Railway construction

powered by

DORR

Milestones

2011

2011: SLAB-TRACK ERFURT – GRÖBERS

The 90 km-long, double-track segment of this new high-speed rail line involves numerous tunnel and bridge structures and will be built by PORR using the ÖBB-PORR slab-track system. In addition to the rail track, the project also includes the construction of 22 kilometres of noise and wind barriers. The project is scheduled to be completed by the end of 2013.

2010

2010: VIENNA CENTRAL STATION

Vienna's new central station – the city's largest infrastructure project – will be between the former South and East stations and Südtiroler Platz. Its most striking feature is the folded, diamond-shaped roof which stretches over the platforms. The roof will allow light to infiltrate through its approx. 25,000 m² surface and will ensure a bright and welcoming environment.

2007

2007: CAMPINA – PREDEAL LINE (ROMANIA)

Another large-scale foreign project is acquired in July 2007 with the Campina – Predeal line. By the end of 2011 around 120 kilometres of track and 120 sets of turnouts have been laid, five stations renovated and numerous civil structures built – in addition to more than 1.1 million cubic metres of earth being moved.

2005

2005: BRADINA – KONJIC LINE AND JOSAVKA – BANJA LUKA LINE (BOSNIA)

PORR acquires multiple renowned railway construction projects abroad. In 2005 a total of 60 kilometres of track are completely overhauled in Bosnia in an extremely short time period.

1993

1993: FOUR-TRACK EXTENSION OF THE WESTBAHN LINE

Start of the four-track extension of the Westbahn line – a project which will span decades. Right from the start, the PORR railway construction department takes the lead on many structural engineering projects and track construction with or without ballast. In 1995 the ÖBB-PORR slab-track system is declared a standard system in Austria. The dawn of the new millennium sees a real construction boom in railways. The railway department is able to develop numerous construction projects in every sector and above all the slab-track system developed by ÖBB-PORR provides a striking advantage. To date over 250 kilometres of operating track have been laid with this system in Austria.

1992

1992: UPGRADING ÖBB TAUERN TUNNEL

The nineties see the start of a new era in rail construction with countless major links on the railway network being upgraded and extended and new track sections being built. On the Tauern Tunnel, Track 2 is removed, the tunnel clearance expanded to Euro Profile and track is newly fitted with the ÖBB-PORR slab-track system, in an operation which sees the track close for just four months. In 2002/2003 work is completed on upgrading Track 1. In the same way, the 100-year-old Arlberg Tunnel is overhauled from 2007 to 2010 and our slab-track system is installed; in addition it is adapted to allow road vehicle access.

1989

1989: ÖBB-PORR SLAB-TRACK SYSTEM

Together with ÖBB, the Austrian Federal Railways, PORR develops a slab-track system with elastically supported track base plates. The system is used on a test stretch on the Vienna – Gmünd railway line in the Langenlebarn region across a length of 264 metres.

1983

1983: RAILWAY CONSTRUCTION IN ALGERIA

As part of a consortium, PORR extends the 42 km-long, double-track line, while maintaining traffic flow. This large-scale project involves building numerous bridges and underpasses, station buildings, setting up a quarry and a dedicated sleeper factory. It is the largest project of its kind ever carried out by an Austrian construction company abroad.

1979

1979: FIRST SLAB-TRACK SYSTEM IN VIENNA

Construction of 2 x 200 m-long stretches using monolithic ballastless sleepers on the Vienna "Vorortelinie" as a trial for the Semmering Base Tunnel. PORR starts to develop alternative technologies in railway construction.

1906

1906: OPENING OF THE VINSCHGAU RAILWAY

PORR takes a leading role in numerous railway construction projects at the turn of the century, including building the Vienna city railway, the rail link Bolzano – Merano (Vinschgau railway), construction of the Csetnektal railway in Hungary and many more.

1869

1869: FOUNDING OF „ALLGEMEINE ÖSTERREICHISCHE BAUGESELLSCHAFT"

First listed on the stock exchange, making it one of the oldest companies to be traded on Vienna's stock market. Work begins on extending the 143 km-long railway line from Linz to Budweis. The horse-drawn railway is converted for locomotive rail.

Foreword

PORR has a longstanding tradition of building railways of every kind imaginable.

Extending rail services and routes in Europe – and on other continents – has been accorded high priority since the 1990s. Investment programmes by governments and development banks have meant that this industry sector has been able to grow steadily despite every economic crisis. Using the dominant market presence in Austria as a base, PORR has also turned this sector into a core competency on the international market.

The following pages show the way in which PORR covers the entire service range necessary for railway construction as well as the numerous projects on which it has already demonstrated its expertise.

PORR constantly extends its activities abroad based on demand and carries out railway construction on every one of its home and international markets.

Experience, technical expertise and a thirst for innovation are the three pillars on which this department's market success rests. For customers, this means that they can rely on PORR for every complex task in the course of building up the world's rail networks.

Tulln Danube Bridge

Working programme

St. Pölten Station

1 Track construction

New construction. Extensions. Overhauls. Servicing.

PORR covers every aspect related to rail networks at home and abroad, for main-line and branch-line services, networks for urban transport providers, tramlines and underground rail, as well as feeder lines for industrial firms, **offering full-service construction in the highest quality.**

This involves the new construction, overhauling and servicing of track and turnout systems and platforms, right through to building complete rail traffic facilities. PORR also produces turnkey railway lines including the design and all necessary planning permission and authorisation procedures.

Rail junction Wagram, St. Pölten

The Wagram junction connects the existing Westbahn line with the new Vienna – St. Pölten stretch and the St. Pölten bypass for freight rail. It was necessary to build three underground routes and numerous bridges with highly varied structural features in order to achieve the requisite rail connections. In addition to the comprehensive civil engineering works, PORR also contributed to building all of the rail system (track).

Track laid	23,600 m
Turnouts	45 pcs.
Track ballast	170,000 t
Slab-track system	3,000 m

Reconstruction, track and roadbed construction Kalsdorf, Werndorf

Between 2000 and 2002 PORR carried out the track works for the reconstruction of Kalsdorf Station and the affected feeder lines. The rail service was maintained throughout the entire work period. Track construction work for building a freight terminal in Werndorf was subsequently completed. This work was coordinated with work on the foundations and building construction, as well as erecting a marshalling yard at the terminal and the necessary track conversion work.

Kalsdorf track laid	9,550 m
Kalsdorf ballast laid	47,000 t
Werndorf track laid	17,100 m
Werndorf ballast laid	80,000 t
Werndorf marshalling yard	16,500 m^2

Batajnica – Golubinci, Serbia

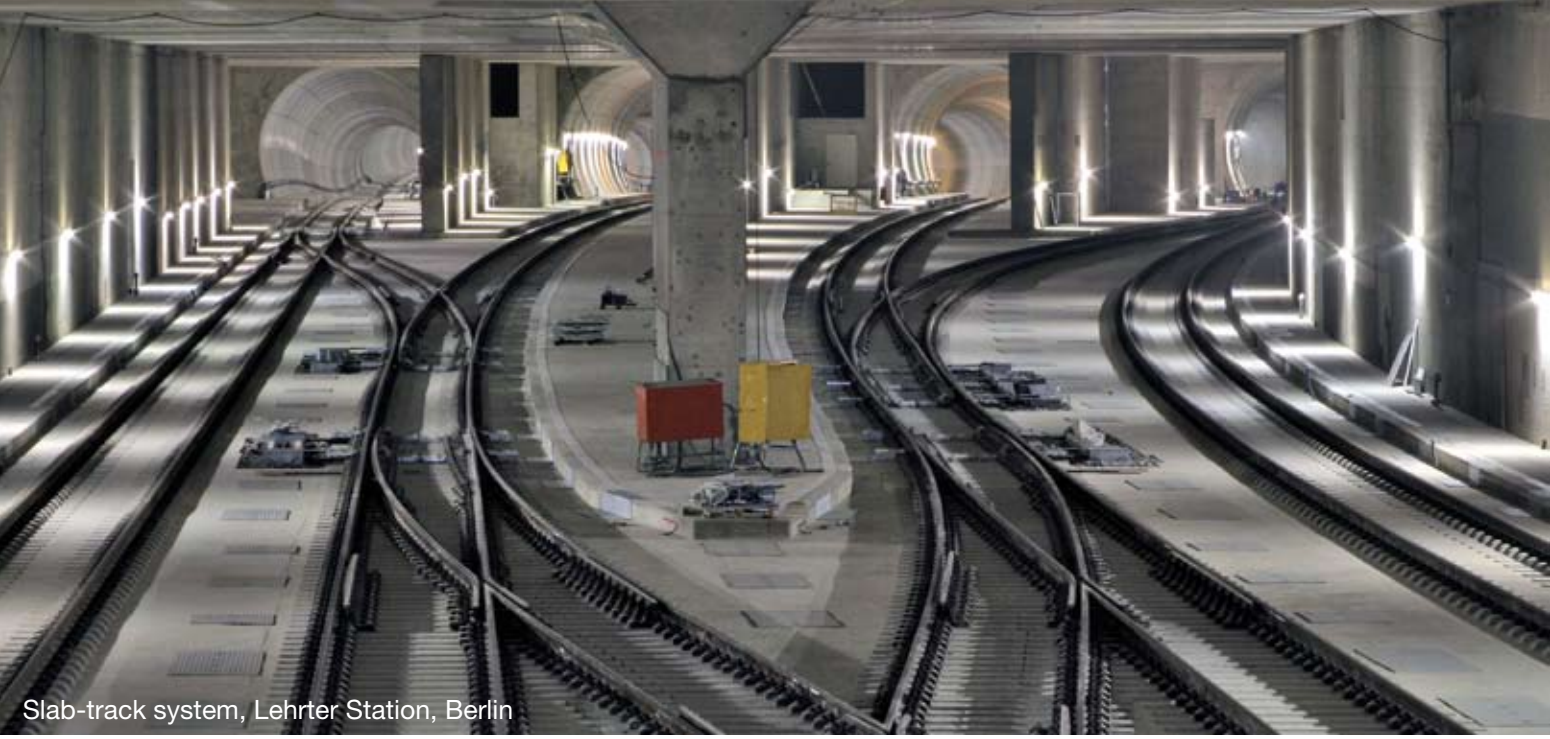
It took a mere five-month construction period for PORR to reconstruct the Batajnica – Golubinci rail line, while also maintaining rail operations on the single track. This was one of the largest projects to be carried out by Serbian Rail on the network in over ten years. Through its technical knowhow, adherence to deadlines and exceptional quality, PORR convinced Serbian Rail that it is a reliable partner for future railway construction projects.

Earthwork	200,000 m^3
Track laid	30,000 m
Turnouts	41 pcs.
Station buildings	2
Loading ramps	2

Renovating St. Pölten Station

The main station of Lower Austria's capital city was given a facelift, with PORR in charge of the project. The comprehensive services included renovating the station's foundations, renewing and building underpasses, constructing platform facilities and stairway access, as well as a new design for the station's forecourt. Observers could follow construction progress in real time on the internet.

Track laid	20,000 m
Track ballast	100,000 t
Turnouts	50 pcs.



Slab-track system, Lehrter Station, Berlin

2 Slab-track system

Trailblazing. Unparalleled. Resilient.

The **slab-track system ÖBB-PORR** elastically supported track base plate was pioneered through collaboration between the Austrian Federal Railways (ÖBB) and PORR. This special type of track system involves replacing ballast with another material – such as concrete or asphalt – so that the track's load is transferred from the rail to the base layer by concrete. The slab-track system ÖBB-PORR elastically supported track base plate has been the standard system in Austria since 1995 and has also been applied to bridges and tunnels in Germany since 2001.

The system's advantages lie in the quality of the concrete finishing achieved through prefab conditions and its maintenance-free lifespan – the oldest section dates back to 1989 and has not yet required maintenance. Around 250 kilometres of track in operation employing this system are currently in use.

Arlberg Rail Tunnel

As part of a safety-related upgrade of the Arlberg Rail Tunnel, PORR was contracted for works which included lowering the level of trackbed and installing the slab-track system, “ÖBB-PORR track base plates”. These special track base plates were made so that they also provide access for emergency road vehicles, representing a key safety factor. In total this system was installed across 19,271 m in the 10,650 m-long Arlberg Rail Tunnel. Space restrictions meant that special track base plates with reduced width were used in some sections.

Slab-track system	19,271 m
Turnouts in ST	8 pcs.
Sound absorbers with vehicle access	19,375 m
C-sections for vehicle access	38,750 m
Elastomeric insulation matt	3,900 m^2

Lainzer Tunnel

Lainzer Tunnel is one of Austria’s largest infrastructure projects and connects the Westbahn with the Südbahn and the Donaulände line. The ÖBB-PORR slab-track system was also used on the “Westbahn link” section. The track base plate was fully uncoupled from the concrete using an elastic separating layer, thereby reducing impact sound transmission. Furthermore this PORR project also involved installing the trackbed shoulder, cable troughs and fire-water pipes.

Concrete	72,000 m^3
Reinforcement	6,450 t
Slab-track system	18,500 m
Turnouts in ST	10 pcs.
Fire-water piping	26,000 m

Lehrter Station, Berlin

Lehrter Station is the centrepiece of a new rail traffic concept, which Berlin is implementing in order to facilitate the expected traffic volume in the coming years. In addition to laying a slab-track system, the project also involved all of the design services required and handling all necessary permits and authorisation. One major challenge involved the special construction required for the joints, which PORR efficiently overcame with its technical expertise and innovation.

Slab-track system, North-South	21,000 m
Turnouts in ST	49 pcs.
Slab-track system, East-West	5,600 m
Turnouts in ST	4 pcs.
Track base plates	902 pcs.

Wienerwald Tunnel

PORR had a leading role in the construction of the slab-track system in the Wienerwald Tunnel. Because of the local conditions, the construction elements had to be transported to the installation site partly by road, partly by rail in a 14.5 km construction lot. Despite these serious logistic challenges, it was possible to meet the 34-month deadline for the entire construction and to complete the project on time.

Track	54,000 m
Slab-track system	26,405 m
Turnouts in ST	4 pcs.
Fire-water piping	26,000 m
Reinforcement	2,450 t

Tullnerfeld Station

3 Catenary, energy supply

Catenary systems. Overhead transmission lines.

For decades, **European Trans Energy GmbH** (EUROPTEN) has been a reliable partner in catenary systems and overhead transmission lines. In order to guarantee high quality standards, EUROPTEN is certified to ISO 9001, BS OHSAS 18001, ISO 14001, EN 1090 and the technology centre in Ennsdorf is also certified to EN 15085 (welding railway vehicles and their components). The German Federal Railways (DB) named us “Supplier of the Year” in 2003 in the machinery and electrical engineering category.

Catenary systems

The portfolio includes all services from design through to installation and servicing. EUROPTEN also carry out the development of components for catenary systems, adjusted to meet any special requirements. The design and preparation involved in the programmes developed not only allow EUROPTEN to produce a detailed construction schedule in advance, but also to significantly reduce any interruption to the rail service caused by construction work. When manufacturing foundations for the overhead line masts, drilling work in tunnels and fitting catenary systems, special assembly technology keeps installation time to a minimum, particularly on work in existing facilities. To ensure that overhead line works are also conducted safely and economically, EUROPTEN uses installation equipment such as the “complex catenary mounting train” or a “catenary wire-suspension cable exchange unit”. All work is carried out by an exceptionally skilled and highly motivated team.

Tullnerfeld project

Tullnerfeld Station is a construction lot on the high-speed rail line of the ÖBB-Westbahn line and provides a link to the existing line in the Tulln area. Work began in August 2008 and the whole project should open fully in autumn 2012 with the change of timetable. Part of this order involved extending the existing catenary system of the track which connects to Tulln and producing the catenary for the new Tulln Danube Bridge.

Station length	5.1 km
Overhead lines	45.5 km
Max. speed	250 km/h

Overhead transmission lines

EUROPTEN has been installing high-voltage overhead transmission lines for all of the energy distribution firms in Austria and Germany for over 90 years. Together with ALTRASS (a wholly owned subsidiary), EUROPTEN provides every service required, from design right through to installation.

Mistelbach – Zellerndorf traction power line

Under contract to ÖBB EUROPTEN built this 15.6 km-long, 110 kV line in the period from October 2011 to January 2012. This required the erection of 51 masts. As on the projects for the 110 kV Graz/ Seiersberg – Werndorf traction power line and the 380 kV line in Styria, the mast foundations were built by PORR.

Line length	15.6 km
Masts	51 pcs.

Ballast bed cleaning, TENT, Obrenovac, Serbia

4 Subsoil remediation, ballast bed cleaning

Regular. Efficient. Environmentally friendly.

In addition to conventional **subsoil remediation**, PORR also carries out mechanical **ballast bed cleaning** or ballast cleaning. Depending on traffic volume and weather impact, this is conducted regularly and guarantees the stability of the ballast bed and the track system. The bed/ballast cleaning systems need to fulfil different criteria depending on the characteristics of the track ballast and the base layer. Factors which require consideration include maintaining good track geometry when returning the reusable track ballast, as well as the removal of the old ballast in such a way that the ballast bed is not polluted.

Track construction in Bosnia

In November 2004 PORR was commisioned to upgrad the single-track stretches, Bradina – Konjic and Josavka – Banja Luka. The Bradina – Konjic section involved a 28 km-long mountain rail line, with 45 tunnels and 13 bridges. The second, 22 km-long section runs through the plains near Banja Luka. In a construction period of just 9.5 months, a total of 50 kilometres of track had to be dismantled and newly laid. The replacement of the track ballast was carried out during the same period by two ballast cleaning machines.

Track laid	50,000 m
Track ballast	85,000 m^3
Concrete sleepers	80,000 pcs.

TENT Obrenovac, Serbia

The track ballast was cleaned mechanically on this project. To achieve this, the track was unclamped at intervals of 200 and 270 m and fixed with clasps. It was cleaned down to the formation layer, found 50 cm below the lower edge of the sleeper. The excavating chain used is able to clean widths of up to 4.6 m, with ZW excavators used for larger widths. In the final stage the ballast was newly laid and the track was plugged to the end. Any ballast which could not be reused was transported by MFS to the appropriate waste site.

Ballast bed cleaning	13,000 m^3
Track replacement	10,000 m
Track joints flash-butt welding	260 pcs.

Ybbs – Amstetten, lot 3

The 13.3 km-long lot is an important terminal in the four-track extension of the Westbahn line. Following the construction of a new, two-track section, the existing Westbahn line was also completely overhauled. In addition to comprehensive fill works, the sub-base layer (frost protection) and base layer (formation protective layer) were also realised. Through the use of state-of-the-art construction machinery and highly sensitive measuring equipment, it was possible to handle the high volumes in an extremely short construction period.

Excavation	382,200 m^3
Fill	325,000 m^3
Unbonded sub-base layer	172,500 m^3
Unbonded base layer	297,700 m^3

Vienna – St. Pölten branch line, earthworks TF3

Construction work on the 9.3 km-long TF3 section primarily consisted of earthworks for the two-track, newly built stretch Vienna – St. Pölten and the connection to the existing single-track line Tulln – Herzogenburg. In addition, comprehensive noise reduction measures, drainage and hydraulic measures (incl. 48 retention basins) as well as landscaping and TCS works were carried out along with the construction of a line alongside the railway.

Cut (incl. tunnel)	1,700,000 m^3
Fill	1,500,000 m^3
Lime stabilisation	215,000 m^3
Impermeable mineral layer	75,000 m^3
Frost protection	210,000 m^3

Tamping machine 09-32/4S Dynamic

5 Providing machinery, rail treatment

Innovation. Expertise. Reliability.

Investments and maintenance in the rail networks of the 21st century require cutting-edge machinery at almost every stage of the work process. Thanks to years of experience, PORR has in-depth expertise in the application of **rail construction machinery**.

The tasks involved in modernising Europe's rail infrastructure are extremely complex. Whether new construction, extension or maintenance, PORR's team and machine technology supports customers on construction sites in the European rail network in almost every phase of construction.

MFS 100 units

MFS 100 units are used for loading, conveying and transporting ballast materials. These are available either with an integrated loading station (MFS 100 B) or with a ballast distributing device (MFS 100 S).

Silo content	68 m^3
Net weight	62 t
Max. total weight (construction site)	150 t
Max. total weight (transfer route)	144 t

Gantry crane

Gantry cranes are used for the economical and efficient installation and removal of tracks. Depending on requirements, there are different models available for dismantling and installing track sections and for laying individual sleepers.

2 pcs. PK 150 gantry crane (transport and laying sleepers/section)	Sleeper loading approx. 20 concrete or 24 wooden sleepers Track gauge: 3,450 mm
2 pcs. PK 1-20 ES gantry crane (for laying individual sleepers approx. 140 m/h)	Sleeper loading approx. 20 concrete or 24 wooden sleepers Track gauge: 3,450 mm

Tamping machine

With the Plasser & Theurer machinery UNIMAT 08-475/4S, UNIMAT 09-16/4S, UNIMAT 09-32/4S Dynamic, USP 2010 SWS and USP 2010 SWS U, PORR has access to the most cutting-edge tamping and profiling machinery for the perfect installation of tracks and turnouts. This facilitates above-average output in higher quality in the course of reconstructing tracks and turnouts.

UNIMAT 08-475/4S	stamping radius >= 140 m
UNIMAT 09-16/4S	stamping radius >= 120 m
UNIMAT 09-32/4S Dynamic	stamping radius >= 140 m
USP 2010 SWS U	silo size 7 m^3, transfer option to MFS
USP 2010 SWS	silo size 10 m^3

Rail milling train

The LINSINGER SF03W-FFS rail milling train has set a new benchmark. Precise track treatment with continuous elimination of track defects and the exact reconstruction of the rail profile make a significant difference to extending the useful life of the track. Just a single operation allows the material to be cut on both rails, in line with the respective wear and tear of the gauge line and surface of the rails. No cooling or cleaning equipment is generally required during the track treatment. The milled discharge from inside and outside the rail milling train is collected by means of suction and conveyor systems in the discharge containers from the processing site and from the machine.

Milling radius	>= 150 m
Transfer speed V_{max}	100 km/h
Processing speed	5 – 25 m/min
Cut per crossing	0,3 – 1,5 mm

Vienna Central Station

6 Civil engineering services

Quality. Precision. Experience.

Civil engineering services in the course of railway construction projects usually call for superlative skills in terms of both technology and organisation. Years of experience on the most difficult projects are proof of PORR's expertise along with high quality, precision and reliability.

Renovating railway stations without interrupting service, the new construction and overhaul of bridges, underpasses and civil structures of every kind represents a particular challenge in terms of logistics and expertise in railway engineering. This is a challenge PORR is delighted to take on. Projects need to be completed in ever shorter construction periods, with the least disruption possible to services on existing networks.

Vienna Central Station

PORR is also at the forefront of the largest infrastructure project of the coming years. The new station city will be built on a 109-hectare area and will house a shopping centre, offices, eateries, retail, service and cultural facilities, a hotel and covered parking in addition to the station itself. On top of all this, 5,000 apartments, a school campus and an 8-hectare parking facility are planned. The entire site will boast impressive architecture and disabled access throughout.

Excavation	1,040,000 m^3
Fill	825,000 m^3
Drilled piles	22,800 m
Steel	30,500 t
Concrete	255,000 m^3
Formwork	370,000 m^2

St. Pölten Station

The reconstruction of St. Pölten's main railway station was carried out in two construction phases. Around 30 operating phases with track closures, night work, relocating etc. were required in order to maintain the rail service for around 23,000 rail users per day. The most striking upgrade saw the conversion of the former road underpass, Kremser Landstraße, into an access area for passengers. PORR's many years of experience with large-scale projects of this type facilitated the on-time completion of the project in 2011.

Concrete	20,100 m^3
Excavation and cut	1,000,000 m^3
Reinforcement	1,800 t
Drilled piles	11,000 m

Tulln Danube Bridge

The Tulln railway bridge, built in 1875, had to be overhauled and renewed in the course of reactivating the Tullner Westschleife. PORR was charged with overhauling and strengthening the bridge's four existing pylons and the two abutments as well as building a new, two-track truss bridge with a reinforced concrete composite slab. The very cramped surroundings on the banks of the Danube posed a particular challenge for the construction team. Only 18 months were available for realising the entire structure. Despite delays caused by the weather, PORR was able to meet all of the deadlines precisely.

Steel support structure	3,800 t
Scour protection	45,000 m^3
Reinforcing steel	1,700 t

Ybbs – Amstetten, lot 3

PORR played an important role in the four-track extension of the Westbahn line between Ybbs and Amstetten. The maximum speed which trains can travel at was increased to 250 km/h and the section was brought up to the standards of high-speed rail lines. 20 viaducts and underpasses posed a particular challenge. The "centrepieces" of the lot are represented by the sites HB10 and HB11 with a total length of 2.4 km – the west basin and tunnel using the cut-and-cover method. Completion of this project, which will close the gap on the Westbahn line, is set for 2015.

Concrete	140,200 m^3
Excavation and cut	99,000 m^2
Reinforcement	21,500 t
Drilled piles	43,700 m

7 Design & Build

Planning and execution

With this PORR concept the entire **design and construction** is handled by the contractor. PORR is responsible for the complete realisation of the project, from the initial design onwards. PORR also deals with the authorities and takes care of all permits required for carrying out construction.

Whether on road or on rail – PORR already has a wealth of experience in fulfilling contracts of this type.

Campina – Predeal, Romania

In the course of overhauling the Campina – Predeal stretch on the rail line Bucharest – Brasov, PORR was responsible for lot 1, stretching 47.85 km. The order involved replacing all materials right down to the subgrade level, upgrading the subgrade level, slope reinforcement with anchors and geogrids, reinforcing the existing slope walls with anchors, as well as repairing and renewing five stations and seven stops including the replacement of all electric and sanitary installations.

Track length	117 km
Turnouts	60 pcs.
Excavation	790,000 m^3
Filling	370,000 m^3
Concrete volume	45,000 m^3

Lehrter Station, Berlin

The “Lehrter Station, Berlin” project was also realised as a Design & Build concept. The project involved extending the overground East-West line with an underground North-South line, applying a so-called “mushroom concept” for Berlin’s mainline and regional rail services, as well as technical work on fitting the East-West mainline and the S3 city line with mass-spring systems (MSS) and slab tracks.

MSS East-West	5,600 m
Sound absorbers East-West	21,000 m^2
MSS North-South	12,900 m
Stainless steel fire-water piping North-South	12,000 m

Stambolijski – Plovdiv, Bulgaria

The Stambolijski – Plovdiv stretch involves lot 3 of the Septemvri – Plovdiv line in Bulgaria. The base layer, tracks and catenary of the existing two-track line will be overhauled, with one track remaining open to traffic throughout the entire construction period. TCS and telecom lines will be adapted. One station (Todor Kableshkov) is also affected by the upgrade works. The entire construction work should be completed in 30 months, 12 months of which will be dedicated to design and planning.

Cut	250,000 m^3
Catenary	33,000 m
Track laying	33,200 m
Turnouts	22 pcs.

Harmanli – Svilengrad, Bulgaria

On lot 2 of the Dimitrovgrad – Svilengrad line, PORR is responsible for upgrading four stations as well as the new construction of the single-track line which will run between them. TCS and telecom lines will also be adapted. Construction began in February 2012; following a six-month planning phase, the project should be completed in a construction period of 30 months by summer 2014.

Cut	1,300,000 m^3
Catenary	53,000 m
Track laying	54,000 m
Embankment fill	1,100,000 m^3

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ABAP Ref. 522e/08.12/1M