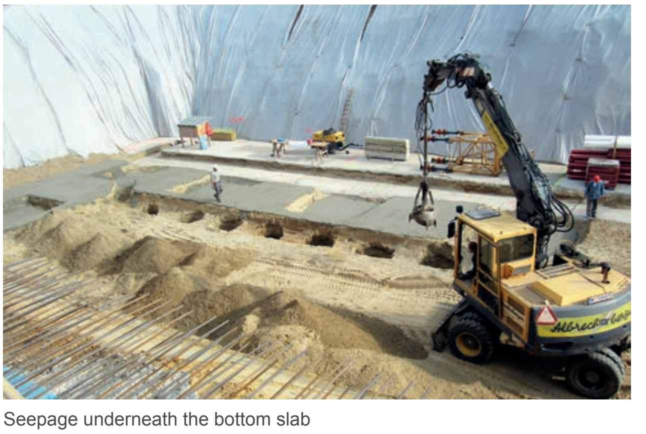
Construction pit reinforcement by means of concrete grates and protruding platforms
Image: PORR AG

Construction pit reinforcement by means of concrete grates and protruding platforms
Image: PORR AG

According to statics, the "Erdberme" could only be removed after the merger of the "reinforcement horizon" and the actual building.

The resulting time delay needed to be made up for and approx. 50,000 m³ of excavated soil needed to be removed from the construction pit to be able to commence work.

After this, the topic of "seepage" was tackled. In order not to flood the entire building site, a seepage concept was worked out which stipulated to insert some 700 m³ of drainage gravel into 66 draining wells (diameter: 1.2 m; depth: 1.5 m; centre to centre distance: 2.5 m) underneath the bottom slab in order to drain the water in a targeted way. The individual seepage wells were connected by means of gravel-filled drain trenches with drainage tubes (DN 300). The overall seepage length was approx. 188 m.



Seepage underneath the bottom slab
Image: PORR AG

Seepage underneath the bottom slab
Image: PORR AG

Seepage underneath the bottom slab
Image: PORR AG

With the bankruptcy of the consortium partner Alpine Bau GmbH, the next problem waited just around the corner. After formal clarification, Porr Bau GmbH assumed both technical and commercial management in the consortium and represented both roles towards clients and project participants.

When the carcass reached the ceiling above the second basement floor, the reinforcement sections already located at the height of the final ceiling were connected to the other parts of the ceiling. In the course of this, bar steel items with diameters of up to 40 mm were installed in large numbers.

Subsequently, earthwork below the "reinforcement horizon" could begin and the car park's carcass was finished.

Earthwork below the "reinforcement horizon"
Image: PORR AG

Earthwork below the "reinforcement horizon"
Image: PORR AG

Earthwork below the "reinforcement horizon"
Image: PORR AG

Cut-and-cover construction method
Image: PORR AG

Cut-and-cover construction method
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Image: PORR AG

Cut-and-cover construction method
Image: PORR AG

Residential complex

Due to these considerations, the topping-out ceremony for the residential complex could be celebrated after just nine months of construction on 24 January 2014. The traditional ceremony was celebrated on 6 March 2014 in the presence of many client representatives and politicians.

Carcass
Image: PORR AG

Carcass
Image: PORR AG

Finishing work

The architects attached great importance to optimal utilisation of the usable living spaces in the units G3 and G4. For this purpose, metal stud walls with just 8 cm thick drywall coverings were used predominantly. On these buildings, also the façade provides a visual highlight. For instance, sloped guardrails, cantilevering windows (partly built around corners) and sliding shutters for privacy and sun protection in front of the balconies were installed.

Thanks to excellent collaboration and cooperation between all clients, architects, consultants and subcontractors, finishing work could be completed in eight months. After just 17 months of construction, the car park was handed over to WIPARK, which had purchased the car park in the meantime, on 20 August 2014.

The two residential buildings, too, were inaugurated in late August 2014.

Project data

Overall construction period	17 months
Excavated earth	50,000 m³
Concrete	13,000 m³
Reinforcements	1,200 t
Gross floor space car park	11,100 m²

Gross floor space residential buildings	approx. 7,400 m²
Commercial car park	Three-storey underground car park with 324 parking spaces
Total number of floors	11 floors (third basement floor to 7th upper floor)
Car park client – building unit G7	B.02 Garagenvermietungs-GmbH
Residential building client – building unit G3 (60 apartments)	Gemeinnützige Bau- und Siedlungsgesellschaft MIGRA Gesellschaft m.b.H.
Residential building client – building unit G4 (53 apartments)	Wohnbauvereinigung der Gewerkschaft öffentlicher Dienst gemeinnützige Gesellschaft m.b.H.

Photographs of completed construction


Car park
Image: PORR AG


Car park
Image: PORR AG


Building unit G3
Image: PORR AG


Building unit G3
Image: PORR AG


Building unit G4
Image: PORR AG


Building unit G4
Image: PORR AG

Construction scheme Thumegg 7

Luxury apartments at the foot of Hohensalzburg castle

Benjamin Buttinger

Porr Bau GmbH, Salzburg branch, was commissioned with the construction of two new blocks of apartments and the modification of a residential and office building including a commonly used underground car park.

Ground layout office / building A / B / C
Image: www.Thumegg7.at | www.planquadr.at

The project

Project Thumegg 7 is located at the foot of Hohensalzburg castle in the city's Nonntal valley district which itself is only a few minutes away from the old part and the Salzburg Festival. Despite being this close to the centre, the outer Nonntal valley captivates with its many green areas and its residential neighbourhood style – this makes this district one of the most popular but also most expensive in Salzburg.

The complex consists of an existing building turned into an office building and a residential block with twelve residential units (building A) and two newly erected residential block with five (building B) and four (building C) units.

Panorama shot of building A (left) and building B (right)
Image: Chris Hofer

Construction

Construction began in March 2013 and was completed in a construction period of roughly 16 months.

Porr Bau GmbH performed the following work in its role as a general contractor:

- Earthwork
- Foundations/sheet piling
- Master builder work
- Interior plaster
- Screed
- Thermal insulation composite system
- Metal work
- Interior doors
- Bituminous surfacing
- Plumbing work
- Terraces
- Outdoor facilities

Modification of building A

Prior to constructing the residential block, three buildings located on the building site had to be demolished.

After this clearing work, the actual modification of building A began. The existing building was entirely gutted so that only the outer walls remained.

First, the existing building's roof which was executed as a coffin lid construction was removed. Subsequently, the inner walls made from bricks and the ceilings which were made from concrete beams with suspended single grain concrete stones, were demolished. The outer walls, now detached, were secured with inclined braces and supported using circumferential high pressure soil stabilisation.

View of supported existing walls
Image: PORR AG

Subsequently, the sheet piles for the adjacent underground car park could be installed and the basement in the existing building could be excavated.

Dewatering was taken care of by means of two settling basins with a capacity of 8 m³ each. The accruing amounts of water were discharged into an adjacent stream.

The basement and floor ceilings were connected by cutting slots into the existing brickwork. This work was carried out in tight collaboration and consultation with the project statistician.

The intermediate walls and apartment partition walls were exclusively masoned.

Newly constructed basement in the existing building
Image: PORR AG

View of building A
Image: Chris Hofer

Newly constructed buildings B and C

Buildings B and C are also equipped with basements and connected to the underground car park via airlocks.

The outer walls of both newly constructed buildings were executed using wood chip concrete blocks and the interior walls using perforated bricks.

The aluminium railings and the partitioning walls on the terraces were powder coated in the same dark grey tint as the entrance doors, windows and all sheeting.

The terraces' floor coverings are made from thermo-wood. The apartments' buyers could choose between thermo aspen, thermo ash and thermo pine.

Thermo wood is a premium alternative to tropical wood.

Using heat and moisture, the wood's cell wall structure is being altered in such a way that its ability to absorb water is significantly reduced. Its lowered ability to absorb water causes worse growth conditions for fungi which, in turn, significantly improves the wood's durability.

With their extensive terrace areas with a view of Hohensalzburg castle, the three penthouses rank among the block's highlights.

View of buildings B and C
Image: Chris Hofer

The completion of our work set a significant cornerstone for the construction of the residential block and the moving in of the new owners.

Project data

Client	Planquadr.at Immobilien- und Projektentwicklungs GmbH
Start of construction work	March 2013
Completion	July 2014
Sheet piling	1,900 m²
Residential units	21
Gross floor space	2,360 m²

Construction of the Steinakirchen am Forst South Bypass

Christian Meisinger

Introduction

The market town of Steinakirchen am Forst is located in Lower Austria's northern Mostviertel region. Complementing the already existing north bypass, the newly constructed south bypass makes it possible to drive around the entire municipality. The resulting reduction in traffic in the town's centre results in a significant increase in traffic safety, especially for the weaker outside traffic participants such as pedestrians, cyclists and children.

Considering a projected traffic volume of some 6,700 vehicles which would otherwise pass through Steinakirchen am Forst every day by the year 2025, the south bypass brings with it the positive effect of reducing the volume by come 64 per cent to 2,400 vehicles per day. Furthermore, the economic development of the small Erlauf valley is being promoted by reducing the time it takes to drive to the motorway junction A1-Amstetten/Ost.

Routing

The south bypass Steinakirchen am Forst starts at the roundabout ATZ Steinakirchen (crossroads of L 89/L 96) which has already been erected in the course of the construction of the north bypass and subsequently runs north of the Kleine Erlauf river, takes a south-west turn and crosses the Kleine Erlauf river in the area of Burgersteg. Subsequently, the bypass road continues south of the Kleine Erlauf river in westerly direction and reconnects with the existing country road L 96 in the area of the river Mühlbach bridge. After that, the bypass runs on the existing L 96 for some 700 m and ends at the entrance to the town part Höfling.

The two-lane bypass road extends on a length of 2.7 km and is 7.5 m wide. Two bridges (over the rivers Mühlbach and Kleine Erlauf) as well as five connections of country and district roads that run at the same level with left-turning lanes and cycling paths and commercial roads are being built.

Aerial shot of the south bypass
Image: Markus Hahslinger

Building phase 1: Roadwork

After excavating the approx. 40 cm thick humus layer, the embankment road-contact surfaces were installed and the areas to be stabilised were determined by means of plate load tests. The required amount of bonding agents was evaluated by means of suitability tests and divided into two sections. In areas of embankment heights of over 1 m, 13 kg/m² and in areas where it was less than 1 m high, 19 kg/m² of cement bonding agent were used. Stabilising depth was 40 cm.

Ground stabilisation in the area of embankment road-contact surfaces
Image: PORR AG

Due to the fact that the construction section is located in the run-off area of the Kleine Erlauf river, the road was installed on a dam of up to 4 m height for purposes of flood protection. The embankment's height (subgrade level) was planned in such a way that the entire section was executed on top of the embankment so that the subgrade level is located at the height of a flood that only happens once in a century.

In the area of the embankment as well as the unbound supporting bases, comprehensive compaction controls were undertaken.

Installation of unbound supporting layers with theodolite-controlled grader
Image: PORR AG

For purposes of unhindered drainage of flood waters a centennial flood would produce, pipe culverts were constructed at select points in the bypass road. In total, 45 culverts with a diameter of 50 to 100 cm were constructed.

Construction of pipe culverts for flood water drainage
Image: PORR AG

Pipe culverts through bypass road for the purpose of flood water drainage
Image: Markus Hahslinger

The bituminous top layer (wearing surface) was applied using two tracked asphalt pavers, working in echelon "hot to hot" to ensure a closed longitudinal seam. Due to the close proximity to adjacent residential buildings, a noise reducing stone mastic asphalt was used as a top layer.

Application of the asphalt cover layer with two tracked pavers
Image: PORR AG

In principle, water is drained via the side shoulder and the embankment's slope, from where it seeps into the adjacent soil. In the well protection area, however, the water is cleaned via humus filter troughs in the drainage lines in order to prevent seepage into the soil and possible adverse effects on ground water.

Furthermore, a roughly 4,000 m² flood channel as well as two additional flood dams were built along the road in the areas of the bridge over the Kleine Erlauf river. Two footpath and cycle path connections including crossing aids were installed on the country road. For purposes of protection of the south-eastern edge of Steinakirchen's residential areas, an approx. 230 m long and 3.5 m high noise protection wall was erected.

To protect the environment, a 390 m² compensation area with gradually lowering soil was constructed as a spawning habitat for amphibians, and so were a flood channel with temporarily water-bearing depth area and amphibian channelling devices as well as small animal passages. Furthermore, plants have been placed on the roadway's outer edges and those sides of the noise protection dam facing residential areas.

Building phase 2: Bridge construction

Removal and reconstruction of the existing river Mühlbach bridge

The bridge over the Mühlbach river is located in the area in which the bypass road meets the existing one.

In order to keep the roads open for traffic, a diversion was installed and a temporary bridge erected for the duration of the construction.

What made the construction of the new Mühlbach river bridge difficult was the unhindered deflection of the flowing stream during the construction period. This problem was solved with dense piping in the existing river bed using heavy load-bearing piping.

The new bridge's superstructure is a single span reinforced concrete frame with a span of 5.5 m and a clear height of 1.8 m featuring a rectangular cross-section which was adapted to the framework conditions of flood protection. The structure was placed on shallow foundations.

Mühlbach river bridge – sealing work
Image: PORR AG

Reconstruction of Kleine Erlauf river bridge
The superstructure consists of a single span reinforced concrete frame with haunched substructure. The superstructure's thickness ranges between 75 and 150 cm, its width is 12.5 m and its inclined length 26.3 at an oblique angle of 61°. The bridge's geometry was adapted to the framework conditions of flood protection.

The frame girders and abutment wings were placed on a pile grillage and placed on foundations made from 16 bored piles with a diameter of 120 cm and a length of 10 m.

Bridge over the Kleine Erlauf river, construction of deep foundations using bored piles
Image: PORR AG

For the purpose of erecting the false work, three strip foundations were concreted at right angles to the bridge's axis. One of them in the area of the frame girders and one in the centre of the superstructure in the river area. At the frame girders, the structure was bedded on cross girders and lowering devices. Additionally, a two-row supporting yoke was used in the centre of the superstructure. The superstructure was supported on 4 rolled profile girders HEB600 and a length of 13.10 m. In the area of the superstructure, the cross girders were executed as rolled profile girders HEB600 of 12 m length, whereby 10 girders were installed in each field at a transverse distance of 1.45 m to one another.

Bridge over the Kleine Erlauf river, completion of form work
Image: PORR AG

The frame girders and superstructure were concreted in one work step.

Bridge over the Kleine Erlauf river, concreting of the superstructure
Image: PORR AG

The river's embankments in structure's area were stabilised by means of stones placed in the base with a stone layer up to the adjacent abutment wall.

Bridge over the Kleine Erlauf river, stone layers at the embankment
Image: PORR AG

Flood incident May 2014

Construction was abruptly interrupted twice by an unexpected natural disaster after completion of the embankment. After continuous heavy rainfalls, the Kleine Erlauf river rose to the level of a centennial flood on the 16th of May 2014 and to that of a bi-centennial flood on the 29th of May 2014. Immediately, the machines were cleared from the construction site and its adjacent areas and in order to protect a saw mill in immediate proximity of the site, a temporary dam was erected.

Thanks to the fact that the embankment had already been completed by that time, damages to the main roadway could be mostly prevented. Things that were observed were contaminations of the drainage, the already completed commercial roads and underwashing of the amphibian protections.

Flooding in the area of the bridge over the Kleine Erlauf river
Image: PORR AG

Flooding on the commercial roads, underwashing of the amphibian protections
Image: PORR AG

Project data

Client	Provincial government of Lower Austria
Execution of construction work	TEERAG-ASDAG AG, Construction area Krems
Planning	Retter & Partner ZT-GmbH, 3500 Krems an der Donau
Construction time	29/07/2013 – 31/08/2014
Net construction time	9 months
Opening for traffic	05/09/2014
Length of construction section	2.7 km
Total length of access roads, commercial roads, cycle paths	2.2 km
Humus excavated	28,600 m³
Earthwork/soil exchanged	34,100 m³
Ground stabilisation	32,000 m²
Embankment	93,000 m³
Rain water sewage	1,500 m
Unbound supporting layers	23,600 m³
Asphalt ready-mix	13,000 t
Stone layers	1,500 t
Bored piles DN120 cm	160 m
Concrete	3,000 m³
Reinforcements	230 t

Final remark

With this project, TEERAG-ASDAG AG, Lower Austria branch, construction area Krems could once again prove its versatility and has performed the entire work itself or contracting companies belonging to the group. Especially the departments for foundation engineering with special civil engineering (manufacturing of the bored piles) and the departments sealing and insulation (sealing of the bridge superstructure) were involved in this project.

Finally, it needs to be mentioned that thanks to the great dedication of those involved in the construction and the excellent collaboration with the client, the short construction deadlines could be met and the bypass could be opened for traffic on schedule.

Reconstruction of the Small Marchlehner Avalanche Gallery

L 240 Venter Straße

Markus Kreuzer

Introduction
Located close to Sölden, the mountain and climbers' village of Vent can only be accessed via a single road through the valley of the same name. A number of avalanche galleries ensure almost entirely avalanche free and rock slide safe access on the L 240 Venter Straße between the villages Zwieselstein and Vent in the municipality of Sölden im Ötztal. Through the reconstruction of the small Marchlehner gallery which closes the gap between two existing galleries (Glasair and Bruchscheiben gallery), the currently unprotected stretch of the road from km 9.5 to km 9.73 will be permanently protected against rockfall and avalanches.

Order
TEERAG-ASDAG AG (T-A), Tyrol branch, was commissioned with the construction of the 228 m gallery in May 2013 by the Provincial Government of Tyrol, department for bridge and tunnel construction on behalf of the Federal Ministry of Agriculture, Forestry, Environment and Water Management and the Forest Engineering Service for Torrent and Avalanche Control, Tyrol branch. Apart from the reconstruction of the avalanche galleries and the associated roadwork as well as comprehensive rock supporting measures on the mountainside, a downhill access ramp to the top of the gallery was to be built. Execution planning (statics, reinforcement and form work plans) were drawn up by engineering office Baumann + Obholzer ZT GmbH.

Project
The small Marchlehner gallery has a length of some 228 m and has been constructed in 19 block sections of 12 m each. On a length of 180 m, the gallery's structure was executed as a level frame including separate downhill wall panels with openings of 2.7 m x 3 m ("column structure") as a rectangular cross section and in the area of the ramp, on a length of approx. 45 m, as a closed design. The clear internal cross-section of the gallery is 8.25 m x 4.9 m. Strip foundations were used on both uphill and downhill.

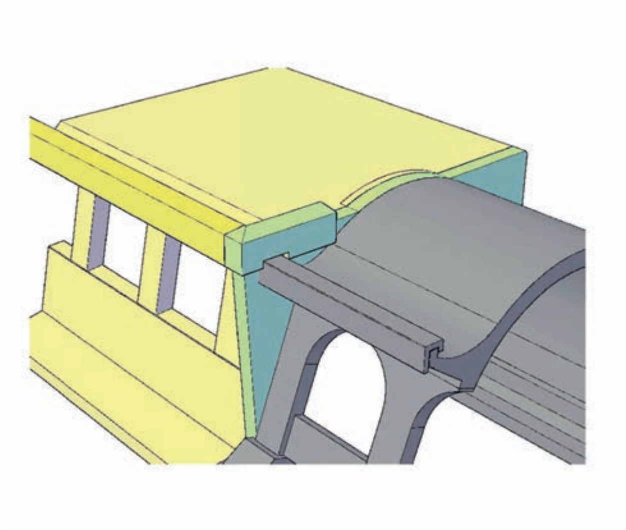
During the entire construction period, traffic had to be guided through a clear space 3 m wide and 4.5 m high across the building site and therefore also through the form work carriage since closing down the L 240 Venter Straße in the area of the construction section was impossible. Construction work commenced in June 2013. According to the building contract, the main construction work – gallery structure including roadworks – had to be completed by November 2013. Outstanding work was carried out in spring of 2014.

Digging, earthworks and supporting work
The construction scheme posed great challenges to the staff of T-A in terms of technology and construction logistics. In order to process the project, for instance, extensive preparatory uphill digging, slope and rock stabilisation work had to be carried out. At the same time, Vent's existing waste water collector was relocated in the entire construction section area and subsequently, also in the areas of the existing galleries beyond the small Marchlehner gallery.

Rock was removed by means of blasting. In the area of the loose material, an anchored jetcrete wall was erected. In parts, the slopes reached heights of more than 8 m. Work had to be carried out while keeping the road open for traffic (single lane, controlled via light signal system - up to 1,000 vehicles per day). Only brief 10-minute traffic blocks for blasting and subsequent removal of rock material were permitted.

Rock stabilisation and excavation work
Image: PORR AG

Concrete frame superstructure
Since the existing Glasair gallery was executed as an arch superstructure, a 50 cm thick "transitional slab" to block 1 of the rectangular frame superstructure had to be installed first. Subsequently, the downhill and uphill strip foundations were constructed. Then, an 80 cm thick uphill wall was installed that was, however, only concreted up to a line two thirds the height of the frame structure. On the downhill side, 2.5 m high wall slabs with columns on top (cross-section 60/100 cm) were erected simultaneously. In mid-July 2013, the gallery form work carriage was set up (approx. 10 working days) and the first of a total of 19 superstructure blocks was cast. On average, two blocks per week were installed until the end of this work in September.



Transition – existing structure – new gallery
Image: PORR AG

Downhill wall columns
Image: PORR AG

Uphill strip foundations
Image: PORR AG

Laying of reinforcements at frame superstructure
Image: PORR AG

Laying of reinforcements at frame superstructure
Image: PORR AG

Gallery form work carriage
Image: PORR AG

Due to the fact that the traffic had to be guided underneath the form work carriage it posed a great challenge to use the confined spatial conditions of the intermediate storage areas at the downhill edge of the building site. At the same time as the construction of the gallery structure took place, the uphill drainage holes and drainage lines for the draining of slope waters had to be installed. Also, sealing work on the gallery had to be drawn in. After completion of the gallery structure, a 50 m access ramp to the gallery's roof and the 180 m long edge beam on the gallery's cantilever arm were built.

Keeping the road open for traffic
Image: PORR AG

Keeping the road open for traffic
Image: PORR AG

Backfilling / roadwork

Once the concrete and sealing work was complete, backfilling was immediately started at the completed sections of the gallery. A 50cm thick gravel layer with (aggregate 80mm) had to be applied to the frame superstructure for the purpose of sealing protection. Subsequently, the backfilling was executed by layers. Only material excavated at the construction section was used for this purpose. It was temporarily stored close to the downhill Glasair gallery, processed for backfilling and installed afterwards. Thus, unnecessary deliveries and removal transports of excavated soil could be prevented in the tourism-heavy Vent valley.

State of construction September 2013
Image: PORR AG

Access road to intermediate dumping area
Image: PORR AG

State of construction November 2013
Image: PORR AG

Roadworks in the area of the carriageway were carried out on one lane at a time to be able to keep the road open for traffic. The uphill slope waters were being separately collected using drainage lines and guided into the Venter Bach stream via three drainage holes.

After frost layer filling and laying of the kerb stones, the still bound base layers were applied. By the end of November, the main work was completed on schedule and the gallery could be opened for traffic. After the winter break of 2013/2014, outstanding work such as application of the top layer and restoration work etc. had to be carried out.

Completion of construction in summer 2014
Image: PORR AG

Final remark

Thanks to excellent collaboration between all those involved in the project – from the client to the local building supervisors – the works could be carried out to everyone's full satisfaction. Construction was finished and the site cleared in May 2014. The greatest challenges for TEERAG-ASDAG AG and all other parties involved in the project was keeping the road open for traffic in the area of the construction site, the unpredictable weather conditions and the confined spatial conditions and the site's difficult alpine location. In the course of the project, TEERAG-ASDAG AG, an essential part of the PORR group could once again prove its experience and know-how in infrastructure and road construction just like it did with all other major Tyrolean gallery projects it has processed in the past years.

Project data

Start of construction	June 2013
Time of final completion	June 2014
Length of construction project	228 m
Road surface	1,500 m²
Excavation/earthwork	8,100 m³
Frost layer	900 m³
Ready-mix	700 t
Tunnel/gallery structures	48 m/180 m
Concrete volume	5,100 m³
Reinforcing steel	600 t
Jetcrete surface	1,500 m²
Injection drill bolts	6,600 m /950 pc.

New entrance building (James-Simon-Galerie) of the National Museums of Berlin

Remaining services in the areas of construction pit and foundations

Arne Kindler, Stefan Mielecke

Preliminary note

Due to substantial delays and additional costs caused by the civil engineering company which was responsible at the time, the construction contract for the erection of the new entrance building/James-Simon-Galerie (NEG) of the National Museums of Berlin was cancelled in 2011.

In 2012, the order for the remaining services was newly awarded after a new call for tenders. In the course of this awarding, Stump Spezialtiefbau GmbH as a member of the joint-venture consisting of three companies, was commissioned with the execution and manufacturing of jet grouted concrete and underwater concrete bases including their foundations and anchoring by means of bored micropiles.

Construction project

The building site of the parent joint venture NEG (new entrance building, James-Simon-Galerie) is located in the inner city on museum island, between the western side of the Neues Musuem Berlin, Bodestraße, Kupfergraben and the southern side of the Pergamonmuseum Berlin.

The new entrance building is supposed to merge the historical complexes of the museum island which have been registered as protected monuments and are part of the UNESCO world heritage to one building block whose foundations are to be built on an elevation of approx. +26.7 metres above sea level.

In the course of construction, it became necessary to build construction pits with residual dewatering (trough pits) in order to be able to install secure foundations for the planned building on the building site. Among others, the construction project's special challenge was to incorporate the services partially carried out by the former (dismissed) civil engineering firm into the elements to be executed now.

Geological and anthropogenic framework conditions

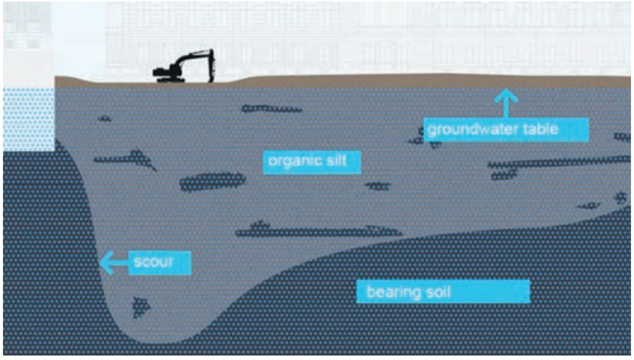
According to the soil survey report for the building project, the museum island is located in the Warsaw-Berlin glacial valley which has been shaped most recently by the Weichselian glacial period. In general, one can expect to find Pleistocene valley sand of differing grain fractions in the glacial valley.

When the ice of the last ice age melted away, so-called drainage channels were created through which the melting water ran off during the glacial periods at the end of the ice age. Today, one of the deepest of these drainage channels runs through the museum island.

In the course of progressing silt accumulation after the melting phase, mostly organic soils (peat and gytja) from the Holocene period have been deposited on the bottom of this ice age drainage channel. These organic soils can be found in alternating strata with loosely deposited sands. At the deepest points, the Holocene soils of the prehistoric drainage channel reach 40 m into the ground. Underneath these Holocene soils, we find load-bearing foundation soil in the form of valley sands from the Pleistocene.

A top layer of anthropogenic fillings between approx. 2.5 and 6.6 m thick is located on top of the organic soils.

According to the soil survey report, the ground water table in the building site area lies at roughly 30.80 metres above sea level.



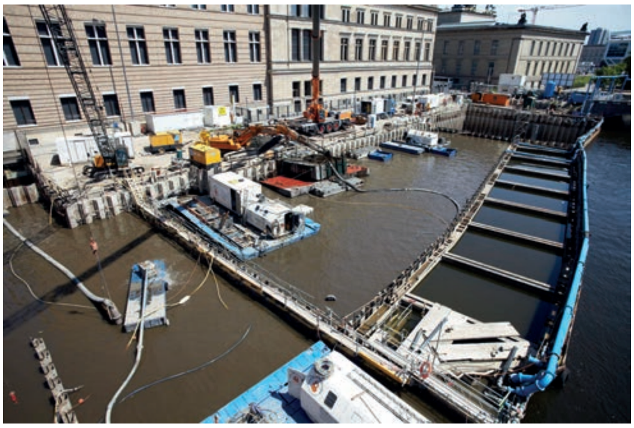
Schematic illustration of the surveyed foundation soil at the building site
Image: BBR Grafik, www.polyform-net.de

Due to historical developments, residual surface ballast and façade pieces from former buildings and old wood piles from the original foundations were expected to be found in the anthropogenic fillings on location. Furthermore, old anchor walls from the old existing, built-over bank wall were suspected there.

Recovered wood piles from the former foundations on the building site
Image: PORR AG

Execution of construction work

Apart from construction site clearance and the removal of existing foundation elements (approx. 500 wood piles), the construction of five trough type construction pits was part of the overall range of services in the framework of this building project. Services performed included earthwork, sheet-pile wall, jet grouting, micropile, steel construction, diving and underwater concreting work.



View into the manufactured and partly pumped out trough type pits
Image: PORR AG

The range of services performed by Stump Spezialtiefbau GmbH included jet grouting and micropile work.

Jet grouted base

For the trough type construction pits of the new entrance building, it was necessary to build jet grouted bases for purposes of horizontal reinforcement of the sheet pile walls' foot points and soil stabilisation. The individual jet grouted elements (some 1,500) measure approx. 1.9 m in diameter and were installed in depths between 6m and 12 m.

Boring and installation of the micropile foundations
Image: PORR AG

This work was necessary due to the fact that the in-situ soil could not safely support and transfer the load of the construction pit's walls or a load-bearing working formation for the underwater concrete bases into the subsurface.

Due to the complex soil – multiple other soil types run through the organic soils – and because further obstacles in the form of residual elements from former foundations could be expected, the jet grouted bases do not – deviating from standard construction methods – feature a water sealing function.

The sealing function was subsequently achieved using back-anchored underwater concrete bases.

Micropiles (small bored piles)

Due to the characteristics of the existing soil, the foundation plans included a transfer of the building's loads via micropiles into the load-bearing soil up to 40 m below ground. The overall volume of the micropiles to be executed included some 1,200 piles with a total length of approx. 40,000 m.

View into a pumped out trough type construction pit with underwater concrete base and micropile back-anchoring
Image: PORR AG

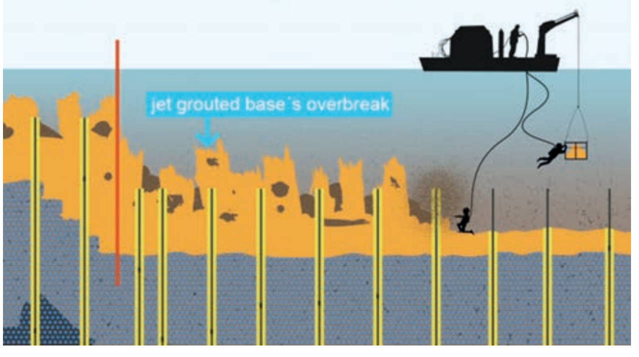
The micropiles served as a safeguard against the lifting of the construction pit base (underwater concrete base) and are subsequently used for the purpose of transferring the building's loads into the soil.

In order to prevent disturbances of the existing soil, an overburden drilling method with interior washing was used.

Incorporation of existing partially finished parts/difficulties

After construction had begun on the new entrance building, substantial deficits (jet grouting and foundation piles) were located on the existing partially finished parts done by the former (dismissed) civil engineering company which necessitated a rectification of these deficits before work could properly begin.

One of the main problems was that jet grouting work had not been performed according to plan. The top of the existing jet grouted base towered up to 2.5 m above the planned elevation and thus, high above the tops of the bored micropiles. This deficit was eliminated technically while maintaining water filled troughs by divers using high pressure water cutting (500 to 1,000 bar).



Schematic illustration of the jet grouted base's overbreak
Image: BBR Grafik, www.polyform-net.de

Summary

All main construction work on the new entrance building (James-Simon-Galerie) was completed in 2014 to the satisfaction of all those involved. Furthermore, the remaining work will be completed by January 2015.

The following technical overall services were performed in the course of the building activities:

Project data

Construction pit	approx. 3,250 m² and depth of up to 10 m
Bored micropiles	GEWI 63.5 mm, approx. 600 pc. and up to 40 m long
Excavation	approx. 22,710 m³
Underwater concrete base	approx. 3,880 m³
Jet grouted body	approx. 3,250 m³

Storage reservoir Simmering

Flood protection for Vienna's 11th district

Thomas Jantschitsch

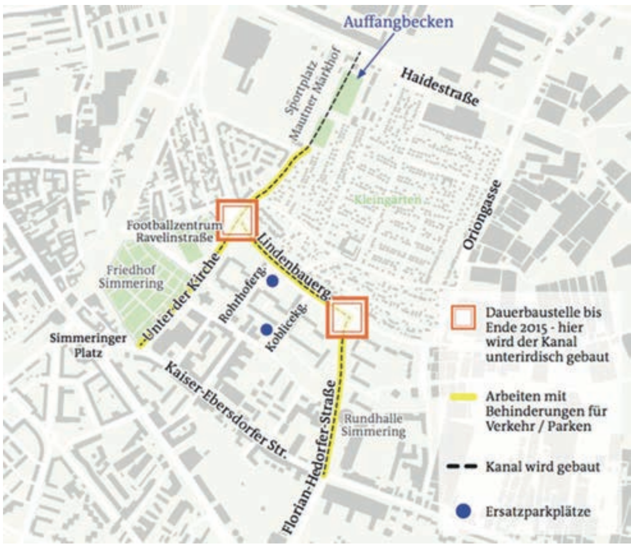
In autumn of 2013, the joint-venture storage reservoir Simmering under the technical leadership of Porr Bau GmbH was commissioned with the construction of the new storage reservoir Simmering by Wien Kanal (Vienna's sewer authority).

Project description

In case of torrential rainfall, the Simmeringer Haide area saw flooding of cellars and roads again and again in recent years. As a reaction to the increased occurrence of heavy rainfall caused by climate change, the city of Vienna has decided to optimise its sewer system and, through the construction of the new storage reservoir, to create an additional flood protection facility for its 11th district which, being the lowest point in Vienna, is particularly affected by such catastrophes.

At a length of 90 m, a width of 45 m and a depth of 7 m, the new reservoir has a capacity of 28.5 million litres of water.

With the sports field at Haidestraße 10, the client's sewer planners have found the perfect location for the underground storage reservoir. Directly underneath the main playing field, more than 34 million litres of water will be temporarily stored in the storage reservoir and its outfall sewers. In order to drain the reservoir once the rain has stopped, powerful pumps will pump the water to the main treatment plant via the sewer system. At a diameter of 2 m and a length of 1,970 m, the two outfall sewers which feed the reservoir can store 6 million litres of rain water. The future storage reservoir and the two outfall sewers are the last two elements in a storage reservoir chain in and around Vienna's11th district which can store a total of 86 million litres of rain water.



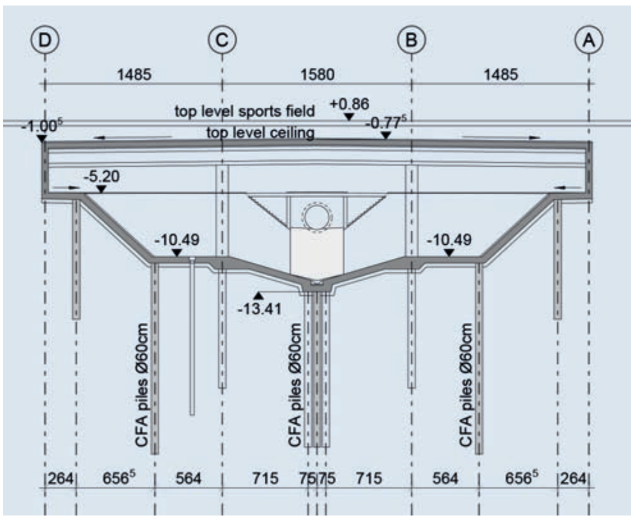
Key plan
Image: Wien Kanal

Storage reservoir

Due to the fact that the building site is located in the middle of the river Danube valley, the ground water table posed a real challenge. It lies some 3 m below ground. Porr Bau GmbH's foundation engineering division was commissioned with the special civil engineering work in a joint-venture. The reservoir's construction pit was executed on three sides with 60 cm thick cut-off walls (single phase diaphragm cut-off type) with a depth of 16 m which were offset by 9 m from the walls of the storage reservoir. On the north side of the construction pit, confined spatial conditions necessitated the installation of an 80 cm thick diaphragm wall which connects flush to the reservoir's walls. In order to lower the ground water table in accordance with the requirements, extensive dewatering measures including a total of 25 wells were installed.

Manufacturing of CFA piles
Image: PORR AG

The structure is a reinforced concrete construction with a base stepped towards the centre. In order to prevent the reservoir from lifting, an additional 148 CFA piles with a diameter of 60 cm and a maximum length of 16 m had to be installed.



Cross-section storage reservoir
Image: PORR AG


Completed construction pit including clear layer
Image: APA/Wien Kanal

The reservoir is being divided by two supporting axes. The objective was to execute the ceiling without supports. For this purpose, a system consisting of precast concrete beams and prefabricated ceiling elements including a 38 cm concrete layer was chosen. The beams have a span of 15.3 m and are 150 cm high. Since the ceilings overall thickness is 50 cm, the ceiling elements had to be manufactured in a special way with 12 cm thick concrete panels and bespoke latticed girders.


View from the head structure into the reservoir
Image: PORR AG


Shifting of the precast beams from the ceiling by means of a 400t crane
Image: PORR AG

The pump house is located in the northern part of the building site and contains three high performance pumps. These pumps will pump the water which has accumulated in the reservoir into the existing sewer at Haidestraße via two DN 800 pressure lines.

Outfall sewers

Two new outfall sewers with an inside diameter of 2,000 mm serve as the connection between the existing sewer system at Kaiser-Ebersdorf-Straße and the storage reservoir. Prior to the start of construction, soil stabilisation was carried out in the headwork area in order to prevent uneven soil excavation on the one hand and uncontrolled soil removal at the heading face, on the other.

Due to the gravel layers and the high water table on location, the micro tunnelling method with slurry-supported heading face and pressured air cushion for supporting pressure regulation was chosen for the execution of headwork. Prior to the start of construction, the existing gravel layers were stabilised by means of injection. Thanks to this method, surrounding traffic was only slightly effected.

Installation of the interjack station
Image: APA/Wien Kanal

From the starting shaft, the reinforced concrete presspipes with a length of 4 m and a shield machine weight of 18t are being pushed in. The soil excavated during headwork is being mixed with the bentonite suspension and transported to the separating device, where liquid and solid parts are separated again. The liquid portion is subsequently injected back into the working circuit.

Presspipe DA 2500
Image: APA/Wien Kanal

Since one can expect extensive tool wear in the course of the drilling of the existing soil, revision shafts are installed every 250 m along the headwork lines. Both the revision and the target shafts' construction pits were secured by means of jet concreted columns and a jet concreted cut-off base which was to be executed in a lift-safe and ground water sealing tight.

View of the tunnel
Image: PORR AG

Control technology

The reservoir's tributaries are being controlled with movable weirs. These are located at the overfall structures at the and of the outfall sewers. Using another valve, the water flow in the sewer at Kaiser-Ebersdorf-Straße can be regulated or alternatively rerouted entirely into the newly constructed 2,000 mm outfall sewers. The fully automated control system is interconnected to sensors in the sewers and determines in real time whether water is supposed to be rerouted into the reservoir and if so, how much.

Ceremonial start of drive

The 17th of October 2014 saw the ceremonial start of drive in presence of Vienna's Councillor for the Environment and the tunnel's patron, Ulli Sima. With a warm "Glück Auf" (the traditional miners' greeting, translating into "good luck") directed to all those working in the tunnel and above ground, the tunnel's patron wished everybody an accident-free construction progress.

From left to right: DI Andreas Ilmer, Department Head at Wien Kanal;, District Councillor Renate Angerer, Vienna's Councillor for the Environment Ulli Sima (Kromus / PID)
Image: PORR AG

According to schedule, construction work will be complete in spring 2016. After completion of our work, a sports field with modern floodlighting will again be built on top of the storage reservoir.

Prague: Construction of office building DOCK V1

Ondřej Sobotka

Project data

Company	Porr a.s.
Location	Prague 8 - Libeň, Voctářova Street
Client	Dock V1 s.r.o. / UBM / CRESTYL
Construction period	22 May 2012 – 1 August 2013, following floods extended to 30 September 2013
Number of floors	2 basement floors, 8 upper floors
Number of parking spaces	87
Built-up area	1,384.36 m²
Gross floor space	13,539 m²
Effective area	8,695 m² + 364 m² of terrace space
Excavation work	12,500 m³

Completed building
Image: Tomáš Malý

Completed building
Image: Tomáš Malý

Completed building
Image: Tomáš Malý

Completed building
Image: Tomáš Malý

Completed building
Image: Tomáš Malý

Project description

The office building Dock V1 is located in within eyeshot of Libeňský castle, close to the underground station Palmovka in the Prague 8 district on Voctářova Street which is the continuation of Vltava Embankment Street. The building site is located in close proximity to the Vltava river floodplain forests and the former Libeň harbour, where a park and a rest area will be built.

On the first floor, the office building was equipped with a kitchen and a dining hall. Floors 2 to 7 are standard floors, whereas the 8th floor with penthouse and terraces is set back.

The entire building is 20 m wide, 80 m long and 27.5 m high. The overall office space amounts to 7,720 m², the dining hall measures 514 m², the public spaces 461 m², the storage rooms 224 m² and the terrace spaces 364 m² in total.

The two basement floors feature 87 car parking spaces and a bicycle storage room. Furthermore, it houses two machine rooms for ventilation and cooling technology, a distributor for measuring and regulating purposes, the UPS system, a control room, a preparation room for the kitchen as well as a waste collection room.

Due to the proximity to Vltava river and the risk of floods connected with it, the high and low voltage lines and the transformer room were installed on the first floor.

A staircase and a lift connect the underground car parks to the first floor.

The lift lobby with four accesses to the rental areas is located in the core of the complex . Each rental area has its own sanitary facilities, a switchboard and features an access to the emergency escape staircase.

Execution of construction work

Foundation work

The project was awarded together with execution planning work which enabled Porr a.s. to implement the optimisation agreed upon. One of the main objectives was to obtain the LEED gold certificate.

Cost-efficiency could be greatly increased by using an anchored sheet-pile wall and a "white tub" type construction instead of the originally planned diaphragm wall. For this purpose, it was required to ram sheet piles into the loose slate layer (depth: approx. 12 m). Thus, the construction pit's base was technically sealed. Niches with collecting shafts for five wells with continuous pump operation were installed in the construction pit for the purpose of pumping off and lowering the ground water table below the foundation base's level.

This base is located some 3.6 m below the ground water table which is why it was of paramount importance to make the "white tub" water tight and process its construction joints. The total depth of the excavation area was 6.9 m and 10.6 m in the lift shaft area. Foundations were executed with piles and reinforcement cages.

The foundation slab was optimised to a thickness of 50 cm and features haunches to the pile heads. The wall sections were at most 12 m long. Sealing between the individual sections was carried out by means of pentaflex sheets with inserted Franke-tubes for eventual filling in of the injection compound. The lighting conductor was earthed by welding through individual reinforcement cages, wall and slab reinforcements and connecting the earth strip to the base concrete. The shafts for air supply and extraction are located on the eastern side.

Façade

The façade is made from strips of ribbon windows. The Schüco aluminium windows were executed as a system solution. The balustrade was covered with Alucubond cartridges or UV-line trapezoidal perforated profile plates. Heat insulation is 16 cm thick and covered with a vapour-permeable membrane.

Exterior blinds in cartridges were installed as an effective heat protection in summer time. The roof was conceptualised as an inverted roof, the insulation plates feature a total thickness of 20 cm.

Outdoor facilities
50 cm x 50 cm concrete paving was laid on the terraces. A glass railing runs along the entire parapet on the 8th floor.

When finishing the outdoor facilities, the connection of the underground car park to Voctářova Street had to be taken into account. A crossroads regulated with traffic lights was installed. A separate access for waste collection services was erected. The green zones are equipped with an irrigation system.

Flood 2013

During the construction period, a flood in 2013 led to the flooding of the structure. Both basement floors were under water and the flood waters reached up to the first floor at a height of 1 m. Thereupon, the client requested the mutual development of a concept of measures for the protection against future floods. The first measure was the erection of a flood protection wall.

A further measure was to relocate the ventilation shafts to a height above the flood water level.

A central diesel generator in the technology room on the 8th floor is used to supply the building with power. The secondary pumps in the shafts surrounding the building are supplied by another diesel generator which is located on the 1st floor. This generator is also available to the emergency team in case of a flood.

Final remark

After completion in September 2013, the building was handed over to the satisfied client.

Completed building
Image: Tomáš Malý

Completed building
Image: Tomáš Malý

Completed building
Image: Tomáš Malý

Lake-side town of Aspern, building site D12

Construction of a residential block including offices and business premises

Stefan Wusits

A building site in changing times

In the 22nd district at Vienna's eastern outskirts, where Napoleon was once defeated by Austrian troops under Archduke Karl I in 1809, the city of Vienna's largest residential building initiative and one of the largest in Europe started in May 2013 – the lake-side town of Aspern.

Aspern airport, at the time one of the most modern in Europe, was opened at today's building site on the 23rd of June 1912.

However, the murder of the heir to the throne Franz Ferdinand in 1914 already brought an end to civilian aviation and Aspern airport was solely used for military purposes from that point on. When World War I ended in 1918, the destroyed airfield was once again reconstructed for international air traffic in 1920.

Schwechat airport which served as a military airport as early as 1938, took over as a civilian airport from Aspern when it was opened in 1954.

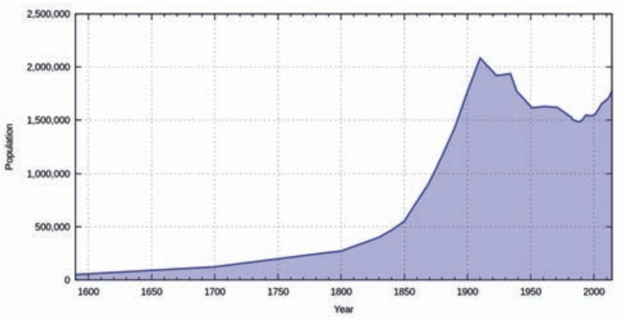
Between 1956 and the 1970s, legendary car races were held on the airfield. Formula 1 world champions such as Jochen Rindt and Niki Lauda raced there.
Aspern airport was demolished in 1980.

Lake-side town of Aspern
Image: Liebherr-Werk Bischofshofen GmbH

Urban development Vienna / lake-side town of Aspern

Due to projections that forecast a population of 2 million people for Vienna in 2020 (as it once had in 1910), large urban development work is currently being undertaken at Vienna's new main railway station, the former north station, the former Aspang railway station and at the lake-side town of Aspern. In 2013 alone, 24,000 new citizens moved to the nation's capital. This roughly corresponds to the population of the city of Leoben. Some 7,000 apartments will be completed in 2014 through funding and initiatives by the city of Vienna.

At lake-side town of Aspern, up to approx. 8,500 apartments on a gross floor space of 2.4 million m² (which corresponds to the size of the seventh and eighth district combined) will be constructed in three building phases over the course of more than two decades.



Vienna's population, 1590-2013
Image: Own work, Statistischen Mitteilungen der Stadt Wien (Heft 4/2000) Statistik Austria. Statistisches Jahrbuch 2009. http://www.statistik.at/web_de/static/bevoelkerung_zu_jahresbeginn_seit_1981_nach_bundeslaendern_031770.xlsx http://www.statistik.at/web_de/static/bevoelkerung_zu_quartalsbeginn_seit_2002_nach_bundesland_023582.xlsx

1st building phase

The first building phase began on 2 May 2013 with a total number 2,600 apartments, public buildings such as kindergartens, schools and the future town hall. In September 2014, residents could already move into the first apartments constructed in this phase.

With some 1,000 construction site staff, approx. 150,000 m³ of concrete and roughly 120,000 m³ of excavated soil were being moved until early March 2014. The connection to the underground line U2 was opened in October 2013. An effective town street, a connection to the existing A23 motorway as well as a railway station will be built in the course of additional building phases.

Visualisation of lake-side town of Aspern 2028
Image: schreinerkastler.at / wien 3420

A very special production was staged in mid-February: Under the title "Kranensee" (Crane Lake), the entire construction site was illuminated using state-of-the-art lighting and projection technology and became the stage for a well-rehearsed choreography of cranes. Instead of the expected 5,000, 14,000 spectators came to see the show.

"Crane Lake“ in mid-February 2014
Image: PORR AG

"Crane Lake“ in mid-February 2014
Image: PORR AG

The lake-side town of Aspern is a city within a city, both urban and immersed in green, with lots of public areas and large open spaces.

Once the entire project is completed, 20,000 people will find a new home on the former airfield. New work places for almost the same number of people will be created in the office and service sector.

Half of the ground area is public space with streets, squares, green areas and recreational spaces. PORR is currently involved in the erection of eight building sites with a total of 1,056 apartments and a hall of residence for 316 students.

Concrete mixing facility with building logistics centre
Image: PORR AG

Building logistics

Statically, the construction of one apartment requires up to 60 lorry journeys with some 2,500 – 3,000 kilometres driven. Thus, for the construction of 15 apartments, lorries drive once around the globe.

In order to counteract and reduce pollutant emissions, noise and dust and to keep construction site traffic at a minimum, the contracting companies are obliged, on the basis of the relevant EIA requirements, to deliver the accruing excavated material to the concrete mixing facility on location and to source the concrete from this concrete mixing facility.

Lorry access to the lake-side town is strictly limited to 700 journeys a day which is being meticulously controlled by means of on-site barrier systems.

EIA requirements furthermore stipulate that work can only be executed from Mon-Fri between 6 am and 7 pm, which makes the requirements at the lake-side town even more strict than the Viennese noise protection laws.

Construction site traffic is restricted to 20 km/h on unpaved tracks and 30 km/h on paved roads. In order to grant neighbouring and prospective residents views of the lake-side town, a walkway and bicycle path crossing the building site were installed.

Due to the fact that the emergency helicopter Christopherus 9's landing place is located in close proximity to the building site, all cranes had to be equipped with crane lights.

Visualisation building site D12 with larch façade
Image: Architecture: querkraft architekten und berger+parkkinen architekten, Visualisation: berger+parkkinen architekten

Visualisation building site D12 with larch façade
Image: Architecture: querkraft architekten und berger+parkkinen architekten, Visualisation: berger+parkkinen architekten

Building site D12

Building site D12 which stands out from the other sites with its larch façade, is a residential block in the lake-side town you don't see every day. Porr Bau GmbH has been commissioned with the turnkey construction of the residential block with 213 apartments, three offices and eight business premises by Gemeinnützige Bauträgergesellschaft EBG. Construction on the residential block began on 2 September 2013 – the agreed hand-over time is June 2015.

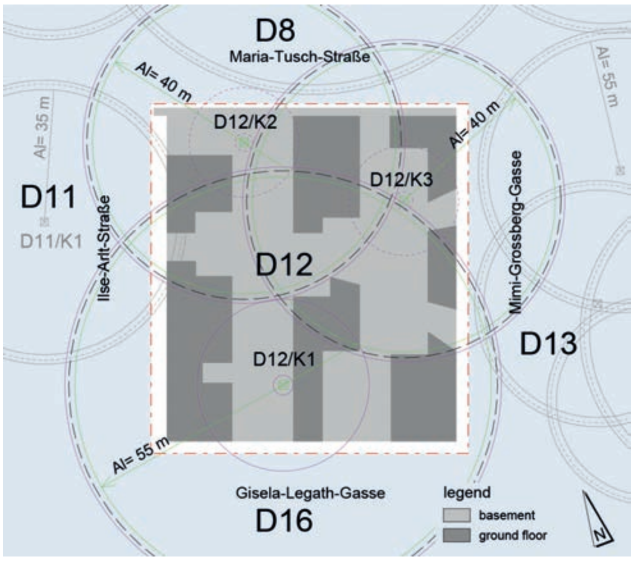
Building site D12 is a rectangular property with edge lengths of approx. 84 m x 93 m. The building is divided into a two-storey underground car park with parking spaces for 413 cars, a mineral plinth area from the ground floor to the first floor and a wood façade from the 2nd to the 6th floor. The building block consists of six staircases which are connected to one another through arcades in three rows.

The fact that planning was carried out in cooperation between two architectural offices was challenging and outside the norm. The architectural office Berger + Parkkinen planned the underground car park storeys and the first floor. The architectural office querkraft was commissioned with the planning of the floors 2 to 6 – the entire area covered by the wood façade.

Temporary construction pit system by means of sheet piling
Image: PORR AG

Temporary construction pit system

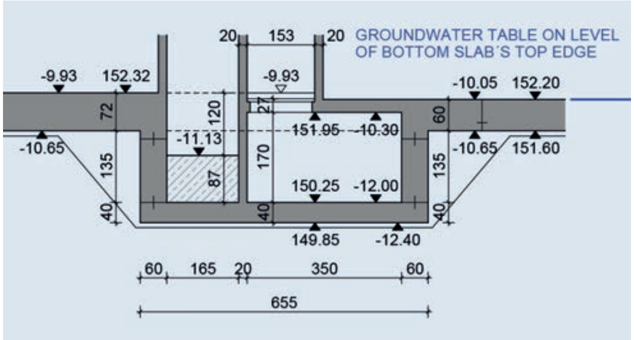
In order to allow for the excavation of 37,000 m³ of material and the construction of two underground storeys, a free-standing sheet pile wall with a maximum height of 5.5 m was chosen as a temporary construction pit system. Only in the area of the existing power-polybox, chording became necessary since preliminary embankment was impossible in this area. The Larssen lengths measured up to 16 m in order to perform an incorporation into the stevedore.



Construction site facility plan
Image: PORR AG

Construction site facilities

Three revolving tower cranes with boom lengths of 40 to 55 m were used for the erection of the building executed as a mixed construction with in-site concrete and precast elements. The fitted precast loggia elements weighed approx. 7.5 t which had to be taken into account during positioning and dimensioning the cranes.



Car park drainage collection structure
Image: PORR AG


Well installation for lowering the ground water table
Image: PORR AG


Retention basin

Dewatering of ground water

Due to the fact that the ground water table was located on the level of the bottom slab's top edge and since the bottom slab had an average thickness of 60 cm, the required collection structures for car park and lift shaft drainage necessitated lowering the ground water table by some 2.5 m.

Six wells were used to lower the ground water table. In the course of this work, we benefited from the fact that we could also use adjacent Opel factory's existing fire water well for the lowering of the ground water table. A retention basin with a capacity of roughly 3,000 m³ was built at a distance of approx. 150 m from the construction site. With a pumping performance of up to 160 m³/h, the ground water table could be lowered to the required height within two days after startup. After completion of the bottom slab shrinkage fields and the rising basement walls on the second basement floor in early February 2014, the dewatering of the ground water was reversed according to the guidelines of the MA 58 (Municipal Department 58).

House technology

The block is heated by a floor heating system which is supplied by geothermal heat pumps, air and ground water pumps which are being installed by Wienenergie in the course of a research project.

An innovative and intelligent control system automatically identifies the heating demand at a given time and finds out which heat pump has the highest rate of efficiency at any given moment based on the determined framework conditions. This pump is given preference. Should this heat pump lack the necessary performance, the pump with the second highest efficiency is also being started. Furthermore, a thermal solar energy plant has also been installed at the building. In summertime, this plant can cover the entire hot water demand.


Borehole heat exchangers
Image: PORR AG

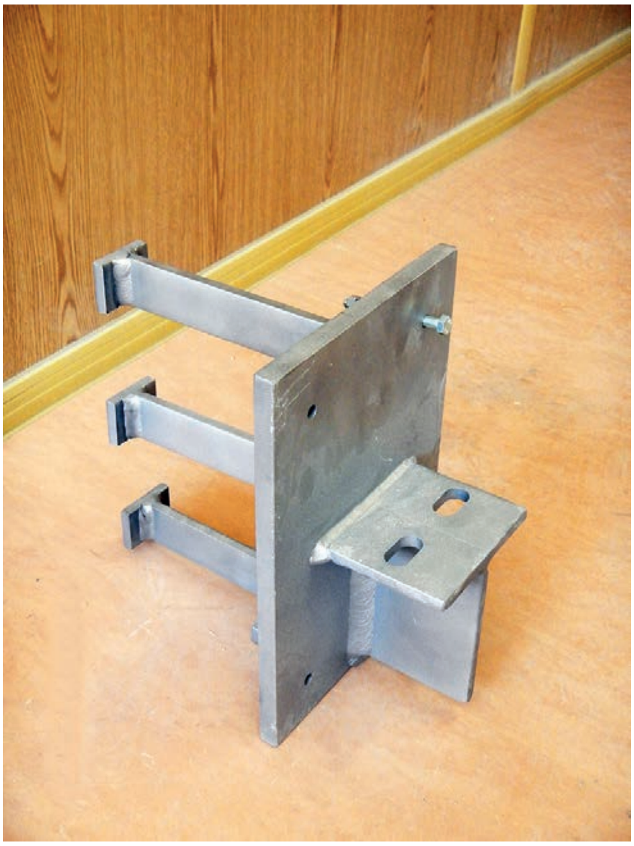

Borehole heat exchangers
Image: PORR AG

Larch façade
Image: PORR AG

Larch façade

In order to prevent fires spreading over the larch façade measuring some 9,000 m² (from the 2nd floor to the 6th floor) a "total protection" type fire alarm system based on TRVB 123 S and according to the requirements of the Vienna fire department is to be installed and operated.

Among others, this requirement stipulates that a master key which is to be kept in a designated key vault which allows the fire department access to all rooms and thus, also all apartments.



Assembly parts for loggia assembly
Image: PORR AG

Loggias and balconies

The manufacturing and fitting of the precast loggias and balconies posed another challenge in terms of precision. A total of 1,200 assembly parts for 67 loggias and 83 balconies were fitted exactly. The loggia and concrete precast elements could only be fitted floor by floor and simultaneously with the installation of the wood façade.

Final remark

Interior finish work for a timely hand-over by late June 2015 is currently in full swing.

Residential complex Eisenstadt, Feldgasse

A success story from 2008 to 2014

Gerhard Ploy

Introduction

In November 2008, TEERAG-ASDAG AG (T-A), Burgenland branch, was commissioned with master building works for the construction scheme residential complex Eisenstadt, Feldgasse by Oberwarter gemeinn. Bau-, Wohn- u. Siedlungsgenossenschaft reg. GenmbH. Included in the order was structural work, interior plaster and façade work, final screed work and the entire outdoor facilities including all paving and surfacing work. TEERAG-ASDAG AG, Burgenland branch built some 4,000 housing units in the last 25 years for the client, a very successful company in the sector of private housing. Besides the requested quality, adhering to all deadlines was top priority.

General description

The property is located in the south east of Eisenstadt and is characterised by its rural character despite the fact that it is close to the city.

Planning submission design included six stairways and two underground car parks. Maisonettes with approx. 100 m² usable living space and apartments with sizes between 50 m² and 95 m² were built. Each housing unit comes with a dedicated parking space in the underground car park. Apart from 199 parking spaces, the basement floors house the plant rooms and basement storage rooms.

Groundbreaking ceremony with Governor Hans Niessl
Image: PORR AG

Structural work

In the first building phase, T-A was commissioned with the construction of the stairways 1 to 3 with 57 housing units. At stairway 1, 15 maisonettes were built and 17 and 25 apartments, respectively, at stairways 2 and 3. Construction began with the groundbreaking ceremony in November 2008 in the presence of Governor Hans Niessl, Eisenstadt's Mayor Andrea Frauenschiel and representatives from Oberwarter Siedlungsgen. reg. GenmbH. The erection of the complex included a basement floor, a ground floor and four upper floors. The basement floor was executed as a seal concrete shell. From the ground floor up to the 4th floor, the structure was built from ceramic brick masonry of 25 cm thickness and an element slab. The apartment partitioning walls and the staircase walls were executed as concrete walls with corresponding retention walls. The intermediate walls and the primary walling were constructed from ceramic masonry 10 cm and 8 cm thick, respectively. Each staircase is equipped with one lift.

The roof is a single-pitch roof with appropriate heat insulation. The façade was equipped with a heat insulation composite system. Despite the fact that the complex is only a 10 minutes' walk away from the centre, great importance was attached to the availability of generous open spaces with separate gardens and plenty of green areas when situating the stairways.

Stairways 1, 4, 5 and 6
Image: PORR AG

The topping-out ceremony for stairways 1 to 3 was celebrated on the 3rd of November 2009. The first building stage could be handed over to the residents as early as July 2010.

Because demand for additional apartments was high, TEERAG-ASDAG was commissioned with the construction of stairway 4 with another 20 housing units in November 2010.

In June 2011, construction work on stairway 5 with 16 housing units was begun. T-A was commissioned with the last building stage – stairway 6 with 17 housing units – in May 2013. These apartments, too, could be handed over to their new residents in June 2014. Handing over was fittingly celebrated.

Summary

Thanks to decades of excellent cooperation with Oberwarter gemeinn. Bau-, Wohn- u. Siedlungsgen. reg. GenmbH, 787 housing units could be built in recent years in Eisenstadt alone.

Stairways 4, 5 and 6
Image: PORR AG

Stairways 2 and 3
Image: PORR AG

Project data

Client	Oberwarter gemeinn. Bau-, Wohn- u. Siedlungsgen. reg. GenmbH
Project planner	Arch. Taschner – Kinger ZT GmbH
Statics	Höhenberger Engineerging ZT mbH
Start of construction	November 2008
Completion	June 2014
Housing units	110
Residential floor space	4,784.00 m² on stairways 1 to 3 1.666,53 m² stairway 4 1.363,08 m² stairway 5 1.370,19 m² stairway 6

PORR constructs bridges for the Austrian Railway Services (ÖBB) in Hinterstoder

New construction of two railway bridges, a small road underpass as well as rehabilitation of a 1.3 km long section of tracks

Mario Ecker, Daniel Sebö

Order

In late April 2013, PORR was commissioned with constructing the railway bridges and the small road underpass as well as with the rehabilitation work between the two bridges.

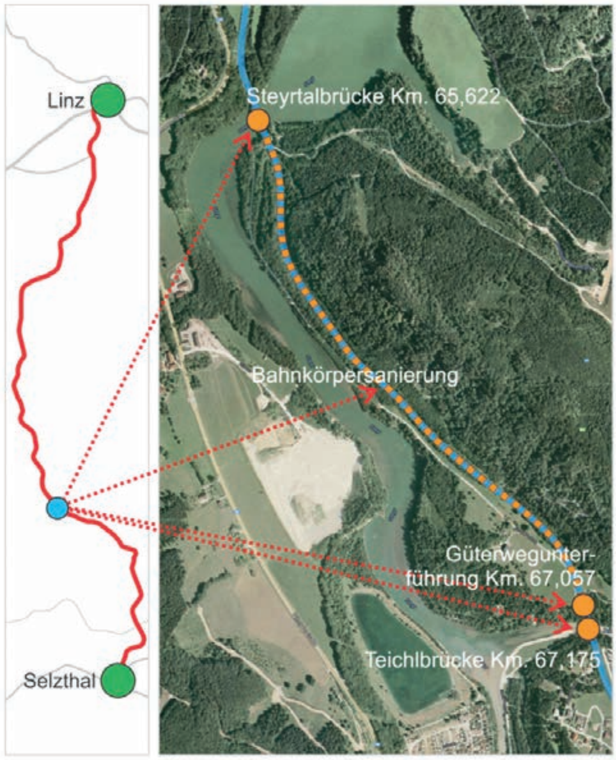
The order volume for this section is approx. EUR 10 million and the project is being executed by an internal joint venture between the railway engineering department and Lower Austria branch.

General information

The single-track railway line Linz – Selzthal between Linz and Upper Styria was constructed in the early 20th century. Until the end of 2014, this section is to be upgraded to such an extent that it allows the transport of heavy loads. In the course of this project, the reconstruction of the two railway bridges across the rivers Steyr and Teichl forms a part of a range of new bridge constructions and renovations of existing structures along the section in the past few years.

Existing Steyr valley bridge
Image: ÖBB

Existing river Teichl bridge
Image: ÖBB



Position plan
Image: ÖBB

Project overview

The existing track section is located along the Austrian Railway Service's (ÖBB) line Linz – Selzthal between the stations Steyrling and Hinterstoder and is, in its line layout, consistent with a mountain rail road with arc radii of at least 250 m. Starting at Steyrling station (approx. km 64.200), the section runs above the Klaus storage lake. In an area in which the country road B 138 runs above the railway line on top of a steep slope, the route takes a sharp left and finally reaches the existing bridge across the river Steyr and thus, the last section of the Klaus storage lake.

After crossing the storage lake, the route follows the right foot of Mount Falkenstein, whereby the river Steyr runs below the rail road tracks in close proximity.

In varying arc succession – first in side-cutting location, then in a slightly embanked location, the route finally reaches the bridge across the river Teichl to which Hinterstoder station connects after a long left arc.

Photo montage Steyr valley bridge
Image: ÖBB

Steyr valley bridge km. 65.622

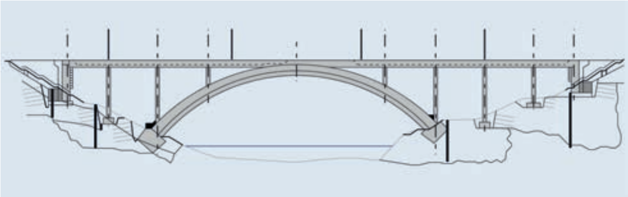
The single-track section crosses the Steyr valley bridge which was constructed in 1905 at rail road km. 65.622. In the course of reconstruction work, the existing route is to be relocated in such a way that reconstruction work and upgrading of the route can be carried out next to the existing one.

The existing bridge's main span has an inner width of approx. 80 m. The bridge's floodplain superstructures have an inside width of approx. 30 m.

The main superstructure spans across the storage lake of the dammed river Steyr. One main pier is located in the storage lake.

The bridge's ancillary superstructures span across the bank slopes on both sides of the storage lake.

The new superstructure was to be built alongside the existing bridge and to span the storage lake in its entirety so that no pier needs to be footed in the lake. The new superstructure's inner width (arch opening) is approx. 98 m. The arch foundations (vault abutments) are located in a distance of 9 m and 11 m, respectively, from the shoreline and are fixed in the adjacent rock. The clear height at the arch's crown amounts to approx. 26 m above water level.

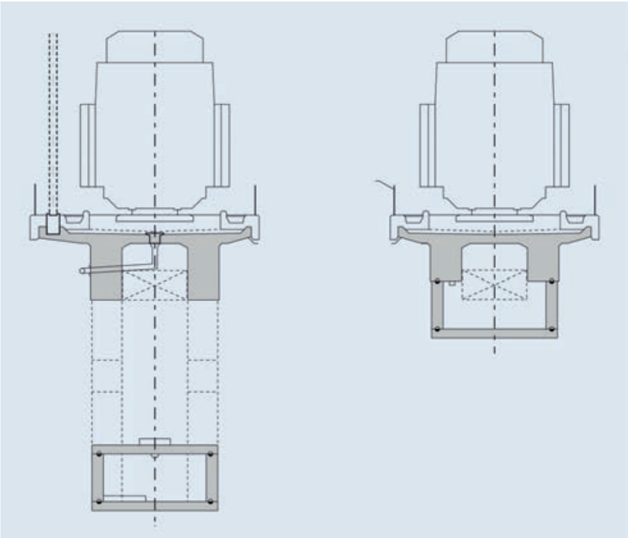


Longitudinal cut
Image: PORR AG

The arch's shape follows a circular geometry. At the crown, the arch (box girder cross section) merges with the superstructure's 2 web T-beam. Arch width and web outer edges have identical dimensions. The arch span remains constant across the entire length of the arch, the arch thickness varies from approx. 3.2 m at the abutment to approx. 2.2. m at the crown.

A dual-span (Linz side) and a triple-span flood plain bridge (Selzthal side) connect to the arch. The piers are being executed as double columns (cross section 1 x 1 m) and are equipped in their upper sections with push-trough openings (at right angles to the bridge axis) with a maximum width of 35 cm for the installation of false work (superstructure) for the purpose of future inspections.

The superstructure (two-web T-beam) is monolithically connected to the substructure (piers and arch) in the form of a continuous beam and has an total support span of 180.5 m.



Structural cross-section at the crown and in the arch area
Image: PORR AG

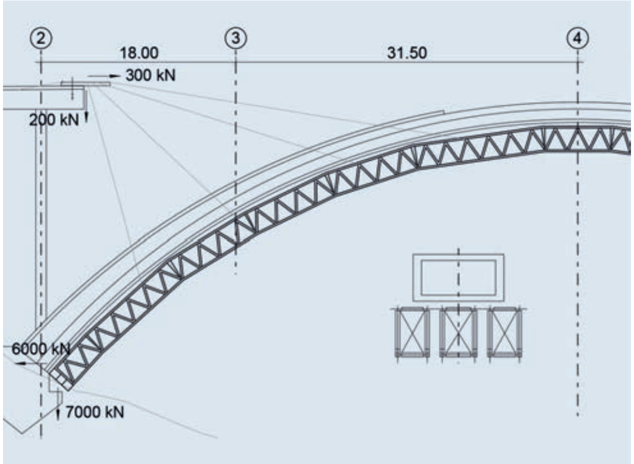
Aerial shot of Steyr valley bridge
Image: LBS Redl

Arch support structure
The arch support structure was planned as a single-celled reinforced concrete box girder with a continuous width of 4.2 m, a height in the crown area of 2.2 m and 3.2 m in the abutment area. The arch's support span is 97 m and the arch rise approx. 22 m. The reinforced concrete box girder was manufactured in three phases – first the base plate followed by the webs and the roof plate.


Arch support structure Steyr valley bridge
Image: Günther Gröger


Manufacturing of arch box girder
Image: Günther Gröger

The arch support structure is supported by a field of T 50 heavy duty girders (six girders next to one another) clear-spanning the Klaus storage lake. The heavy duty girders have been adjusted to the arch's curve by arranging them in a polygonal shape (boom length 4 to 12 m). For the purpose of supporting the girders in the abutment area, they have been executed accordingly. Since bracing was necessary in order to assemble the load-bearing towers, the flood plain structures up to the abutment were built first. The bracings were subsequently attached to these superstructures.



False work arch support structure
Image: PORR AG


False work arch support structure
Image: PORR AG

Track superstructure
The superstructure was executed as a double-webbed T-beam structure supported in the flood plain area by reinforced concrete columns on strip foundations. Above the storage lake, the superstructure is being elevated onto the already constructed arch superstructure by means of reinforced concrete columns. The double-webbed T-beam structure extends across nine bridge panels with support spans of 14.5 m to 18 m, a net structural span of 6.5 m and a height of 2.15 m. The superstructure was manufactured panel by panel with coupling joints at the fifth points, whereby the two flood plain structures were constructed up to the abutment piers first, followed by the section above the arch after completion of the arch construction. Supports were executed using continuous rolled profile girders HEB 600 and HEB 800 at lengths of 13 to 23 m. Six longitudinal girders were placed in the cross section.

T-beam superstructure
Image: Günther Gröger

View arch construction phase
Image: Günther Gröger

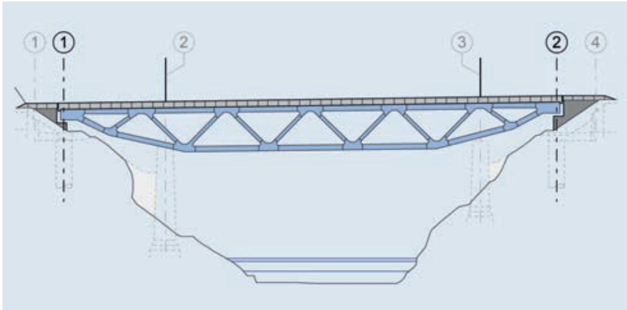
Completed Steyr valley bridge
Image: Günther Gröger

Existing structure

Contrary to the initial plan of demolishing the existing structure, it was taken over by the Province of Upper Austria in the meantime. The province will adapt the existing bridge and integrate it into the hiking and bicycle trail network.

Project data

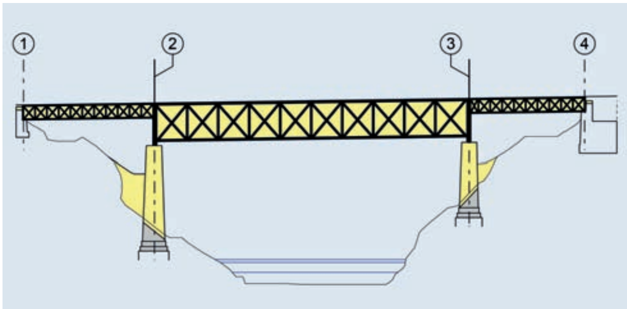
Concrete for arch construction	510 m³
Concrete for track superstructure	1,030 m³
Concrete for vault abutment	660 m³
Concrete for abutment	920 m³
Reinforcements	680 t
Arch false work made from steel	approx. 100 t
Sealing	1,250 m²
Construction period	1.7.2013 – 30.4.2015
Opening	3.11.2014



View River Teichl bridge
Image: PORR AG

River Teichl bridge km. 67.175

The single track railway section on the line Linz - Selzthal crosses the river Teichl at railway km. 67.175 on a bridge structure consisting of three single span steel superstructures whose support spans (24.97 m + 60 m + 22 m) amount to 106.97 of overall support span. The river Teichl runs approx. 34 m below rail level. The river valley features very steep slopes whose stability is being assured by means of conglomerate banks.



Existing structure
Image: PORR AG

The urgently required rehabilitation of the bridge constructed in 1905 was technically and economically infeasible. Therefore, the structure was replaced.

Due to the close proximity to the Phyrn motorway A9 and private properties, the railway route's position could barely be altered which meant a swung-out type of reconstruction of the tracks was out of the question. Therefore, the new construction was erected in lateral position on ancillary abutments and subsequently laterally inserted and connected to the existing tracks during a track closure that only needed to last a few days. The rail level's height remained unaffected in the process. In the course of line improvements, the ground layout was slightly altered.

The type of construction selected was a single span steel composite superstructure of latticed form work type with tracks on top. The support span is 94 m. The tracks with a 4.6 m wide continuous ballast substructure and a total width of 7.2 m are made from a reinforced concrete composite slab. The twin wall latticed steel form work joined with the track slab is located underneath the composite slab. The distance between track supporting layers amounts to 4.1 m in latticed framework axis. The latticed steel form work's lower boom extends upwards in both boundary fields. This results in differences in the superstructure's overall height. The overall height including composite slab amounts to 9 m in the field (8.5 m + 0.5 m) and to h = 2.57 m (2.07 m + 0.5 m) at the abutment.

Installation of the latticed steel form work
For the purpose of installation of the latticed steel form work, a possible method including longitudinal insertion from the direction of the abutment on the Linz side was described in the call for tenders. This method suggested to insert the pre-fabricated steel bridge in an elevated position, approx. 9 m above the existing abutment, and to subsequently lower it.

Due to the fact that the client allowed for a different installation method in the call for tenders, the joint venture offered the following installation method:

The latticed steel girders were being pre-assembled in their entire length on the left hand bank at the Teichl valley floor. After completion of the assembly work, a 600 ton lattice crawler crane (GRK 600) was set up. After preparatory work was completed, the lattice crawler crane took over the first form work girder, shifted it longitudinally and finally placed it on the abutment. The second girder was shifted in identical fashion.

Shifting of steel form work girders and pre-assembly site
Image: Günther Gröger

Lifting in of steel form work girders
Image: Günther Gröger

Top view of steel superstructure in lateral position
Image: LBS Redl

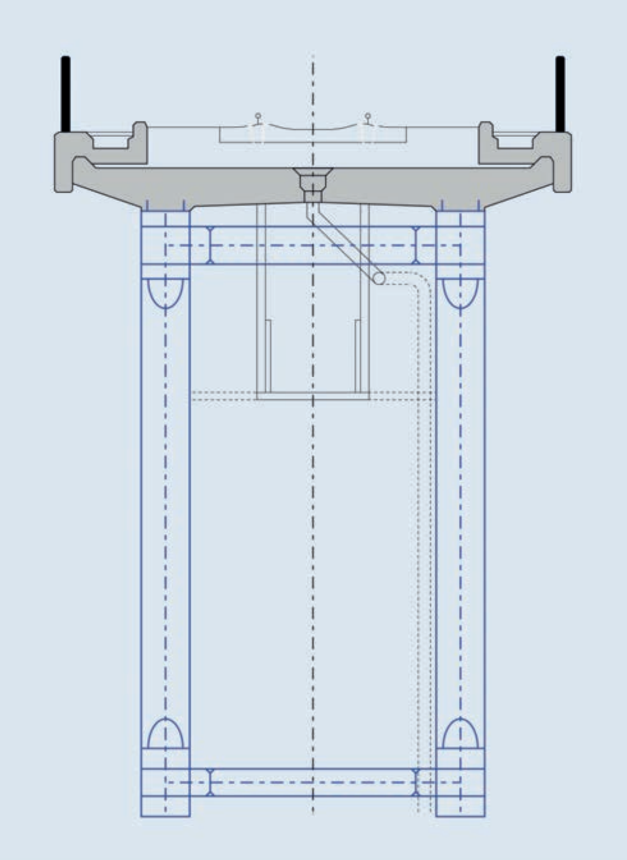
Composite track slab manufacture
The composite track slab made from reinforced concrete of strength class C 30/37 serves both as a compression boom, representing a significant building element and as a cross structure transferring dead loads and tensile loads onto the steel construction.

The overall span of 6.66 m is divided into the transversely reinforced strip footing's 4.10 m and the cantilever slab's 2 x 1.28 m.

The constructional thickness of 40 cm at the centre and lateral haunches of 10 cm on the underside in direction of the steel upper booms and the cambers result in a slab thickness of 55 cm above the main girders.

On the outer edges of the composite slab, humps for the anchoring of edge bars have been installed according to guide drawings. The defrost water drains are located at the depth contour, at the slab's centre. A little off the superstructure's axis, the longitudinal line of the bridge drain runs underneath the water drains.

The composite slab must be executed in monolithic type, meaning without section joints and in one pour.



Normal cross section – River Teichl bridge
Image: PORR AG

Composite track slab manufacture
Image: PORR AG

Removal of existing bridge
According to the call for tenders, the contractor was supposed to individually work out a blasting concept. In collaboration with SST-Schuster Spreng Technik GmbH, the joint venture created the following blasting concept:

The south and north piers are being tilted upstream by means of blasting out a wedge. In the course of this method, a falling wedge is being blasted out of the pier above ground level which is supposed to assure the piers fall over away from the new superstructure.

Due to its length, the steel superstructure could not fall low enough into the valley floor to make it come to a rest in the riverbed so that it could be reached with demolition excavators.

For this purpose, the upstream steel structure's top and lower booms were cut by means of blasting. The piers fell over sideways which resulted in the steel superstructure coming to a rest sideways; through cutting the steel booms, the steel superstructure could buckle and subside which made it possible for it to be reached by demolition excavators.

Blasting of river Teichl bridge
Image: Günther Gröger

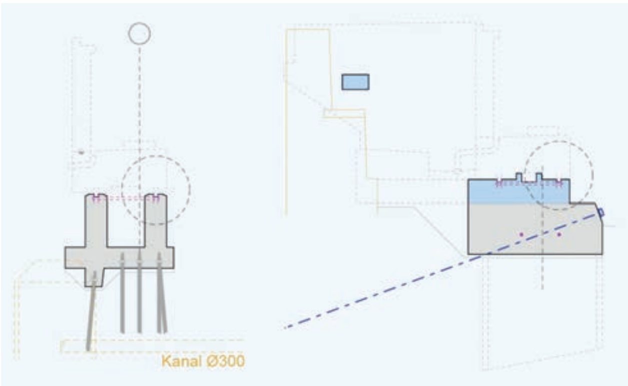
Removal of the blasted river Teichl bridge
Image: Günther Gröger

Lateral shifting
The skidways consisted of the shifting channel located at the bottom in which the skid, which was formed by an upside down crane rail, ran. In the beginning, the shifting channel was only fixed with concrete at the supporting abutment and free in the area of the main abutment. Only once the superstructure's weight was resting almost entirely (after concreting the composite slab) on the supporting abutment, the rising structure was installed at the main abutment and the shifting channel was newly aligned and fixed in concrete there.

As a sliding carriage, the skid was inserted into the shifting channel partly filled with Teflon fat in the area of the benching. An upside down crane rail, profile KSA 75, was used as a skid. Head bolts pointing upwards were welded onto its foot flange.

The lateral shifting was executed by means of a towing device. For this purpose, tendons were installed as deeply as possible in the benching. This towing device was executed as a console supported on the abutment's side surfaces in such a way that the loads are being transferred onto the abutment. For this console construction, a steel girder package was attached to the abutment which is anchored to the well latch and supported by the rising wall.

The expandable chucks were then placed on and fixed to the consoles. For purposes of lateral shifting of the superstructure, two identical presses were used per abutment. After the superstructure has been lined up with the benchings, their position was provisionally secured and the shifting channel was immediately backfilled.



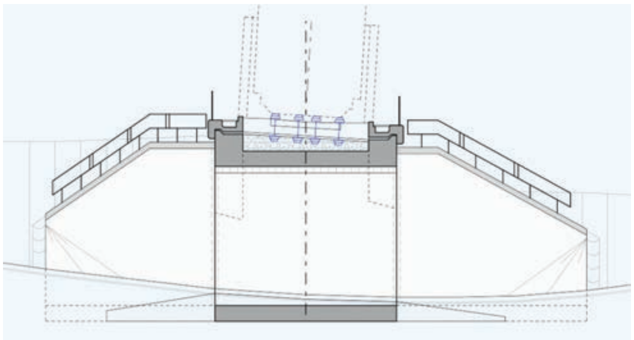
Cross section skidway
Image: PORR AG

Lateral shifting of the new river Teichl bridge
Image: Günther Gröger

Completed Steyr valley bridge
Image: Günther Gröger

Project data

Latticed steel form work	approx. 420 t
Corrosion protection	2,200 m²
Sealing	580 m²
Concrete for track slab	290 m³
Concrete for abutment	176 m³
Reinforcements	80 t
Concrete for well foundations	280 m³
Construction period	1.7.2013 – 30.4.2015
Opening	3.11.2014



Longitudinal cut small road underpass
Image: PORR AG

Small road underpass km. 67.057

In order to reconstruct the existing valley bridge at railway km. 67.175 across the river Teichl, it was necessary to relocate the small road crossing the railway tracks underneath the flood plain superstructure of the river Teichl bridge at the abutment on the Linz side before construction could commence.

The new road underpass was constructed as a single span closed reinforced concrete frame.

In order to keep the railway underpass open for public transport during the entire construction time of objects km. 67.057 and km. 67.175, the bridge was built underneath a previously erected auxiliary bridge.

The entire reinforced concrete frame was constructed underneath the auxiliary bridge under confined spatial conditions.

Due to the fact that, according to geological information, a sufficiently stable ground existed in low depth, the structure was constructed using a continuous bottom slab on shallow foundations.

For purposes of slope reinforcement, reinforced concrete wing walls were installed on both sides on the Selzthal side and on the western side on the Linz side. The wing walls (angular retaining walls) are disjointed from the frame apertures and were erected on separate foundations.
On the Linz side, the stone pitching on the eastern side runs along the small road all the way to the bridge.
Sealing work, the application of protective concrete and shifting the pre-fabricated concrete elements were performed during a track closure after removal of the auxiliary bridge.

Aerial shot of small road underpass and river Teichl bridge
Image: LBS Redl

Rail road track rehabilitation

All the required work on the rail road tracks was performed during a five-week track closure from 29 September 2014 to 3 November 2014. The tracks were adapted to the new Steyr valley bridge, the existing river Teichl bridge was removed, the new bridge was shifted into its end position and the rail road tracks were reconnected. With no effect to railway operations, a range of remaining works still need to be completed until the end of the year after the closure has ended.

Project data

Track substructure	1.3 km
Application of track ballast	2,400 t
Laying of cable troughs	1,200 m
Construction of substructure	1,500 m³
Excavated earth	17,000 m³

Work performed by PORR

The following work was performed by the group's companies:

Concrete work: Internal joint venture of PORR Banhbau and Porr Bau GmbH, Upper Austria branch
Lateral shifting: PORRGrundbau
Slope stabilisation and jet grouting: PORR Grundbau
Sealing work: IAT GmbH
Earthwork: Porr Bau GmbH, Upper Austria branch

All deadlines could be met and all structures were handed over according to schedule.

BelsenPark in Düsseldorf-Oberkassel

Newly constructed 2-storey underground car park with 692 parking spaces and two office buildings

Nabil Dabit, Michael Felsmann

Introduction

In August 2012, Porr Deutschland GmbH, Frankfurt branch office, was awarded the master builder contract for the construction of a new underground car park and two office and commercial buildings in the capital of North Rhine-Westphalia, Düsseldorf, more precisely in its Oberkassel district. Situated on the river Rhine's left bank, Oberkassel is one of the most attractive neighbourhoods in Düsseldorf. A former goods station which closed its doors in 1981, used to be located in its centre. Following an urban planning competition, the 152,000 m² area was recently converted into a city quarter. The objective was to create a bustling city quarter that combines living, working, catering facilities and shopping with open spaces including a car-free promenade.

A part of this area was developed by CA Immo Germany GmbH and Emscher Real Estate GmbH who have founded different project corporations for this purpose. On behalf of the two corporations, Porr Deutschland GmbH, Frankfurt branch office, built a two-storey underground car park with 14,300 m² floor space and two rising, five-storey office/commercial buildings with 2,200 m² and 1,100 m² floor space, respectively. Apart from 692 public and private parking spaces, the underground car park also houses the utility, storage and house connection rooms.

The stipulated construction period was September 2012 to August 2013. Considering the project's geographical location with the expected dangers caused by river Rhine floods, this was a very tight schedule indeed and necessitated, technical challenges aside, a well thought-out logistics concept.

Project Belsenpark is located in close proximity to the river Rhine and is surrounded by the stream on three sides. Due to this fact, Frankfurt branch performed surveys based on a flood that only happens every 10 years in preparation. Based on this, a double flood was taken into consideration in our planning. Necessary measures were strategically included in the plans since the second underground car park storey is located below the water line in the event of a flood.

Overview
Image: CA Immo

Boundary conditions – building site

Another boundary condition of the project involved the fact that due to development undertakings by the city of Düsseldorf, a so-called Planstraße B (hand-over date: 2 January 2013) and another street, Greifenweg, (hand-over date: 1 April 2013) were to be built and handed over to the city in the same urban development area in a time of four and eight months, respectively. Planstraße B crossed the western embankment area of our construction pit and Greifweg ran directly along the southern property line. Both completion dates were contractually agreed upon by the city of Düsseldorf and our clients and subjected to a very high penalty.

The construction of project Belsenpark was based on a very tight schedule from the beginning. Furthermore, construction could only start with a delay of one month due to the fact that preliminary work hadn't been performed. However, this did not affect the completion date of the two streets. Only thanks to follow-up changes to the construction process could the tight schedule be met. According to the calculated construction process, work was to continuously move from the eastern to the western property line. However, the disturbances to the construction process had significantly changed the boundary conditions. In order to meet the tight deadline, it was necessary to adapt and even to completely change the working cycles. Thus, an L-shaped development along Greifweg and Planstraße B had to be brought forward. The dates of hand-over to the city were to be kept under all circumstances due to the fact that sewer work on the main collector was to start at the two streets immediately after hand-over.

Exterior, natural factors such as heavy flooding and the long, harsh winter of 2012/2013, further aggravated the situation. Civil engineering work on the main collector started immediately after hand-over and thus, during our construction period.

Underground car park

The Rhineland's building ground consists of gravelly soil. Upon special suggestion by PORR Foundation Engineering's Munich branch, the 40 cm thick bottom slab was built on foundations supported on piles. The objective was to minimise the construction pit's depth since it was located in the flood-risk area. The 15,000 m² construction pit was built alongside Hansaallee (northern enclosure of the pit) using a secant bored pile wall. On Greifweg (southern enclosure of the pit) and the to-be-built Planstraße B (western enclosure of the pit) as well as on the eastern edge of the pit, Berlin sheeting was used. Special civil engineering work and the installation of the construction pit were carried out by the group's company PORR Foundation Engineering, Munich branch. PORR's Frankfurt branch was commissioned with master building work. The underground car park's bottom slab is 40 cm thick and features reinforcements for the pile caps which are another 20 cm thick. It functions as a reversed mushroom slab. Incorporation of the foundations into the soil was minimised to allow construction work to progress even at high ground water levels. The bottom slab rests in a self-supporting way on partial displacement piles with a diameter of 50 cm to 60 cm.

Pile caps in the underground car park construction pit during the flood
Image: PORR AG

For lower lying parts of the structure such as lift core boxes or sump pits, it was planned to install sheet piling poxes in the event of rising ground water. Buoyancy safety for the area not built over could only be achieved through the installation of tension piles. During the construction phase, the building was protected from buoyancy up to a water level of approx. 30 m a.s.l. (above sea level) after completion of the second basement floor and to approx. 31 m a.s.l. after completion of the first basement floor. In the event of flood waters rising above the aforementioned levels, the concept includes a purposeful flooding of the second basement floor by means of flood openings. Due to the altered L-shaped construction method, the construction pit was kept open and was only closed once buoyancy safety was assured. During this period, three floods occurred in the construction pit without causing any damages.

For the purpose of sealing against ground water, the basement floors' outer walls, together with the bottom slab, form a "white tank". The mean water level in the area of the structure was approx. 27.5 m a.s.l. and thus, 0.55 m below the lower edge of the bottom slab. The outer walls were executed as pre-fabricated double wall elements with in-situ concrete core at a thickness of 30 cm. Together with the floor slab above the basement floors and the bottom slab, the outer walls form a stiff basement box. In this context, the floor slab above the basement floor serves as a constrained layer for the rising floors.

The most economical solution saw the execution of the in-situ concrete ceilings in the underground car park in Topec ceiling boarding. Due to the changed boundary conditions caused by the necessary alterations to the construction process, the available amount of form work of 2,800 m² was raised to 4,500 m² in order to stick to the deadline for the two street areas agreed upon with the city of Düsseldorf. In the area of the utility rooms, horizontal reinforcements were installed since the floor slab height stretched over two floors.

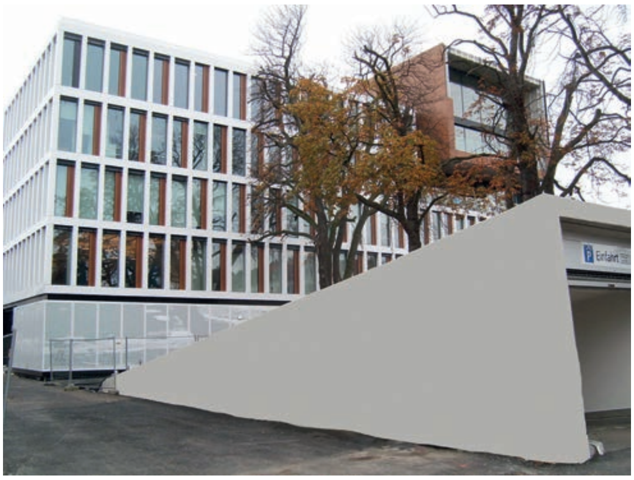
In the area of the boulevard (width: 16 m; length: 200 m) and the dead end roads, the underground car park floor slab above the first basement floor between the two rising buildings had to adhere to load class SLW 60 and was therefore executed with compact joists with a gully located above.

Completed underground car park
Image: PORR AG

In the 2nd and 1st basement floor, a total of 36 concreting sections using approx. 800 to 1,000 m² of power-floated concrete were finished in the open air. During this process, the factors "official permits", "weather" and "upscale residential area" (night-time work) had to be balanced again and again. The permit was only valid for one specific day and one particular section at a time and concreting and power floating could only be performed until 1 am.

The rising structures – two office / commercial buildings

The two aforementioned buildings rest on top of the underground car park's floor slab. The superstructure is a reinforced concrete construction. The reinforced concrete ceilings, executed as in-situ concrete ceilings, transfer their loads onto the vertical elements consisting of reinforced concrete cores, reinforced concrete walls and supports. At the same time, the cores serve the purpose of buttressing the building against horizontal loads caused by wind and deviations from the vertical line. The most economical solution was to execute the in-situ concrete ceilings of the rising buildings with Topmax slab tables in order to allow for some scaffold clearance.



Completed commercial building
Image: PORR AG

Completed commercial building
Image: PORR AG

Construction process

The fact that a single company was commissioned with all work turned out to be a significant advantage for the entire project and all partners involved in it. First, PORR Foundation Engineering's Munich branch was commissioned with special civil engineering and building the construction pit with a total volume exceeding 100,000 m³, followed by the awarding of master building work on the underground car park and the two rising buildings to PORR's Frankfurt branch. Another essential benefit was the possibility of a partial hand over of the construction pit and the early start of the subsequent construction work connected with it. Thanks to this, the total construction period could be significantly reduced. One part of the concept saw the planned relocation of the access ramp to the construction pit. Until November 2012, this ramp was located in the area of Planstraße B and was later relocated to the northern side of the construction pit (Hansaallee).

The fact that a single company had been commissioned, also paid off when problems arose: On the one hand, when the river Rhine flooded the area and on the other during the sudden discovery of a contaminated area.

The construction work was performed in extreme weather. Three floods and a period of extreme frost during the time of the flood caused an extension of the construction period. The flood caused by the river Rhine in Christmas 2012 was directly followed by a period of extreme frost in January which made the water in the construction pit freeze so it resembled a skating rink. When the time of frost ended, the snow in the areas of the river Rhine's tributaries that are located higher up started to melt which caused the next flood in February 2013. This second flood was followed by the third which lasted from May 2013 to July 2013. Nevertheless, thanks to forward-looking work planning processes and work cycles, it was possible to continue working – at least in some areas – so that all these problems resulted in only a minor extension of the construction period of 96 days. Due to the fact that floods are to be expected in this area, a contractual settlement basis for cost reimbursement in the event of construction standstills caused by flooding was already agreed upon with the client when the contract was signed.

Underground car park area during February's flood
Image: PORR AG

Underground car park during June's flood
Image: PORR AG

... underground car park area five months later
Image: PORR AG

Another disturbance was the discovery of a contaminated area in the construction pit close to Greifweg (at the southern side of the construction pit). An environmentally compatible restoration concept was worked out and implemented in collaboration with the district government of Düsseldorf, the Environmental Agency and the client.

According to a directive issued by Düsseldorf's city council, no sloping anchors reaching into adjacent properties were to remain in the ground. The sheeting's anchors were dismantled and removed from the completed floor slab above the 2nd basement floor. In order to pull the anchors and the Berlin sheeting along Greifweg, it was strictly necessary to construct an appropriate abutment. A special suggestion stipulated an L-shaped structure. The underground car park walls including the reinforcement cores from the 2nd basement floor to the ground floor had to be completed for this purpose. The distance from the construction pit's edge to the reinforcement cores was roughly 25 m.

Final remark

Thanks to the technical expertise of PORR's staff and excellent collaboration between the client, the planners and the statisticians, it was possible to meet the tight deadlines despite the fact that the start of construction was delayed by one month.

Underground car park area in June
Image: PORR AG

Project data

Client	Emscher Real Estate GmbH CA Immo Düsseldorf BelsenPark
Start of construction work	October 2012
End of construction	September 2013
Office / Commercial buildings	18,200 m²
Power floated floor with subsequent surface protection coating basement floor	28,000 m²
Parking spaces in the underground car park	692
Concrete	27,000 m²
Concrete quality 55/60	500 m³
Reinforcements	3,800 t
Fixing fillets	6,000
Gross floor area basement floor + 2 buildings	45,932 m²
Gross building volume basement floor + 2 buildings	61,000 m³

Construction of the New Rail Link through the Alps (NRLA)

PORR SUISSE AG project

Bernhard Flühler

Introduction

With the construction of the new Rail Link through the Alps (NRLA), a fast and effective railway connection is established at the Saint-Gotthard-Massif. The two base tunnels at Gotthard and Ceneri form its centre pieces. With a minimum of gradients and bends, they run from Altdorf all the way to Lugano.

NRLA at Gotthard represents a quantum leap for passengers. Journey time between Zurich and Milan is reduced to less than three hours.

The Gotthard base tunnel features two 57 km long single track tunnels. These are connected to one another every 325 m via cross passages. If one also counts all connection and access tunnels and shafts, the entire system has a length of more than 152 km.

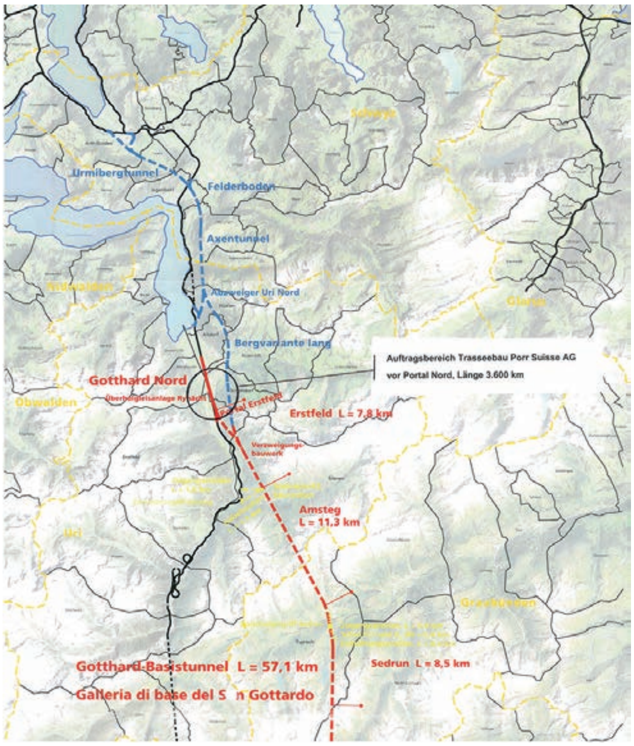
Two multi-functional areas in Faido and Sedrun divide the two tunnels into three sections of roughly equal length. Emergency stop stations and two lane change possibilities each are located at these multi-functional spaces. These allow trains to change from the one tunnel to the other. The air extraction system and numerous technical operation systems, too, are located there.

Via the overground access routes to the north and south of the two portals in Erstfeld and Bodio, the base tunnel is connected to the existing SBB (Swiss Railway Services) core line.

Division of tunnel sections

For planning purposes and construction, the Gotthard base tunnel was divided into four sections:

- Northern Gotthard overground route (4.4 km): PORR SUISSE AG was awarded contracts for work in this area.
- Tunnel segments: Erstfeld (7.8 km), Amsteg (11.3 km), Sedrun (8.5 km), Faido (13.5 km), Bodio (15.9 km)
- Southern Gotthard overground route (7.8 km):



Routing
Image: AlpTransit Gotthard

PORR SUISSE AG projects

PORR Suisse AG's contract sections pertain to the areas of the northern overground route. This overground route between Altdorf and the northern portal connects the new Gotthard railway to the existing SBB core line. Apart from the new railway route, several engineering structures, drainage installations, emergency stop stations and systems for maintenance and operation are being built.

PORR SUISSE AG contract sections:

- Section 012: Rynächt railway route construction with more than 3.6 km
- Section 028: Erstfeld undercrossing
- Section 105: Water treatment plant and dismantling of installation structures
- Section 052: Renaturation

Rynächt railway route construction – contract section 012

This section no. 012 includes comprehensive work such as ballasting, utility lines and sewers as well as a barrier layer for NRLA's access to the tunnel portal in Erstfeld. The work was performed by a joint-venture in which PORR SUISSE AG was in charge of management and technical supervision.

A submissions phase in June 2006 was followed by a long time of offer negotiations with the client which ended with the awarding of the contract in summer 2007. The order volume was approx. CHF 45.38 million.

Installation work began in September 2007. After a construction period of 7 years, work was completed by late September 2014.

The construction site was 3.6 km long and divided into eleven segments. Work first started at the construction site's northern area. After the first ballasting, the conveying systems to the different installation points were installed on the left and right of the Gotthard railway's core line. At the same time, comprehensive seepage systems, utility lines and drains were constructed.

Also part of the contract was the construction of footpaths, game crossings, valve structures and pressure lines. Prior to the installation of the barrier layer, all mast and signal foundations needed to be built. Finally, comprehensive fence systems were installed.

Railway bed in northern direction - construction condition of the northern segment after half a year of construction; on the left one can see the core line of the Gotthard railway, on the right: the conveying system's yellow belts
Image: PORR AG, Sept. 2008

Mechanical heading of the two tunnels from Erstfeld to Amsteg was carried out by the tunnel construction company from 2008 to 2010. Excavated material from these two 7,700 m long tunnel sections was used for preparing the concrete for the interior finish work and the ballast required for the railway bed in front of the northern portal.

Conveying devices and temporary storage of the excavated material for ballasting
Image: A. Wildbolz, Alptransit Nord, April 2010

Construction work in the northern segment between 2007 and 2012:

- Building of the railway bed including installation of mountain and tunnel water lines to the river Reuss
- Installation and dismantling of the conveying devices that were used to move material
- Construction of the seepage system Ried
- Ballasting of the installation area by means of a large scale pump for the sub-contractor in charge of railway technology
- Construction of small animal crossings, concreting work for switches and mast foundations
- Application of barrier layer

Construction work in the southern segment between 2011 and 2014:

- Construction of the railway bed including mountain and tunnel water lines to the connection in the tunnel
- Utility lines and sewers
- Construction of emergency stop stations in front of the tunnel portal
- Construction of operation and maintenance roads to the left and right of the new railway route
- Construction of small animal crossings, concreting work for cable crossings and mast foundations
- Application of barrier layer
- Construction of 350 m of noise protection walls ahead of Erstfeld
- Installation of fences and gates on the entire building site

Route running southwards – in the background: the municipality of Erstfeld; the rails leading towards both tunnel entrances are laid. Equipping the tunnels with rails and railway technology is running at full speed; renaturation work on the sides of the railway bed is already being performed.
Image: A. Wildbolz, Alptransit Nord, July 2014

Material used

The following amounts of material were used at section 012:

- 4.5 million tons of ballast
- 30,000 m of cable conduit DN 80 to 200 mm
- 12,500 m of sewer pipes DN 300 to 1,200 mm
- 4,000 m³ of concrete for engineering work
- 22,000 t of asphalt

and additional numbers of channels, shafts, riprap etc.

Conclusion

All deadlines and specifications stipulated by AlpTransit Gotthard AG were kept and implemented by the joint-venture under the supervision of PORR SUISSE AG. All eleven segments of section 012 could be handed over to the succeeding company without any essential faults.

Further services performed by PORR SUISSE AG for AlpTransit Gotthard AG

Apart from the railway bed section 012 (in a joint-venture), PORR SUISSE also executed the following building sections:

Undercrossing Erstfeld (section 028)

Here, too, AlpTransit Gotthard AG was the client. However, PORR SUISSE constructed the undercrossing in Erstfeld (building section 028) as a sole proprietor. All core services could be covered using in-house personnel.

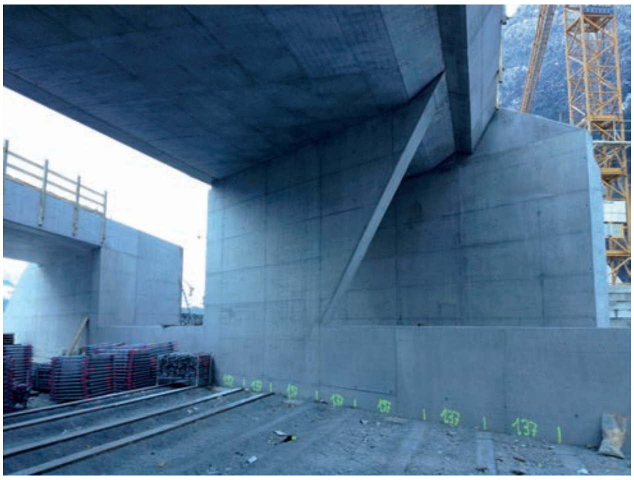
PORR SUISSE AG was awarded this contract with a total volume of CHF 4.677 million on the 31st of May 2012. In the construction period lasting from August 2012 to September 2014, the following work was carried out:

- Construction of the undercrossing for rails 100 and 200 including a ramp for the maintenance road
- Construction of the Wijrtalbach debris collector with corresponding screen and intake structure
- Separation device and seepage structures
- Construction of a 450 m canton road with utility lines, sewers, riprap and asphalt.
- Finishing work on the surroundings as well as installation of fences on the structures

In early September 2013, the canton road which runs through the new Erstfeld undercrossing could be opened for traffic.

Work was completed on the 31st of September 2014 and was accepted without defects by the client.

Area Erstfeld undercrossing (section 028)
Image: A. Wildbolz, Alptransit Nord, July 2014



Fair faced concrete work on the two undercrossings
Image: PORR AG

Water treatment plant and dismantling of installation structures (section 105)

Once again, AlpTransit Gotthard AG functioned as the client. Section 105, too, was executed by PORR SUISSE AG as a single entity. Again, all core services were performed using in-house personnel.

Construction pit and bottom slab of northern pipe basement
Image: PORR AG

The contract was awarded to PORR SUISSE on the 16th of August 2012 with a construction sum of CHF 3.634 million. In the construction period lasting from September 2012 to 2014, the following work was carried out:

- Construction of the construction pits for the two pipe basements
- Construction of the pipe basement with superstructures
- Reconstruction of the existing treatment basins
- Finishing work on the surroundings as well as installation of fences on the structures
- Dismantling of AlpTransit's installations

Renaturation (section 052)
This contract with a construction sum of CHF 1.438 million was awarded to PORR SUISSE by AlpTransit Gotthard AG on the 10th of April 2014. In the construction period lasting from May 2014 to summer 2016, the following work was carried out:

- Renaturation of areas on the sides of the newly constructed railway bed
- Distmantling of temporary storages and restitution to the farmers
- Sowing and plantations and their preservation
- Repair of meliorations

Those interested can view comprehensive information on the AlpTransit construction site at www.alptransit.ch.

Sylvenstein reservoir

Dam rehabilitation

Kersten Klinge

Introduction

Apart from the river Isar, Sylvenstein reservoir - named after a natural gorge section in the upper Isar Valley - also dams up its tributaries, the rivers Dürrach and Walchen. This created a fjord-like lake which is embedded into the mountain landscape in such an astonishingly natural way that one could mistake it for a relic from the Ice Age.

Sylvenstein reservoir's 42 m long and 180 m high dam rests on foundations in the form of a 100 m deep erosion gully in the main dolomite filled with river till which has been sealed with multi-row grout curtains with clay/cement during construction in the 1950s. The slim central sealing core consists of an artificial compound soil cement (gravel, fine sand, addition of Schluffmit bentonite) with adjacent moraine gravel filters on the air and water sides. Together with the pitched/green slopes, the support structure made from river gravel characterises the dam's surface.

Since its start-up in 1959, the dam serves as a flood protection measure. Being Bavaria's oldest water reservoir and the most important one in terms of flood protection, it has done its job very well for more than half a century and has proven its protective effect during large flood water discharges, especially for the city of Bad Tölz and the state capital Munich.

In dry periods, it raises the river Isar discharge which has been narrowed by drainage of water. Water from the reservoir is being used for environmentally friendly power. Furthermore, it has developed into a popular destination for recreation seekers and tourists. Being the oldest state-operated water reservoir in Bavaria, it has been technically adapted from 1994 to 2001 with the construction of a second flood relief spillway and the expansion of the flood control area by 20 million cubic metres through raising the dam by 3 m.

Long shot of Sylvenstein reservoir and its surroundings
Image: PORR AG | Georgi

Planned dam rehabilitation measures

Detailed surveying of the sealing core and the measuring system in recent years has prompted the water resources management authority which operates the barrage to carry out essential rehabilitation measures on the dam and its subsoil. The current upgrading measures are being performed between 2011 and 2015 and are divided in three core areas.

The barrage is located in a valuable area of unspoilt nature, the dam itself in an FFH zone. In order not to overly alter the dam's exterior appearance, solutions involving measures on the dam's inside have been pursued. Besides the safety of the dam structure in the construction phase and in its final state, ensuring unabated flood protection for downstream riparians was of paramount importance. If possible, storage of water in the reservoir should remain possible during the construction period.

In the last two years, numerous variants were intensively examined and the following measures were selected as the optimum solution.

1. Slurry wall

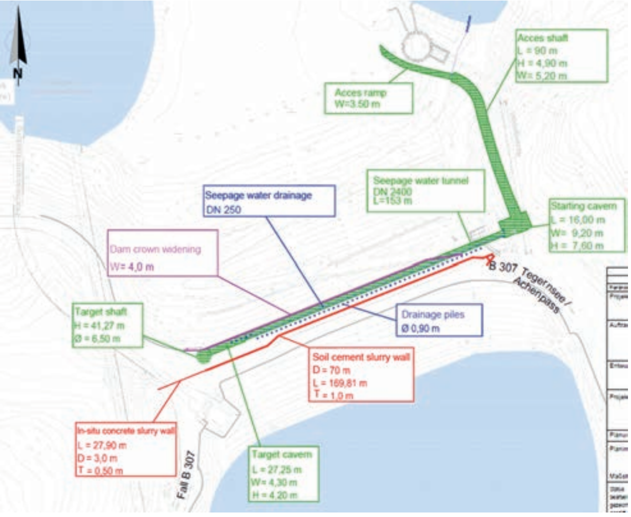
Installation of a slurry wall up to 70 m deep and approx. 1 m thick in the sealing core. This wall reaches down up to 25 m deep into the former Isar valley floor below the dam. The slurry wall was constructed in 2012 by means of a milling machine and grabber.

2. Seepage water tunnel

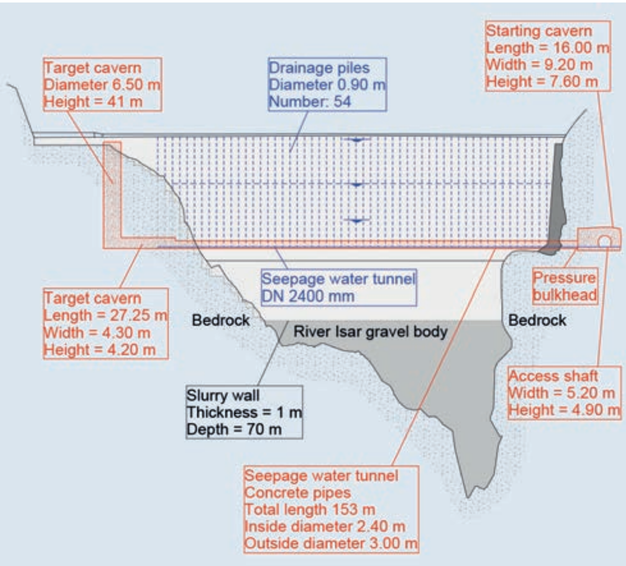
In order to build the seepage water tunnel, an access tunnel has first to be blasted into the rock at Sylvenstein face in 2013. From there, a tunnel drilling machine is used to drill the horizontal underground tunnel through the dam into the opposite Hennenköpfl rock face. Subsequently, the tunnel drilling machine will be retrieved through a previously blasted, 40 m long vertical target shaft. After that, the seepage water tunnel will be finished on the inside.

3. Drainage piles

In 2014, so-called drainage piles of approx. 40 m depth are supposed to be installed behind the slurry wall for the purpose of collecting potential seepage water. A drainage pipe inside these piles ensures the collection of water which is being guided into and measured at the lowest point in the seepage water tunnel.



General view
Image: PORR AG



Longitudinal section – sealing wall
Image: PORR AG

Drainage pile design

The drainage piles were sunken from the dam in 2014 and finished in such a way as to allow the measurement of seepage water. This task was awarded to Porr Deutschland GmbH, Foundation engineering department, now Stump Spezialtiefbau GmbH. The work could be commenced on schedule in July 2014 and finished successfully well within the contractual period by the end of November 2014.

A total of 54 drainage piles of 2.8 m length and 900 mm diameter were sunken on to a depth of 42.5 m. The bore holes were executed as wells and connected to the seepage water measurement device by means of horizontal drilling from the seepage water tunnel (d=2.4 m).

The drainage piles 01 to 05 are located directly on top of the tunnel axis, above the gradient Hennenköpfl rock slope. In the area of the embankment, the bore holes (d=900 mm) were sunken with integration in the rock. In the rock material, bore holes (d=300 mm) without pipes ending at the seepage water tunnel's crown were executed by means of the down-the-hole hammer drilling method. For this purpose, the tunnel walls (d=2400 mm) of concrete quality C50/60 were to be drilled through at their respective ridge.

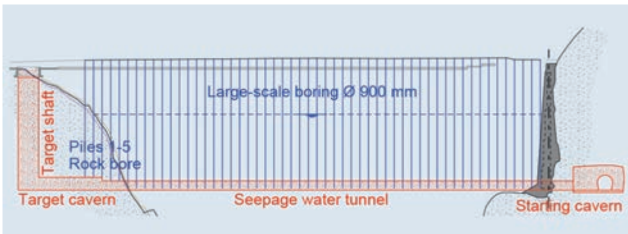
Executing the bore holes as wells included a sump pipe (d=500 mm) including a hopper and "Dr. Traub sleeve", stainless steel continuous slot screens as well as filter and solid pipes made from PE. This ensures their function as monitoring wells for seepage water accruing behind the new sealing wall and the old dam sealing.

A BG36 drilling rig including piping device as well as a LH853 cable excavator, also fitted with a piping device functioning as a lifting apparatus, were used. The d=900 mm drill pipes were sunken in an oscillatory manner onto the final drilled depth of 42.5 m by means of the drilling rig with an auger drill mounted in front.

The d=300 mm rock bores with a drilling length of 25 m were carried out by means of the down-the-hole hammer drilling method. Tunnel finishing work was performed using the LH853 lifting apparatus including piping device for pulling the drill pipes during gravelling using filter gravel.

In order to adhere to the drilling tolerance of 1%, all wells had to be examined and documented by means of verticality measurement after sinking. These measurements were used for the drilling points in the seepage water tunnel in order to install the drainage lines from the wells to the tunnel.

Drilling work was performed using the MR700 basement drilling rig from inside the tunnel. For this purpose, additional sealing systems had to be installed at the joints to collect potential seepage water.



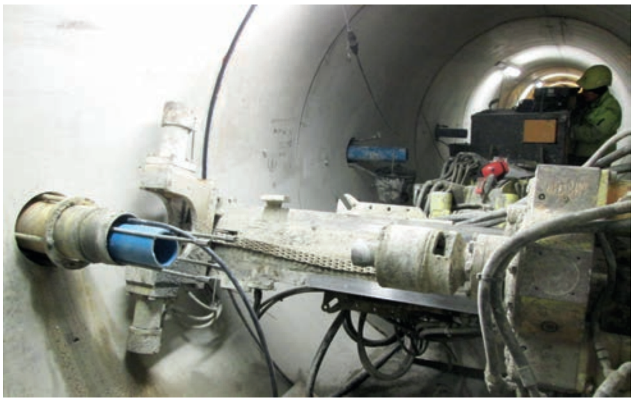
Drainage piles – longitudinal section
Image: PORR AG

Aerial shot in direction of Sylventstein reservoir: in the foreground, one can see the outlets for the regulation of the water level
Image: PORR AG

Building site with BG 36 drilling rig for drilling work and LH853 cable excavator for well removal and dismantling of piping d=880mm
Image: PORR AG

BG36 drilling rig with automated rotary table and drilling auger during drilling work on the dam body
Image: PORR AG

Seepage water tunnel with drainage well in the area of the tunnel top during horizontal drilling between tunnel and well
Image: PORR AG



Execution of horizontal drilling using basement drilling rig in the tunnel with a diameter of 2.4 m. Installation of the drainage pipe inside the temporary piping (d=178 mm)
Image: PORR AG

Completed drainage line with sealing using a packer system for the collection of seepage water fron the drainage well
Image: PORR AG

With the revitalisation of the construction site and the reconstruction of the main road B 307 crossing the dam including an additional longitudinal parking strip, the construction scheme should be completed in mid-2015.

Summary

Sylvenstein reservoir was built in the 1950s using the technological and financial resources available at the time. The 1980s saw the first rehabilitation efforts on the dam's core and essential parts of the dam structure were upgraded in the 1990s. Among others, the centennial floods of 1999 and 2005 could be handled thanks to these measures, for instance through raising the dam by 3 m.

Now, it is time to use current engineering possibilities to create a system that is prepared for the tougher challenges projected for the future – also in the wake of climate change. Even in times of tight public budgets, the Free State of Bavaria has therefore decided to undertake the project "rehabilitation of Sylvenstein reservoir bank."

With the successful processing and the constructive collaboration between the client and its project management and the involved planning offices, a unique building has been rehabilitated.

ÖBB (Austrian Railway Services) bridge Kramsach

Construction of a new steel composite bridge over the A12 Inn valley motorway

René Spörr

Introduction

In summer 2014, the entire existing ÖBB railway section in the Tyrolean lower Inn valley between Jenbach and Kundl was reconstructed. The core element of this project was the demolition of the existing steel bridge and the construction of a new arch bridge over the A12 motorway in the area of Kramsach.

Old bridge construction

Built in 1973, the steel bridge structure had reached the end of its service life and was therefore to be replaced. The distance between piers on the existing bridge was 2 x 30.25 m. Located between the two carriageways of the A12 were two cylindrical piers which were executed as rocking piers and made from 600 mm diameter steel pipes which were grouted with concrete. Point supports twistable all around were installed on the top and bottom of the piers.

The bridge was built as a construction made from two single-celled steel box girders with a width of 2,500 mm and a mean height of approx. 1,385 mm. The two box girders were constructively connected to one another by means of cross girders and cover plates. The clear passage height under the bridge was 4.7 m at the most critical point.

Existing ÖBB (Austrian Railway Services) bridge Kramsach
Image: PORR AG

Existing ÖBB (Austrian Railway Services) bridge Kramsach – twistable nodal support
Image: PORR AG

Since, as was already mentioned, the old steel bridge over the A12 had reached the end of its service life, ÖBB-Infrastruktur AG decided to replace it with a new arch bridge to ensure the safety and effectiveness of the lower Inn valley line. The new steel composite bridge with a length of 100 m and a width of 16.6 m was constructed parallel to the old steel bridge while keeping railway operations going and without any major effects on traffic on the A12 motorway. During a track closure of 14 days, the existing steel bridge was removed and the new railway bridge was skidded in place. The new railway bridge was opened for railway traffic on 1 September 2014 at 5:00 am.

Visualisation of new ÖBB-bridge Kramsach
Image: ÖBB-Infrastruktur AG

Project

The following essential criteria and operational objectives were to be taken into account for the construction of the new railway bridge over the A12 motorway in the area of Kramsach:

- Pier-free construction
- Maintaining the A12's minimum clearance outline
- Continuous ballast bed
- Assembly to be completed during a closure of both

tracks of approx. 2 weeks
- Keeping railway traffic moving except for short-time track closures

The track bed in the bridge area and the location of the bridge were determined by the line routeing. In the area of the bridge, the track distances amount to 4.5 m at Wörgl abutment and 4.26 m at Innsbruck abutment. In this area, the tracks describe a transition bend. The track gradients follow a crest.

Due to the mentioned framework conditions, a composite construction type single-celled bridge structure with a distance of 100 m between supports was selected. It consists of a double girdered arch superstructure in steel construction and an 11.8 m wide track supporting layer made from in-situ concrete. Choosing an arch construction proved to be the optimum solution in terms of requirements towards the structure and from the perspective of layout. Transverse load transfer was achieved through an in-situ slab which was finished with a smooth suffit for reasons of preservation. This was of paramount importance due to its location right above the motorway.

Overall measurements of the new bridge construction:

- Distance between supports: 100 m
- Total length without abutments: 102.87 m
- Total width including catwalks: 16.60 m
- Axis-centre distance between lattice girders 13.00 m
- Clear width at head of rail: 11.80 m
- Height above head of rail approx. 12.12 m
- Total construction height: 14.05 m

Arched ÖBB (Austrian Railway Services) bridge Kramsach
Image: PORR AG

The superstructure's width increases to 13 m axis-centre distance of the main supports due to the the carriageway below and due to line routing at the transition bend. Due to the increased width and greater distance between supports, it was possible to place the load-transferring abutments with their pile foundations by the side and behind the existing abutments. Construction work was performed while keeping the effects on railway traffic at a minimum.

The new superstructure was equipped with a continuous ballast bed. This homogeneous superstructure increases ride quality while reducing the generation of noise.

Due to the fact that the double track closure was restricted to approx. 2 weeks (14 August 2014 to 1 September 2014), the new superstructure had to be built next to the existing tracks. In order to keep railway traffic moving, the existing tracks had to be secured by means of a coffer-dam construction. To make building the new composite bridge next to the existing steel bridge possible, it was furthermore necessary to erect a 2,000 m² safety scaffold above the A12 motorway and to temporarily close both emergency lanes since parts of the foundations for the scaffold were installed there. The safety scaffold covered an area as large as some seven tennis courts.

Safety scaffold above A12 motorway
Image: PORR AG

Safety scaffold above A12 motorway
Image: PORR AG

Protected by the safety scaffold, the two arch superstructures were shifted, adjusted and welded in place by means of a 750 t crawler crane. Due to confined spatial conditions on location and in order to maintain a minimum distance of 3 m to the railway bed, the steel structure had to be moved 2 m away from the abutment to be assembled there. The entire steel superstructure was welded in a force-fitting way using in-situ concrete prior to the construction of the track supporting layer. Furthermore, all required auxiliary constructions were built and shifted by 2 m at right angles to the railway bed. After skidding, the superstructure was supported on steel packs and secured in longitudinal and transverse direction at the abutment and the cut-off wall.

Installation of 750t crawler crane
Image: PORR AG

Assembly of steel frame
Image: PORR AG

Order

In February 2014, TEERAG-ASDAG AG's Tyrol branch was commissioned with the construction of the steel composite bridge measuring 100 m in length and 16.6 m in width as well as with the demolition of the old railway bridge over the the A12 including all corresponding dewatering and foundation work by ÖBB-Infrastruktur Aktiengesellschaft, GB Strecken- und Bahnhofsmanagement Region West. First, the building site had to be extensively surveyed due to the possibility of finding war relics which would have to be removed prior to starting bore piling work and excavating the construction pit. Directly after that, the challenging and impressive building scheme could be tackled. Fully according to schedule, the new bridge could be opened for railway traffic on 1 September 2014. The old abutments were demolished during the track closure from the 14th to the 31st of August 2014. In several night shifts in September 2014, the removed old superstructure was lifted out and directly loaded onto flat bed semi-trailers in four parts by means of a 500 t mobile crane. Subsequently, those parts were cut and recycled. Dismantling work on the temporary installations and skidding foundations as well as the adjacent motorway and railway embankments was performed in autumn 2014. The building project, including all recultivation, roadway and remaining work could be concluded in winter 2014.

Footings – foundations – subconstruction

At the start of construction work, the building site had to be developed and three access roads had to be built. Two of the access roads used as construction site access will be used as service roads for future maintenance work on the bridge and its abutments. After building the access road at the Wörgl side abutment on the right hand side of the bridge, preparation work on the building site equipment area started. In the course of this process, the working formation for the upcoming sheet piling and drilling work on the two abutments left and right of the railway tracks was constructed. During four track closures of 72 hours each, PORR Foundation Engineering installed 16 inclined large bored piles (DN 120 cm) with a length of 36 m from two different levels (track and motorway level). Therefore, it was necessary to use two different drilling machines, a BG 36 and a BG 40. At the same time, the coffer-dam construction was installed at the abutments, consisting of sheet pile walls parallel to the existing tracks, which were fastened together with GEWI anchor bars (DN 63 mm) and reinforced with waling girders in the course of construction pit excavation. Previously, our in-house measurement department had installed a monitoring system on the existing tracks. Until final completion of construction pit excavation work, measurements were taken three times per day. Due to the fact that points are located at both abutment sides, only settlements smaller or equal to 5 mm were permitted along the entire section.

Abutment Wörgl – Coffer-dam construction including operating path
Image: PORR AG

Once the construction pit excavation had been completed, the bored piles which were to serve as foundations for the new bridge were cut by hand and the pile grillage was formed, reinforced and concreted. At the same time, the footings for the skidding foundations, made from bored micro-piles (DN 200 mm), were constructed. On these footings, the skidding foundations and, at the same time, the basis for the construction of the two bearing blocks including 16 m cut-off walls were erected using in-situ concrete. The skidding foundations needed to be built in order to construct the new bridge and its abutments by the side of the fully operational railway section and to be able to install the steel skid rails for transversal skidding.

The construction of the bearing block including the installation of the steel skid rails, too, required a kind of special and technical expertise not found every day. In the first step, the skidways were placed in the skidding foundations and pile caps were placed in their proper height and location with an accuracy of +/- 1 mm at the right hand side of the bridge and were, after clearance through control measurements by the client, grouted using high-tensile shrinkage-compensated grout. During this process, the crane rails are connected to the skidding channel through a weld-on plate. Furthermore, the skidway was encapsulated. During the following work, keeping the pre-lubricated skidways clean was of paramount importance. The skid gaps between and on the sides of the two skidways were filled with gravel. This formed a plane for the laying of the deck panels serving as residual form work which were pre-fabricated at the construction site. The bearing blocks were formed at the bottom with these pre-fabricated deck panels which were to be executed rough on both sides to allow for later shear transfer through the joint. The side surfaces were formed conventionally. The gravel filling was removed after the bearing block had hardened. The gravel had to be removed from the skid gaps by means of suction.

Installation of skid rails in their foundations
Image: PORR AG

Laid countering form work (deck panels) for the construction of the bearing blocks
Image: PORR AG

Reinforced and formed bearing blocks with concreting and ventilation openings
Image: PORR AG

Subsequently, the cut-off wall executed with in-situ concrete and the bearing pedestals with inserted welded base plate were installed on the bearing block and the plate was richly grouted using shrinkage-compensated grout. The bearing pedestals with welded base plate needed to be manufactured beforehand in order to provide the steel packs for the purpose of supporting the bridge superstructure after removal of the safety scaffold. After completed construction of the two steel arches and subsequent transversal skidding by 2 m, the steel packs were already installed on the bearing block and the bridge was supported on those packs.

At the same time, all footings and foundations for the safety scaffold over the A12 motorway and for the skidding construction used for shifting out the existing bridge were built using in-situ concrete. Subsequently, the steel construction for the safety and shifting scaffold was erected on those footings and foundations. Planning and statical measurements were carried out by TEERAG-ASDGAG's Tyrol branch.

Prior to track closure, four 60 t skid shoes were assembled on site as pre-fabricated elements. During the track closure, after the old bridge had been shifted out and the existing abutments had been removed, these shoes were placed between the pile grillage under very confined spatial conditions using a 350 t mobile crane.

Installation of pre-cast shoes for subsequent skidding
Image: PORR AG

Installation of pre-cast shoes for subsequent skidding
Image: PORR AG

Subsequently, the distance pieces were installed between the skid shoes and the GEWI anchors (DN 63 mm) were inserted and fastened. After the shoes had been fastened, the area between the two shoes was concreted using C50/60/B2 quality concrete.

Due to the construction process's tight timetable, the skid rails needed to be installed right after the installation of the skid shoes. The accuracy/maximum deviation tolerance had been specified with +/-1 mm in height and direction. Due to the fact that the 6,000 t bridge had to be skidded over the skid rail after a hardening time of just 12 hours and due to its short construction time, the rail was grouted with a special grouting material based on methacrylic resin. This grouting material made from purely chemical ingredients hardens to a strength of 60N/mm² in just one hour. In order to install the product despite harsh weather conditions and constant rain showers, both skidways were covered with a 19 x 3 m enclosure.

Subsequent to this work, the skidway could be released for transversal skidding on 21 August 2014.

After the skidding process had been completed, the skid gap was filled with expanding grout since the longitudinal forces had to be transferred to the foundations via a skid stud in the area of the pile heads. The shear forces were transferred through this grout. Additionally, two injection hoses were installed in each skid rail in order to subsequently fill hollow spaces which could be created during the grouting process with an expanding artificial resin. This assured a continuous compound and – in turn – full shear transfer.

In parallel to the coffer-dam, the wing walls which were highly complex in terms of formwork were installed in architectural concrete quality together with their foundations on all four abutment sides at a distance of some 1.5 m to the track's minimum clearance outline. Recesses for pulling the anchors during removal of the coffer-dam construction had to be provided in the wing walls. Only this allowed for the infill of concrete with drainage channel and the injection of filter concrete up to the top anchor level while keeping railway traffic moving at full capacity as well as for the removal of the chording, anchor row by anchor row.

Abutment Kufstein – Pile grillage and foundations for wing wall
Image: PORR AG

Abutment Kufstein – Completed wing wall
Image: PORR AG

The pre-fabricated wing walls were connected to the abutment wall with added in-situ concrete after the new railway bridge had been transversally skidded. Additionally, the bearing block was connected with the pile heads using tension rods. Pre-fabricated chamber wall elements which were fastened to the bearing block and the cut-off wall served as lateral stopend panels for the concrete topping. Due to confined spatial conditions, the pre-fabricated elements were put in place and fastened using a 130 t mobile crane. The pre-fabricated chamber wall elements were manufactured directly at the building site. After fastening the pre-fabricated elements, the in-situ concrete topping was reinforced and concreted.

Installation of pre-fabricated chamber walls
Image: PORR AG

Production of deck panels for the purpose of closing the assembly openings
Image: PORR AG

Concreting of pre-fabricated chamber walls
Image: PORR AG

Construction – steel bridge structure – composite slab

In preparation for the construction of the bridge superstructure, a 2,000 m² safety scaffold made from steel with a sealed and shear-resistant wooden mounting surface was erected on top of the A12 motorway. The safety scaffold consisted of seven steel yokes which rested on concrete foundations, a shear-resistant mounting surface, shores integrated into the safety scaffold for the mounting of the steel superstructure, two skidways for the transversal skidding by 2 m and 3 m high lateral planking serving as fall protection as well as a splash guard towards the motorway and the railway tracks. The entire steel construction was pre-fabricated by PORR's Steel Construction Department on location in Kematen and erected on location in collaboration with TEERAG-ASDAG AG. ASFINAG (Austrian Motorway Operators) only allowed us one night shift with a total track closure of one hour in each direction to erect the steel construction over the A12 motorway.

The mounting surface and the lateral planking of the safety scaffold were pre-fabricated at the building site. The individual mounting surface sections measured 3.5 m x 4 m and weighed roughly 1 t in total, 142 mounting surfaces and 100 pieces of planking had to be pre-fabricated. The individual elements needed to the placed and fastened in a shear-resistant way above the motorway using truck-mounted cranes during traffic closures lasting only 20 minutes. Each individual mounting surface was made from timber beams of 20 m x 10 m (220 m³) and a plane formwork bottom (2,000 m², S-CUT 27mm formwork panels), a layer of foil and a protective layer made from oriented structural boards (2,000 m² / 22 mm). Along the planking, a drainage channel was built to drain rain water in a controlled manner. The statical measurement of the mounting surfaces and the protective planking as well as the acceptance of the safety scaffold were carried out by Porr Design & Engineering GmbH. Dismantling was performed following the same procedure as assembly.

Installed safety scaffold assembly base viewed from below
Image: PORR AG

Storage of on-site constructed assembly bases for the safety scaffold
Image: PORR AG

The 145.6 m steel superstructure was conceptualised as a three-span composite construction of torsion-proof box girder type. The constructional height at the abutments amounts to 1.9 m and approx. 3.1 m at the piers. Connection and flange plates are up to 100 mm thick. The haunches and the narrow width of the steel superstructure – 2.6 m in the area of the bottom boom and 3.8 m at the top boom – make the bridge construction appear more elegant and lighter. The steel superstructure's flexurally rigid connection to the pile heads was executed with an "add-on construction" consisting of two vertical sheets on the sides (sheet thickness 40 mm) which were both welded to the steel superstructure's solid, 100 mm thick lower boom sheet and, constructively connected to the pile head through 2,400 shear studs. These inserted steel elements were concreted during pile construction.

The double girdered arch superstructure with anchorages in steel construction weighing 1,200 t were manufactured in the steel construction workshop in 24 individual segments and delivered to the construction site by means of heavy load and special transports. At the mounting / crane set-up site on location, which needed to be built in preparation for the mounting process and the set-up of the 750 t crawler crane, the sections were lifted in place and fastened to the safety scaffold and the temporary shores one by one at night during track closures of 20 minutes. Section upon section was lifted in place and welded together in this way. The heaviest section weighed some 85 t alone and had to be placed at a distance of 75 m. This required the 750 t crawler crane, of which only a few are available in Europe. Four auxiliary frames were necessary for the construction of the steel arches. They reinforced the arches during construction and prevented them from distorting during concreting. Until installation of the final suspenders, additional temporary suspenders made from GEWI anchors (DN 63 mm) were mounted to the outsides of the arches. These also served as arch reinforcements during construction. Once the steel superstructure was finished, it could be skidded by 2 m on the safety scaffold in the direction of the existing section. At the same time, the superstructure was supported on the steel packs installed for this purpose and fastened to the abutment for the purpose of concreting the track supporting layer. After concreting the track supporting layer and completion of all the other superstructural parts including placement of the pre-fabricated parts, the final suspenders were installed. For this purpose, it was necessary to pre-stress the steel superstructure using the temporary suspenders and to adjust the arch. Subsequently, they were installed and welded in a force-fitting manner. Installation and activation of the suspenders was performed according to a detailed procedural concept by the client's statistician.

Installation of 80 t arch base
Image: PORR AG

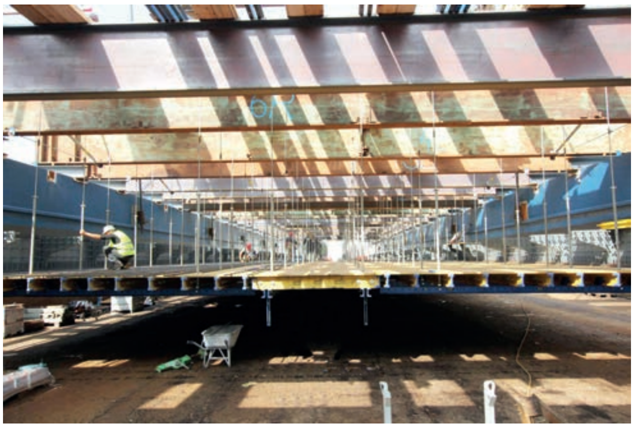
Completed arch superstructure and false work for superstructure form work
Image: PORR AG

The side walkways located on both sides were attached to the superstructure by means of steel consoles and were furthermore executed as collision guards for the motorway below. After completion of the new ÖBB bridge, the structure was appropriately put in the spotlight using lamps mounted on these walkways.

The entire team also faced a technical challenge during the manufacture of the falsework and the superstructure formwork. The special part of the demanding work was that the superstructure formwork was supported on heavy falsework made from 34 HEB 1000 mm and 28 HEB 600 mm steel girders. The individual girders were laid on HEB 300 steel girders of 1.5 m length on the steel construction's anchorage. Centring bars were mounted between the HEB 300 girder and the HEB 1000 girder to assure even load transfer into the anchorage. DOKA formwork tables that were pre-fabricated and covered in the factory were chosen for the superstructure's formwork. These tables were suspended on the steel girders using four anchor bars each as well as load-distributing WS10 rails. Due to the fact that the gap between safety scaffold and track supporting layer only left a work height of 1.4 m, bespoke trolleys were assembled in order to move the individual tables to their destined position. The boundary areas and the connection to the bottom boom were conventionally formed using H20 girders and formwork panels. Here, too, PORR Design & Engineering performed the statical measurements and acceptance.

False work for superstructure form work
Image: PORR AG

False work for superstructure form work
Image: PORR AG



Superstructure form work suspended on false work
Image: PORR AG

The non-prestressed reinforcements weighing 220 t and 32 t of prestressing steel were laid and installed "hand in hand" with the formwork. A total of 30 tension members with a length of 100 m each were laid. Due to the suspended superstructure formwork, the tension members could not be uncoiled by means of a mobile crane and a drum, but had to be inserted manually one by one. In terms of non-prestressed reinforcements, a total of six layers of longitudinal and transversal distribution beams were laid. In the course of construction work, a special concrete recipe was worked out in collaboration with the concrete technologists which was used for concreting the 1,100 m³ track supporting layer with an average thickness of 85 cm. Finally, concrete of quality C35/45(56)/B5/GK22/F52/Cem I,42,5R,C3a-free was chosen and used. Thanks to this type of concrete, a maximum hydration heat of 65°C could be achieved. The track supporting layer concreting process started at the superstructure's centre and moved separately in both directions. Using two concrete pumps, it was executed in one pour. At a mean pump performance of approx. 40 m²/h, the concreting process could be completed in one 13-hour-cycle. Contrary to common practice, two layers of some 50 cm each were executed on each side and carefully "sewn". In the process, the bottom layer was executed in advance for three sections (approx. 15 m) and the top layer was continuously drawn along at this distance. The client had requested constant monitoring of the hydration heat through the installation of three temperature sensors during concreting of the track supporting layer.

Feeding and fastening of tension members
Image: PORR AG

Tension members supported on drums
Image: PORR AG

Concreting of 1,100 m³ track supporting layer
Image: PORR AG

Concreting of 1,100 m³ track supporting layer
Image: PORR AG

According to plan, the inserted beams and the track supporting layer were finally executed with a cant of 15 cm at the structure's centre. In order to build a longitudinal drainage line to both abutments with a slope of 0.5%, 15 cm thick sloping concrete with an integrated drainage channel was installed using an alternating sequential method. The concrete was pre-processed using a high-pressure water jet method and subsequently sealed using a base coat of epoxy resin and a 2-layered waterproofing layer. Additionally and also using an alternating sequential method, a 5 cm thick layer of protective concrete was applied for the purpose of protecting the sealing.

After the track supporting layer including all mentioned superstructural parts had been completed, the hand-forged bridge suspenders were pre-stressed at constant loads and connected to the steel superstructure (anchorages and arches) in a force-fitting manner. Only after the suspenders were installed, the pre-fabricated elements for the edges could be divided.

98 pre-fabricated drainage parts and 98 pre-fabricated cable trough parts were installed on the superstructure, grouted with filter concrete and connected to each other. Additionally, the track ballast mats were laid. All the work was carried out prior to the 2-week track closure in order to make sure that, after successful transversal skidding of the

new bridge, the only tasks left were to backfill the abutments and apply the track ballast.

Installation of pre-fabricated cable troughs on the superstructure
Image: PORR AG

Placement of single-grain concrete below the pre-fabricated cable troughs
Image: PORR AG

Transversal skidding

On the 24th of August, the 100 m long and 12 m wide steel composite arch bridge with a total weight of some 6,000 t was, according to plan, skidded in a transverse direction by 19 m to its correct position. Thus, the railway section could be duly opened on the 1st of September.

In order to achieve this milestone in the course of the building scheme at hand, the following technically challenging constructive measures had to be taken:

The skidway consisted of a type A150 skid rail and a welded steel construction for support and anchorage. The crane rail was connected to the bearing block in 2 parts of 3 m each in the area of the bearing points. Additionally, a 380 x 40 mm sheet with shear studs was welded to the rail and installed in the bearing block. The lower part of the skid rail was installed in the skid foundations and the pile caps on the right side of the bridge. The remaining part was installed during the track closure after installation of the pre-fabricated parts located between the pile heads. The skidway's connections were to be smoothed flush in order to eliminate additional frictional forces during transversal skidding. Furthermore, it was necessary to chamfer the crane rails at the front and the skidways in the joint area.

Considering the extensive loads and the long skidding distance, choosing the correct anti-friction agent was very important. Due to pressures of approx. 90 N/mm², build-up of high temperatures in the skid gap was to be expected. Therefore, the chosen anti-friction agent needed to be highly heat-resistant. Additionally, the agent was not to be squeezed out by the pressures created in the process.

In the course of the track closure, earthwork was carried out in the area between the pile caps and directly afterwards, the pre-cast concrete parts were lifted in place and grouted using in-situ concrete. The skidways were installed in a separate work step during which it was paramount to stay within the stipulated installation tolerances. The skidway's welding seams were to be smoothed flush. The steel consoles anchored to the pile head used for supporting the stressing jacks were installed on the pile caps to the left of the bridge. The steel consoles were fastened by means of tension rods installed in the pile heads and via a transversal girder in the top area of the pile heads. Ducts for inserting the tension members were installed in the bearing block. The tension members were anchored in the area of the bearing block by means of anchor plates on the outside. These could be removed once the skidding had finished. The exposed part of the skidway was to be coated in lubricating grease.

5 MN stressing jack for transversal skidding
Image: PORR AG

Preparation work for transversal skidding
Image: PORR AG

Transversal skidding
Image: PORR AG

Transversal skidding
Image: PORR AG

Transversal skidding of the superstructure had to be carried out on both abutments at the same time. The two teams working at the abutments needed to stay in contact via an intercom system. The following steps needed to be adhered to in the course of skidding:

1. Pre-stressing of the jacks to 100 kN.
2. Removal of safety straps.
3. Provision of position measuring device and observer.
4. Slow increase of press force until movement occurs. The press forces as well as the degree of potential gentle jerks were recorded.
5. Steady pulling in increments of 10 cm. It had to be assured that all four jacks performed the steps equally.
6. After each step, the distances covered were compared. In case the distance covered by one abutment exceeded the other one's by more than 50 mm, the abutment needed to be pulled further using shorter skidding distances.
7. The tension cables' tension was to be kept constant. After each tensioning process and prior to relocating the stressing jacks, the tension cables needed to be wedged.
8. Once the jacks performed equal steps, the distance covered in each step could be increased.
9. As transversal skidding continued, the skidway was to be lubricated using the above mentioned anti-friction agent. The area between the rail sections could be lubricated using inserted hoses.

In the event that, during transversal skidding, the press forces required should markedly rise, loads on the skidway could be reduced by lifting the superstructure and the bearing block. For this purpose, recesses in the bearing blocks had been provided. Four jacks (2 x 400 t, 2 x 500 t) had been provided for lifting the superstructure.

Due to the fact that – for reasons still unknown to this day – problems occurred during skidding the 6,000t ÖBB bridge over the A12 motorway which meant the bridge could only be moved in jerks, the utilised system had to be changed. In a planning / coordination meeting called upon at short notice, it was determined that the eight jack support points on each abutment were to be equipped with jacks resting on slides and that the bridge was to additionally be skidded on greased Teflon plates. The slides were manufactured on site in one day and installed together with the jacks. Thanks to these measures, it was finally possible to reduce the loads on the skid rails and perform the skidding operation. Thus, the bridge could be placed in its correct position on the 24th of August 2014 at 7:00 am.

The cable runs and pre-laid ballast with rolled layer could be punctually handed over to the contractors in charge of roadbed and track as well as line installations on the 26th of August 2014.

On Sunday, the 31st of August 2014, towards the end of the closure of the track section between Jenbach and Kundl, ÖBB's new 6,000 t steel arch bridge faced a double load test. Six "Taurus" locomotives weighing 86 t each were used to first perform a statical and subsequently, a dynamic load test. The bridge was literally put to the acid test. In the first test, three locomotives coupled together were parked on the new bridge and the loads created by some 500 t of weight, were measured using the most accurate measuring devices. The second step was the dynamic load test. During this, the locomotives crossed over the new structure several times. First, loads were measured at 40 km/h and at the end, at the future top speed of 160 km/h. During crossing, bridge construction experts once again measured the structure thoroughly. Early Monday morning, at 5 am, the first scheduled train could cross the new, 12 m wide and 100 m long bridge at significantly reduced noise. This also marked the end of the track closure of the overground railway line in the Tyrolean lower Inn valley which had started on the 14th of August.

Cut-off rocking pier after 20 cm of transversal skidding
Image: PORR AG

Demolition of existing bridge – finishing work

The existing structure was pushed out via the three strip foundations (central reserve, abutments on Wörgl and Innsbruck side) and the steel skidding constructions at the foundations' top edge. Slides supported on stainless steel sheets and Teflon plates were located in all three skidways. The old bridge was shifted out on the 16th of August after it had been partially cut in the abutment area and after the existing structure and the skidding construction had been connected in a force-fitting manner while A12 motorway traffic remained unrestricted.

A total of three slides equipped with hollow piston jacks with a capacity of 44.5 t were used. Thus, one slide and one jack were mounted for each skidding axis. The skidding slides were connected to one another with GEWI rods (DM 26 mm) via the slides' exterior bore holes. They were fastened using the corresponding anchor plates and domed nuts. The tension rod running in skidding direction was connected to the skidway at its end. Now, when the hollow piston was extended, the three slides moved in skidding direction due to the press power. Subsequently, the cylinder was retracted, the cylinder nut with anchor plate was readjusted and the next cycle could start. The Teflon plates released by the forward movement of the slides were reinserted in skidding direction. The entire existing structure including rocking piers was thus transversally skidded. The skidding process took place during the night from the 16th to the 17th of August 2014 from 10 pm and 4:30 am. For this purpose, the 2nd lane of both carriageways of the A12 (Kufstein and Innsbruck) needed to be closed.

Transversal skidding of the existing structure
Image: PORR AG

After the existing structure had been transversally skidded, it remained on the site until final dismounting (from 24 to 30 September 2014), supported on the skidding foundations and the skidding scaffold.

The existing superstructure was to be cut into four parts of roughly the same size. The following work steps were performed in the process:

- A movable safety scaffold was installed between the two box girders of the existing bridge as protection for the A12 motorway below and to ensure the safety of the workers.
- The two superstructures were divided by means of a longitudinal cut, protected by the afore mentioned safety scaffold.
- The superstructure was transversally divided in the area of the centre pier, while both 2nd lanes on the dual carriageway were closed from the 25th to the 26th of September 2014, from 10:30 pm to 4:30 am.
- In order to allow the parts to be lifted out, four openings of equal size were cut into the superstructure beforehand which were then used to connect the slinging means (4 chains). The chains were used to create a loop into which a shaft was inserted. The openings were cut into the structure when the 2nd lanes on the dual carriageway were

closed, at the same time as the transversal cut was made.

- Before the four bridge parts could actually be lifted out, it was necessary to build structural supports for the skidding construction at the abutments on the Wörgl and Innsbruck sides. For this purpose, a total of four WS10 rails were mounted to the left and right of the construction using rock anchors and anchor rods (DN 15 mm). Furthermore, shores using heavy-duty props which supported the steel construction were installed to prevent the construction from tilting in the direction of the carriageway.
- The motorway had to be completely closed twice to lift out the four bridge parts (part 1 to 4). The pre-fabricated parts were lifted out using a 500 t mobile crane with anchoring device that had to be set up prior to the motorway closure at the end of the skidding foundations on the respective carriageway, between the 1st and the emergency lane.
- In two night shifts, the four bridge parts were placed directly on two flat bed semi-trailers, cut in the middle on site, further cut in to deliverable parts at the building site and transported to the dump.
- The rocking piers and skidding construction on the central reserve were dismantled during the second night using the mobile crane which had been provided for lifting out the superstructure.
- The temporary foundations of the skidding construction were dismantled in autumn 2014 in the course of removal and restoration work.

Excavation existing superstructure by means of a 500 t mobile crane
Image: PORR AG

Separation of the existing superstructure supported on two low-bed semi-trailers
Image: PORR AG

Existing superstructure supported on low-bed semi-trailers
Image: PORR AG

The difficulty lay in setting up the 500 t mobile crane as quickly as possible in confined spatial conditions. Furthermore, the road maintenance department and the authorities only allowed TEERAG-ASDAG a time window of 1.5 h to lift out two bridge parts. The entire existing bridge could be dismantled in the two night shifts available.

Remaining and finishing work

In the course of construction of the ÖBB bridge, TEERAG-ASDAG also reconstructed the storage and manoeuvring space belonging to Nagel. This project involved the construction of a 4,800 m² manoeuvring and storage space with seepage swales and a 170 m long noise protection wall resting on foundations made from bored piles. Most deliveries and removal transports to and from the construction site went through Nagel's property.

After the existing bridge had been transversally skidded and lifted out, dismantling and restoration work began in order to return the area to its original state. For this purpose, all temporary structures such as foundations, skidding constructions etc. had to be dismantled/removed. Subsequently, the embankments along the A12 motorway were reconstructed.

At the same time, the bridge drainage and the A12's existing drainage system were connected and all operating paths and embankment stairways were built. The embankments in front of the two abutments were covered with a 10 cm thick filter 0/32 and a rough LMB60/300 riprap. The asphalt recesses in the motorway area and numerous other tasks requested by ASFINAG were performed and the measures effecting traffic were completed in autumn 2014.

Installation of dump stone riprap below the new bridge
Image: PORR AG

ÖBB arch bridge Kramsach shortly before completion
Image: PORR AG

Final remark

The toughest challenges the executing company TEERAG-ASDAG AG, Tyrol branch, the sub-contractor responsible for the steel bridge structure, the engineering office Obholzer & Baumann and the planning and building management on site faced were the technically demanding construction and mounting of the bridge, the short construction period of just 10 months, keeping railway traffic moving as well as the framework conditions of the building site (access) and the delicate location of the construction site. With this infrastructure project, TEERAG-ASDAG AG, as an essential part of the PORR group, has repeatedly proven its expertise in executing building schemes that are both technically demanding and following a tight schedule.

The opening of the new ÖBB bridge over the A12 eliminated one of the last remaining bottlenecks along the overground railway section in the lower Inn valley. From now on, this section is, like most parts of the western line, prepared for speeds of 160 km/h. For railway customers, this means reduced noise, more punctual trains and future timetable stability. Furthermore, the new bridge leads to a reduction of noise for residents living in close proximity to the tracks thanks to its construction which has been optimised in terms of noise emission. This markedly aesthetic and elegant bridge construction represents a technical showcase for railway construction between Kramsach and Brixlegg over the A12 motorway.

Load test using 6 "Taurus" locomotives weighing 86t each
Image: PORR AG

Load test using 6 "Taurus" locomotives weighing 86t each
Image: PORR AG

Project data

Client	ÖBB Infrastruktur AG, Innsbruck
Contractor	TEERAG-ASDAG AG, Tyrol branch
Length of construction section	800 m
Length of bridge	100 m
Width of bridge	14.20 m
Bridge surface	1,450 m²
Distance between piers	100 m
Steel bridge structure	1,200 t
Steel safety scaffold	300 t
Concrete volume	4,600 m³
Pre-fabricated parts	310
Reinforcing steel	600 t

Prestressing steel	32 t
Bored piles	670 m
Micropiles	930 m
Injection drill bolts	1,560 m
Jetcrete strengthening	1,200 m²
Sheet piles	1,100 m²
Embankments	19,000 m³
Asphalt mix	1,500 t
Start of construction work	February 2014
Beginning of operation	1 September 2014
Lifting out of existing bridge	16 August 2014
Dismantling of existing bridge	September 2014
Insertion of steel composite bridge	21 to 24 August 2014
Final completion	Winter 2014

Regionalbahn "Innsbruck Northern Innrain" handed over to IVB on schedule

Image: PORR AG

By order of Innsbrucker Verkehrsbetriebe und Stubaitalbahn GmbH (IVB), TEERAG-ASDAG, Tyrol branch, renewed and extended the entire track and road infrastructure at northern Innrain in a construction period of just 10 weeks.

Mayor Mag. Christine Oppitz-Plörer thanked the people involved in the work performed: „The work was completed on time despite adverse weather conditions in summer.“

Deputy Mayor Mag. Sonja Pitscheider, responsible for mobility, joins in with Innbruck's mayor: "Since school start, IVB has already been running its lines on schedule and without any diversions."

Figures, Data, Facts

On the part of Innsbruck Kommunalbetriebe AG, construction work on the overall project at northern Innrain began on 10 February 2014. IVB then joined in in August with road and track construction. Construction work was officially completed on 17 October.

In total, 615 m of tracks, three track crossings, four points and one bus boarder of 60 m length were erected in the course of track construction.

Road works included 250 m of road and track drainage lines, 19 catch pits and track drainage boxes, some 4,800 m² of road surface, 400 m² of pavement and bicycle paths as well as platforms. Furthermore, 450 m of curbstones and 840 m of ductwork (for IVB point controls and signalling) were laid.

Chancellor Werner Faymann awards Styrian apprentices' construction site Anton-Benya-Prize

Image: Michael Mazohl

Image: Michael Mazohl

With the project "Lehrlingsbaustelle PORR Steiermark" (apprentices' construction site PORR Styria), Porr Bau Gmbh, Styria branch, has found a unique way of improving apprenticeship training and making it more innovative. On the construction site, future skilled labourers – accompanied by a foreman – learn how to complete an entire construction stage completely on their own, thus assuming responsibility early on.

The project has a positive effect on all those involved and culminated on the 20th of October 2014 in Vienna's town hall. The Anton-Benya endowment fund has awarded our apprentices' construction site project the main prize for apprenticeship training.

The Anton Benya endowment fund was created in celebration of Anton Benya's 60th birthday in 1972. Every two years, the prize is being awarded to organisations, individuals and companies in recognition of innovative ideas in the area of the promotion of skilled labour.
The fact that PORR has won one of the main prizes this year fills everyone involved with great pride and joy.

In the course of the award ceremony in Vienna's town hall, Dir. DI Peter Schaller, BRV Christian Supper and Oliver Erat were handed the acknowledgement for taking the right path in apprenticeship training and thus, for securing skilled labour in their own company by Chancellor Werner Faymann, Federal Minister Hundstorfer, ÖGB President Foglar and other representatives from politics and the economy.

On-schedule release for traffic at Austria Federal Railway's (ÖBB) construction scheme "discontinuation of railway junction Weißenstein/Carinthia"

Image: PORR AG

Image: PORR AG

Image: PORR AG

TEERAG-ASDAG AG, Carinthia branch, could release the construction section of ÖBB's "discontinuation of railway junction Weissenstein" for traffic on 10 October 2014, five months after work commenced. At an overall volume of approx. EUR 2.1 million, the construction scheme included the construction of a reinforced-concrete bridge crossing the L37 Ferndorfer Straße, the railway section "Bleiburg - Innichen", a reinforced-concrete bridge for the newly created municipal road, the rehabilitation of the platforms as well as the erection of various new municipal roads.

The centre pier of the reinforced-concrete bridge crossing the L37 and the ÖBB tracks was executed as a V-shaped type. In-situ concrete was used on the superstructure on top of the L37, the superstructure on top of the tracks was executed in pre-cast elements with subsequent grouting. A two-day night closure was available for the lifting the pre-cast elements into their place. Thanks to excellent organisation and great efforts by the personnel on location, lifting the elements in place could be completed in the course of one night closure.

Due to close collaboration with ÖBB and all persons involved in the construction, the scheme's tight schedule could be kept.

Celebratory inauguration of the rehabilitated railway section "Trencianska Tepla – Belusa" in Slovakia.

After a 4.5-year construction period, the renovated section of railway “Trencianska Tepla – Belusa” was ceremonially opened in the presence of Transport Minister Jan Pociatek, General Director of the Slovakian state railway (ZSR) Stefan Hlinka and representatives of the joint-venture “Belusa” on 01/07/2014.

During the project the 20 km long section that is located around 140 km north-east of Bratislava was modernised during track operation and developed for speeds of up to 160 km/h as part of the European corridor network. The main areas of work included the track substructure (earthworks), rail construction, railway modernisation, road building, line construction and signalling systems. The line is one part of the European corridor from Kittsee through Bratislava to Žilina and then onto Čierna nad Tisou. Construction work started on this project with a contract volume of EUR 250 million (27% share in PORR) in the spring of 2010.

PORR carried out its share of the work within the working partnership largely using in-house capacity. The track-laying work was carried out successfully by colleagues from the rail construction department in Austria in collaboration with colleagues from PORR s.r.o.

PORR was able to punctually hand over the project to the client after a 4.5 year construction period and has made a name for itself as a competent and reliable partner for major railway projects in Slovakia with the work performed.

Image: PORR AG

Image: PORR AG

Image: PORR AG

Celebratory inauguration of Attnang-Puchheim railway station

With great citizen participation, the new railway station - the third largest in Upper Austria after Linz and Wels was inaugurated on 24 October 2014. In their speeches, Minister for Transport Alois Stöger, Governor Dr. Josef Pühringer and Dep. Governor Ing. Reinhold Entholzer as well as Attnang-Puchheim's Mayor Peter Groiß highlighted, in particular, the regional significance of this investment. Austrian federal railway's (ÖBB) Chairman of the Board Mag. Christian Kern also referred to the importance of investing in new train stations as a prerequisite for switching from individual traffic to public transportation. Every day, Attnang-Puchheim's train station is frequented by 8,000 passengers.

Image: Günther Gröger

From left: Moderator; Christian Kern, CEO ÖBB; Federal Minister Alois Stöger; Provincial Governor Josef Pühringer; Deputy Provincial Governor Reinhold Entholzer; Mayor of Attnang-Puchheim Peter Groiß
Image: PORR AG

Image: Günther Gröger

The construction performance included the construction of a new reception building and new pedestrian tunnels with corresponding access points to the platforms. Like their access points, the newly constructed platforms have been designed to be barrier-free. The entire renovation and new construction work (not including building equipment) was mainly executed by Porr Bau GmbH, Upper Austria branch.

Image: Günther Gröger

Topping-out ceremony at the new office building "The Green Line Kačerov" in Prague

The newly constructed office building's topping-out ceremony was celebrated on the 9th of September. The client, the group of companies Karimpol Group has already completed more than 20 projects in Prague and many more in central Europe.

In his speech, Mag. Andreas Prokes of Karimpol said: "Today, together with our general contractor PORR, we celebrate the topping-out ceremony for our project The Green Line Kačerov. The carcass has already been completed and the façade sheathing is currently being constructed. In March of next year, we will already be able to welcome the first tenants."

The building has four basement floors and seven upper floors (including ground floor). Green terraces with a view of Prague were built on the top two floors. The generously sized central reception lounge gives the tenants access to the individual floors. Every one of the four main building cores is equipped with two lifts. Space for a separate reception lounge was provided in the building's northern wing. To ensure visitors comfortable access to the building, a separate visitors' lift takes them from the underground car park directly to the main reception. The individual upper floors have been designed in a functional and efficient way - even open space offices extending across an entire floor are possible. The building's design allows ample daylight to reach all rooms. It is intended to install conference rooms, relaxation zones, restaurants and a café on the ground floor.

The project The Green Line Kačerov receives the globally recognised certificate LEED Gold (Leadership in Energy and Environmental Design) which is being awarded to environmentally friendly buildings. The property meets A+ standards and offers a number of innovative technologies. It goes without saying that fully air-conditioned rooms, built-in fan coil devices and double floors are part of this.

Image: PORR AG

From left: Franz Scheibenecker (PORR); Milan Jendrusák (KARIMPOL International s.r.o); Andreas Prokes (KARIMPOL International s.r.o); Štefan Havlík (PORR); Josef Husar (PORR)
Image: PORR AG

Topping-out ceremony at newly constructed Landesklinikum Neunkirchen

Provincial Minister Karl Wilfing during handover of the traditional topping out ceremony donation to Site Manager Roman Gutwenger and bricklayer Christopher Heitzer.
Image: PORR AG

In the presence of Provincial Minister Karl Wilfing and many more representatives from Lower Austrian politics and the province's public health services, the topping-out ceremony for the newly constructed Landesklinikum Neunkirchen was held on the 16th of October 2014.

From late 2015, the hospital will provide medical care in the southern regions of Lower Austria. The clinical centre's foci are on orthopaedics and psychiatry.

The complex of buildings is comprised of four main structures for which some 40,000 m³ of concrete and approx. 3,000 tons of concrete steel were used during structural work.

In ten months, a Porr Bau GmbH internal joint venture including the department for major building projects and Lower Austria branch has erected the carcass on behalf of VAMED AG .

Thanks to detailed preparatory work and excellent collaboration between all parties involved in the project, its tight schedule could be met.

In the name of Vamed AG, its Managing Director Ing. Walter Troger, praised the performed services.

Ceremonial opening of the Wiener Privat Klinik's new Health Service Center

The 5th of September saw the ceremonial opening of Wiener Privat Klinik's Health Service Center in Lazarettgasse 25 in Vienna's 9th district.

As a representative of Porr Bau GmbH, managing director Josef Pein held a speech in which he addressed the executed planning and construction services as well as good collaborations.

Chief physician Dr. Walter Ebm, Managing Director of Wiener Privat Klinik's holding, illustrated the new building's functions: Besides 14 group surgeries for the attending physicians which have been elaborately designed and equipped with common secretary's offices, one also finds 14 7-day-surgeries which are used during the whole week. Two floors house what is currently Vienna's most modern x-ray institute. However, the real highlight among its equipment is, apart from magnetic resonance and computer tomography, a device for the novel SPECT/CT method, a diagnostic procedure which can display both the structure of organs and their metabolic processes.

Building supervision received special praise from the client for its exceptional dedication.

Through value engineering, the major building projects department could optimise the already approved project in such a way that the client's budget was not exceeded while still making sure the building was completed in the agreed time.

A catholic minister held a reflective speech in which he also referred to the limits of the medical arts and the celebrations ended with prayers and a blessing.

Subsequently, the guests received a private viewing of artist Peter Mairinger's acrylic paintings which give the rooms an artistic note.

The day drew to a pleasant close at the leisurely buffet.

Ground breaking ceremony for flood defences in Gottsdorf

Last Friday, Federal Minister Alois Stöger and Provincial Minister Dr. Stephan Pernkopf conducted the ground breaking ceremony for another important flood protection project along Lower Austria's section of the river Danube. The federal government, the province and the market town of Persenbeug - Gottsdorf have invested more than EUR 17 million in the flood defences.

Since the last flood catastrophes the province of Lower Austria has, in fact, invested heavily in flood protection. 360 projects worth EUR 630 million were completed and 110 additional projects are currently being realised. Thanks to a budget increase after last year's flood on the river Danube, the continuous flood defences along the Danube can be completed ahead of schedule in 2019. The recently started project is being realised by Porr Bau GmbH, Lower Austria branch.

Image: PORR AG

Ceremonial opening of flood defences for Melk an der Donau

From left: Alois Stöger (Federal Minister), Erwin Pröll (Governor), Thomas Widrich (Mayor of Melk), Wolfgang Kaufmann (Deputy Mayor of Melk)
Image: PORR AG

The 5th of September saw the celebratory ceremonial opening of the city of Melk's flood defences and its newly designed main square by Governor Dr. Erwin Pröll and Federal Minister Alois Stöger.

Instead of the projected starting date in 2015, moving the Province of Lower Austria's subsidies forward allowed constructions to begin in 2013. A total of EUR 14.5 million were invested, EUR 10.1 million in protective measures alone. The flood defences including surface reconstruction of the main square and parts of the inner city were completed in the course of six construction phases.

The project was a cooperation between the Lower Austria branch and the department for foundation engineering and was processed to client's full satisfaction.

Cornerstone laying ceremony at Prager Carrée in Dresden – bye bye "Viennese Hole"

Image: PORR AG

True to this motto, the 8th of September 2014 saw the laying of the first cornerstone for the residential project Prager Carrée on what was previously Dresden's most prominent brown field.

The construction pit was excavated in 1998 in the course of tunnel construction in front of the railway station. However, the city was unable to find an investor.

In fact, the pit is still there, but four buildings with six and seven floors, respectively, are supposed to be erected between Kugelhaus and Prager Straße until early summer 2016.

In perfect "Anglo-Saxon", the client, real estate company Revitalis, invited more than 100 guests to the cornerstone laying ceremony. Among the guests were the city's Manager for Construction Jörn Marx, the comedian Uwe Steimle, representatives from the city's administration and the city council and many more.
In bright sunshine, with a glass of champagne, delicious canapés and background music, the time capsule was filled with such things as money, a current newspaper, an architectural plan and a Germany jersey imprinted with the words "Prager Carrée". Subsequently, the capsule was ceremonially placed in the cornerstone by comedian Uwe Steimle, the city's Manager for Construction Jörn Marx and architect Jan-Oliver Meding.

On more than 23,000 m², project developer Revitalis plans to erect some 250 flats and commercial units. The construction will occupy the last unused site in the southern section of Prager Straße, thus closing the last gap on the heavily frequented axis between the main railway station and Dresdner Altmarkt.

The topping out ceremony is scheduled for the coming year. One year later, everything should be completed.

Porr Deutschland GmbH, Berlin branch, has been commissioned with execution planning and turnkey construction.

Berlin: Construction scheme "Living 108" - Topping out ceremony on the 4th of September 2014

On the 4th of September 2014, nine months after work began, Peach Property Group AG celebrates the topping out ceremony for apartment project Living 108 in Chausseestraße 108 in Berlin's "Mitte" district.

The Living 108 construction scheme with its 128 apartments, one underground car park and three commercial units extending on one basement floor and up to seven storeys, encompassing an overall space of 7,569 m², was built in the heart of the city.

This is where the city's pulse beats the fastest. Chausseestraße is the continuation of Friedrich-Straße and is located directly at the underground station "Naturkundemuseum", just 10 minutes from Brandenburger Tor and Alexanderplatz. The new building housing Germany's intelligence service headquarters is situated in its immediate vicinity.

At the time of the topping out ceremony, all but twelve out of the Swiss real estate company Peach Property's 128 luxury apartments in Chaussestraße were already sold.

According to plan, the apartments, sized between 38 and 121 m² and featuring two to four rooms, will be handed over to their owners in spring 2015.

"Constantly increasing demand from buyers since project start as well as swiftly progressing construction work made Living 108 a big success for us", Bernd Hasse, Managing Director of Peach Property Group (Germany) AG stressed and added: "and it shows, just like its neighbouring project Living 106, how well our Living-concept for modern and premium city apartments is being received."

Porr Deutschland GmbH, Berlin branch, has been commissioned as a general contractor with complete turnkey construction performance, including general planning from HOAI phase V as well as with the entire building site preparation (not including construction pit). On the occasion of the topping out ceremony, both client and architect have praised the collaboration with PORR as well as its excellent performance.

Topping-out ceremony at project Stresemannallee in Frankfurt/Main

Just nine months after construction had begun, the topping-out ceremony for project Stresemannalle in Frankfurt was celebrated. Client Aberdeen Asset Management Deutschland AG, the architecture and planning office Wentz & Co., Frankfurt am Main's mayor, the involved subcontractors and Porr Deutschland GmbH's staff celebrated the completion of structural work.

The construction scheme is being erected at Frankfurt's Stresemannalle, close to the centre of the 700,000 citizen metropolis on the river Main. In accordance with the requirements stipulated in KfW 70 standards, six residential buildings with a total length of 170 m featuring 132 rented apartments and one underground car park with 107 parking spaces and 25 car ports are being built in this attractive residential area. Quick access to Frankfurt's inner city makes Stresemannallee an almost perfect place to build – the next S-Bahn, tram and bus stops are just a few walking minutes away and take residents into the heart of the city.

September 2014
Image: PORR AG

With great interest and in perfect weather, the invited guests followed several speeches by the client's representative Fabian Klinger, city planner and Managing Director of Wentz & Co. Prof. Dr. Martin Wentz, Frankfurt's Mayor and Head of Frankfurt's Department for Planning and Construction Olaf Cunitz and the Head of Porr Germany GmbH's Frankfurt branch Uwe Ritter.

"We have gladly taken on the challenge of realising this interesting project", Uwe Ritter, the Head of PORR's Frankfurt branch said in his opening remarks and thanked all those involved in the construction for their work and the area's residents for their understanding.

Olaf Cunitz, Frankfurt's Mayor and Head of his city's Department for Planning and Construction, elaborated on the housing situation in Frankfurt: We see a constant rise in population and the city has already surpassed the 700,000 citizen threshold. Since 2005, the city has grown by 15,000 citizens annually. "The city of Frankfurt has a budget of EUR 45 million per year allocated to construction project", the mayor reported. "And this is why Frankfurt wants to become active in the growth of residential construction." In 2013 alone, Frankfurt issued 5,310 building permits. This marked a record number – it's been 50 years since such a number was recorded. Furthermore, Mayor Cunitz wished for a problem-free continuation of the building process.

From left: Jens Witter (DMP), Willi Eiden (PORR), Fabian Klingler (Aberdeen Asset Management), Uwe Ritter (PORR), Olaf Cunitz (Mayor of the City of Frankfurt), Prof. Dr. Martin Wentz (Wentz & Co), Maik Seifert (PORR)
Image: PORR AG

Our foremen Stefan Scheuren and Stephan Holm had the last word with the traditional topping-out ceremony address.

With the words: "Hoch, hoch, hoch!" (High, high, high!) and the last lines of the topping-out ceremony address:
„Zum Richtschmaus wollen wir nun eilen, (let's hurry to the topping-out feast)
bei gutem Essen, Bier und Apfelwein, (with good food, beer and apple cider)
in froher Runde uns verweilen, (we linger in jolly company)
denn von Arbeit lebt man nicht allein. (for one does not live from work alone)
Das letzte Glas, es gilt der Ehre, (the last mug - it's dedicated to honour)
dem Handwerk, dem ich angehöre. (and my trade.)
Und nun, du Glas, fahr hin zu Grunde, (And now this mug shall form the basis)
geweiht sei dieser Bau zur Stunde!“ (and this building shall be blessed in this hour!)

the building was traditionally blessed and the buffet was opened. This gave one the opportunity to engage in pleasant conversation with good food and finally, to let the topping out ceremony come to an end.

PORR's Frankfurt branch was commissioned with turnkey construction of the project. Construction is scheduled to take a little bit more than 26 months. During the already completed structural work, 18,500 m^3 of earth were moved, 1,800 tons of concrete steel and 15,700 m^3 of concrete were used.

Rehabilitation of market hall Burgdorf (canton Bern)

The market town of Burgdorf commissioned PORR SUISSE AG with the entire rehabilitation of the market hall in Burgdorf.

The historic event hall was built between 1930 and 1933.

Its rehabilitation was carried out within the framework of a general contractor agreement. After completion of all work, the hall will function as a modern, multi-functional location for various events.

For this purpose, significant measures such as improvements to the superstructure, the building physics properties (among others, through comprehensive renewal of the façade and roof), the fire protection, the technical building equipment, the acoustics, the room design and the facilities were necessary.

Offering 1,250 m² of space for some 2,000 people, the hall can be divided into several areas.

Rehabilitation work started in October 2014 and lasts until hand-over to the operator by the end of September 2015.

Existing market hall – before rehabilitation
Image: Kaufmann und Arm AG

Porr Deutschland GmbH, Berlin branch will construct residential building Sapphire – star architect Daniel Libeskind's masterpiece

Image: Ziegert-Immobilien

The project is located at Chausseestraße in Berlin's "Mitte" district, directly opposite the German Intelligence Service's (BND) new building which is currently under construction.

After extensive technical and scheduling consultation by the client as well as design and application planning, Porr Deutschland GmbH, Berlin branch, was commissioned with the turnkey construction of the Sapphire project including execution planning in early October 2014. The excavation of the construction pit had already been commissioned as an advance performance in August 2014.

Sapphire was designed by the architect Daniel Libeskind and represents a residential building unique in shape and type. 78 free hold flats as well as commercial premises and one basement floor form the usable areas in this rather futuristic looking building. The architect's idea was to eliminate all 90° edges as well as vertical and horizontal reference points on the façade and interior. This ambitious project poses a great technical challenge in terms of planning and execution.

Design planning was performed by Porr Design & Engineering GmbH/Vienna who will also take care of further execution planning.

The project's completion is scheduled for spring 2016.

Emscher sewer

Start of tunnelling at building section 40

Porr Bau GmbH was commissioned with constructing the Emscher sewer, construction section 40, in December 2013.

The project in question encompasses a 10 km section of what currently is the largest waste water project in Europe. Apart from building a total of 14 shafts with diameters of up to 20 m and depths of up to 40 m, some 20 km of tunnels are to be built.

Tunnelling at an inside diameter of 2.6 m is being secured by means of reinforced concrete tubing. For this purpose, almost 100,000 segments had to be manufactured in close proximity to the construction site and delivered "just in time".

Due to the fact that a diameter of 2.6 m using the tubing method is very small and thus uncommon, all equipment required for tunnelling was adjusted and procured in accordance with the project-specific requirements.

All preparatory and assembly work was carried out by the experienced construction site team so that tunnelling could be started according to schedule in October 2014.

Since the earth pressure balance method (EPB) has already been successfully utilised by PORR at building section 20 in 2013, it is also being used for section 40.

Now that both tunnel boring machines have started working (tunnel construction engineers refer to this point as "ready to bore"), 20,000 m of tunnelling underneath various motorways and railway lines, pipe lines and former mountain farming areas in the heart of the Ruhr region await the entire team.

Insertion of tunnel boring machine / heavy transport
Image: PORR AG

Starting shaft 033 – start of tunnelling
Image: PORR AG

Insertion of tunnel boring machine using 800 t crane
Image: PORR AG

Opening ceremony for S10 Mühlviertel Expressway, Freistadt bypass

From left: DI Gernot Brandtner – Managing Director of Asfinag BMG, Dr. Klaus Schierhackl – Asfinag AG Executive, Dr. Claudia Kahr – Chairwoman of Asfinag's Supervisory Board, Mag. Gertraud Jahn – member of the Upper Austrian government, Freistadt's Mayor Mag. Christian Jachs, Karel Dobes – Deputy Minister of Transport of the Czech Republic, Alois Stöger – Federal Minister of Transport, Dr. Josef Pühringer – Governor of Upper Austria, Franz Hiesl – Deputy Governor of Upper Austria, Ing. Alfred Sebl – Managing Director of Porr Bau GmbH
Image: PORR AG

Image: PORR AG

In just three years of construction, the Freistadt bypass could be ceremonially opened on Saturday, the 15th of November 2014. For this occasion, Asfinag has invited a number of honoured guests, headed by the Deputy Minister of Transport of the Czech Republic, Ing. Karel Dobes and followed by the Federal Minister of Transport, Alois Stöger, Upper Austria's governor Dr. Josef Pühringer and Deputy Governor Franz Hiesl as well as the residents of the neighboring municipalities.

The guests enjoyed a varied programme. Sports enthusiasts had the chance to test their skills on diverse running tracks and children could get their fun in a separate area equipped with bouncy castle, funtrain and crayons that had been provided for them to leave some last impressions on the future dual carriageway.

Furthermore, emergency services, automobile clubs and Asfinag offered exhibitions and informed visitors on their daily work. Even a special stamp for stamp collectors was issued in commemoration of the day.

The best runners were awarded for their achievements by the guests of honour in front of some 10,000 visitors. In the course of the ceremonial addresses, the Managing Director of Porr Bau GmbH, Ing. Alfred Sebl handed a statue of St. Barbara to the tunnel's patron and Asfinag's Chairwoman of the Board, Dr. Claudia Kahr in recognition of her patronage. Freistadt's parish priest asked God to bless the new dual carriageway and thus, the section was symbolically declared opened. Finally, the guests of honour sang both the provincial and national anthem together with the citizens.

However, before an estimated 15,000 vehicles per day could start bypassing the urban area of Freistadt, thousands of guests celebrated well into the afternoon. Asfinag provided food, drink and musical entertainment.

At a length of 4.5 km, building section 4.1 represents the most essential part of the Freistadt bypass. It was built by a joint-venture between PORR's departments for tunnel construction, concrete and civil engineering and the Upper Austrian branch.

Ground-breaking ceremony for project "Promenaden-Galerien" in the heart of Linz

Late October saw the ground-breaking ceremony for project "Promenaden-Galerien" with the collaboration of the Mayor of Linz, Klaus Luger, client Rudolf A. Cuturi and representatives of planners and the joint-venture executing the work (Porr Bau GmbH was represented by Dir. Sommer).

As part of a joint-venture, Porr Bau GmbH's Upper Austrian branch was commissioned with master building work amounting to EUR 21.6 million. The order involves the refurbishment and new construction of the "Promenaden-Galerien" ("Promenade Arcades"), consisting of a shopping centre, commercial units, office units, a hotel, apartments, an event room as well as a three-story underground car park which is being built using the cut-and-cover method.

In preparation for the project, Porr Bau GmbH's Upper Austrian branch has performed demolition work on the joint-venture's behalf whereas special civil engineering work was carried out by PORR Foundation Engineering.

Image: renderwerk.at

Topping-out ceremony BAN Building Santander on 7 November 2014

Porr Deutschland GmbH, Düsseldorf branch

One day after the successful acceptance of structural work and precisely 205 days after the project had been awarded to Porr Deutschland GmbH's Düssedorf branch, the topping-out ceremony for Santander Bank's BAN Building in Mönchengladbach took place on the 7th of November 2014 with 120 invited guests.

The ceremony officially started with speeches by Santander Consumer Bank's Chairman of the Board, Mr. Leuschner, Santander Global Facilities' Chief Operating Officer, Mr. Juis Guillo, Mr. Sauter, the Managing Director of Porr Germany GmbH and Mr. Reiners, the Mayor of Mönchengladbach. The foremen Klaus Tischmann, Ulf Dreckmann and Thomas Peters held the traditional topping-out speech.

The foremen after the traditional topping-out speech
Image: PORR AG

Aerial shot: Santander
Image: PORR AG

13,000 m³ of concrete and 1,600 t of steel were used for the building with a gross floor space of 24,486 m². During structural work, up to 80 blue-collar workers, three foremen and ten employees worked on the project.

The building annex is located on a plot of 17,880 m² size and consists of a basement floor, a ground floor and a further four rising, three-storey office wings. This annex will be available to the 1,500 staff of SGF, a subsidiary of Santander Bank, from September 2015. A cafeteria that can feed 350 staff at the same time is being built on the ground floor of building no. 4.

Currently, the façades are being built and roof sealing work is being carried out. The building envelope will be completed by the end of 2014. The building's equipment was turned on on the 17th of November 2014.

Porr Deutschland GmbH, Düsseldorf branch will finish turn-key construction of the new building until 26 August 2015.

Aerial shot: Santander
Image: PORR AG

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