



Jacking Around the Globe | Part 2

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HOBAS® GRP for Australia's Largest Ever Pressure Jacking Project

Sewer Rising Main in Australia's Iconic Gold Coast



Australia's Gold Coast, located about one hour's drive south of Brisbane, expects heavy annual rain falls during their "wet season". This posed problems on the stormwater and sewage systems of the area since the pumping station (PS) B47 wastewater catchment flows are pumped to Elanora Sewage Treatment Plant (STP). With the steady population growth in the area, the treatment plant has reached its capacity and has had some Department of Environment and Heritage Protection (DEHP) license breaches, especially in wet weather flows.

The rationalization of the Elanora and Merrimac catchments to reduce flows to the Elanora STP has consequently been the subject of several internal and external reports and investigations. Instead of upgrading the Elanora Treatment Plant, these planning studies and detailed cost evaluations concluded that the transfer of Elanora's northern hydraulic sewage load to the Merrimac catchment was the preferred strategy. The project, known under the name Burleigh Waters Rising and Gravity Main PS B47, involves the design and construction of 1097 meters D_e (external diameter) 718 mm HOBAS GRP Pressure Mains PN 10, 428 meter DN 750, DN 960 HOBAS GRP Gravity Mains and upsizing the impellers of the B47 pumps.

This diversion is required to cater for projected population growth in the Elanora catchments. After detailed discussions with the design consultant AECOM, the pipeline material had been changed due to various advantages of GRP over ductile iron, including: high corrosion resistance, light weight, and the ability to use trenchless technology such as pipe jacking.

Year of construction

2013

Total length

1,525 m

Diameter

D_e 718, DN 750, DN 960

Pressure class

PN 10, PN 1

Stiffness class

SN 640000, SN 64000,

SN 32000

Application

Wastewater

Installation method

**Pressure pipe jacking,
Gravity pipe jacking**

Client

**Gold Coast City Council,
Queensland**

Contractor

Rob Carr Pty Ltd.

Advantages

**Jacking pipes for a pres-
sure pipeline, flexible,
customized adaption
of HOBAS Products,
professional project
consultancy**

After an initial review by the design consultant, an alternative tender submission which constructs the sewer rising trunk main by tunneling instead of open trench was accepted. The design consultant was convinced of the advantages of HOBAS CC-GRP Pressure Jacking Systems and decided to go ahead and utilize them in the project, making it Australia's largest ever pressure jacking project. In December 2012 the construction contract was awarded to a renowned Australian Tunneling Contractor Rob Carr Pty Ltd. This installation method minimized the construction impact to the local community. Apart from that, the overall cost of the project was reduced due to the number of roads and services that could be left unaffected.

As ductile iron fittings, valves, and dismantling joints were utilized as well, the HOBAS GRP Pressure Jacking Pipe needed to connect to these fittings. Traditionally, HOBAS Flanges are made as per DIN standards; but after detailed discussions with HOBAS Application Engineers, the manufacture of flanges as per Australian standards was arranged - another Australian first.

Thus HOBAS once again proved to "Make things happen"

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XXL HOBAS® GRP Jacking Pipes replace Concrete Railway Culvert

HOBAS® Pipes D_e 3600 Jacked Beneath Rail in Gdańsk, PL

Since the concrete culvert crossing beneath the railway line E65 Warsaw - Gdynia in the Polish city Gdańsk could no longer handle high water levels from the nearby stream, it was decided to replace it. For this purpose, HOBAS Pipes with an external diameter of 3600 mm were jacked beneath the railway embankment.

The 2 x 1.2 m concrete culvert could no longer handle the nearby Królewski stream's elevated water levels during periods of heavy rain, which occasionally flooded the surrounding area. There was no doubt it had to be replaced. The first respective plan involved two parallel 2 x 2 m square concrete culverts, laid in open trench. It soon became clear however that the design was unsuitable for the given circumstances and that a different approach was necessary. In 2013, a new rehabilitation project was initiated involving the construction of a single circular. It was decided to install new culvert by means of jacking and to use HOBAS GRP Pipes with a diameter of D_e 3600 for this purpose.

The jacking works were carried out using a set of hydraulic jacks and a special cutter head designed for the project. Where the routes of the old and the new pipeline intersected, the old culvert was demolished and removed. At the end of the installation process the annular space between the old and new structure was grouted with cement. For safety reasons, the rail tracks had to be equipped with beams. In the case of any ground movements caused by the jacking process, these beams would transfer the load from the trains evenly to the rails.

The E65 is a main-line railway with trains passing every 3 minutes. Although the trains' speed was reduced to 30 km/h in this section because of the construction works, the trains could stay in operation without interruptions thanks to trenchless installation. The contractors, PUT INTERCOR from Zawiercie and PROI2 from Katowice were highly satisfied with the project result – they have already installed HOBAS Pipe Systems several times in the past and appreciate the products' high quality.

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Year of construction
2013

Construction time
2 months

Diameter
D_e 3600

Pressure class
PN 1

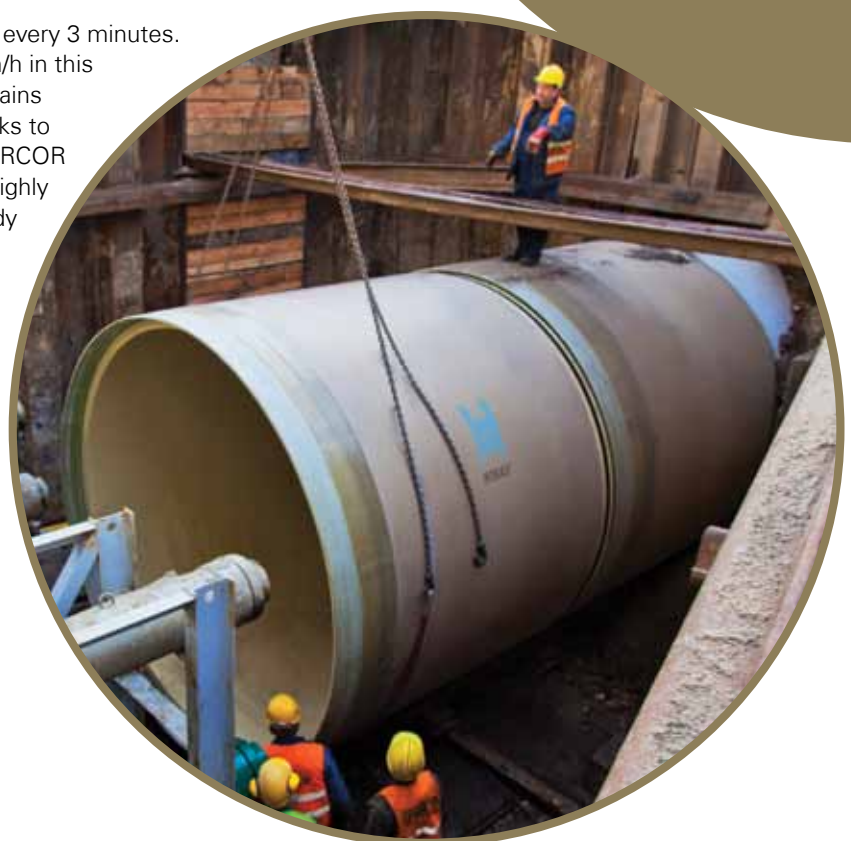
Stiffness class
SN 40000

Application
Railway Culvert

Client
PKP Polskie Linie Kolejowe

Contractor
Przedsiębiorstwo Usług Technicznych (PUT) INTERCOR, PROI2

Advantages
No interruptions of the rail traffic, non-conductive and highly durable pipe material



HOBAS® Jacking Pipes Premiere in Hong Kong – Trenchless Installation of Protection Pipes beneath Rail Tracks

In December 2013, HOBAS Pipes D_e 1026 SN 320000 were jacked in the Chinese metropolis Hong Kong underneath a railway track as protection for power lines.

Hong Kong's Mass Transit Railway (MTR) includes more than 200 km of rail. With an average of 2.45 million passengers per day, it is one of the world's most profitable rapid transit railway systems. Its operating company, the MTR Corporation, is currently extending the network in the vicinity of Hung Hom railway station in the urban area of Kowloon. Since the space around the existing rail track was very limited, the construction company had to remove parts of the adjacent slope over a length of 400 m and relocate the existing power transmission lines. With the new planned route crossing beneath the double-track, the project managers sought for the least invasive and most sustainable solution. They found what they were looking for in HOBAS Pipe Systems: HOBAS CC-GRP Pipes with an outer diameter of D_e 1026 mm and a stiffness class of SN 320000 were jacked over a length of 12 meters in 2.3 m depth beneath the double-track as protection pipes for the power lines. Thanks to the non-conductive material and high load capacity, HOBAS Pipes are ideally suited for the given conditions.

The installation was challenging in several respects. Due to the limited working space on the track's ballast bed, the starting pit had to be kept quite narrow (4 x 4.5 m) and the pipes could not be stored on site but had to be rolled to the jacking pit one after the other on temporary tracks over 50 m distance. As the railway track is in operation 19 hours a day from 5:30 to 00:30 a.m., the client allowed the jacking works to be conducted at nighttime between 1:30 and 4:00 a.m. only. The contractor had to work very efficiently to achieve each night's installation goal within these 2.5 hours. With their smooth outer surface and quick and easy coupling system, HOBAS Pipes increased the installation efficiency significantly.

Due to the restricted space on the other side of the tracks, it was not possible to build a receiving pit. Instead, the boring head was partly dismantled inside the pipe after the installation and withdrawn through the starting pit. After 6 nights and a jacking time of 15 hours, the installation was successfully completed.

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Year of construction

2013

Construction time

6 nights / 15 hours

Diameter

D_e 1026

Pressure class

PN 1

Stiffness class

SN 320000

Application

Protection pipes for power lines

Client

MTR Corporation

Limited

Planner

Ove Arup & Partners

Hong Kong Limited

Constructor

Gammon – Kaden SCL

1111 Joint Venture

Jacking Contractor

Victory Trenchless

Engineering Company

Limited

Advantages

non-conductive features,

high load capacity,

smooth outer surface,

easy coupling system



Russian Railways Authorize HOBAS® Products GRP Pipes Jacked under Railway

Only few pipe producers offer a broad range of technical solutions and are authorized to install their products beneath Russian rail tracks. In order to receive approval, the products need to comply with the requirements and standards of the Russian Railways (RŽD), worldwide one of the three largest rail companies. Safety is absolutely essential.

In summer 2012, RŽD granted HOBAS the permission to implement a pilot project on the railway section between Surgut and Tobolsk in the Russian oblasts Samara and Tjumen. A second rail track is under construction in this area, and the old culvert running beneath it needed to be replaced, since the old corrugated steel pipe showed heavy signs of corrosion that had affected its structural integrity. In addition to this, the contractor asked for the installation of protective measures against flooding during the construction works and not to alter the natural riverbeds. Disruptions to rail traffic should be avoided as well.

Given the circumstances, the contractor decided for HOBAS Pipes De 1434 which should be jacked directly next to the old pipe beneath the railway track by means of auger boring. It was planned to first dispose of the spoil with an auger transporting it through a steel casing. Once the boring head had made its way through to the receiving pit, HOBAS GRP Pipes were connected to the steel casing in the thrust pit and driven to the receiving pit. Subsequently, HOBAS Pipes De 1638 were installed in open trench. For the duration of the construction works on the rail around the site, trains were slowed to 40 km/h. Thanks to trenchless installation, train traffic could be maintained.

HOBAS Products not only scored with their structural properties and corrosion resistance (especially in regard to stray currents) but also a long service life and easy installation. The construction works were completed in October, within four months only and to the complete satisfaction of everyone involved.

After this project's success, RŽD gave HOBAS Russia the official authorization for the utilization of HOBAS Products on future projects that run beneath the Russian railway.

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Year of construction
2013

Construction time
4 months

Pipe length
137 m

Diameter
D_e 1414 and 1638

Pressure class
PN 1

Stiffness class
SN 32000 and 40000

Application
Culvert beneath rail tracks

Installation method
Jacking, open trench

Client
Российские железные дороги (Russian Railways – RŽD)

Advantages
Corrosion and abrasion resistance, high structural integrity, easy installation

HOBAS® Pressure Pipe Jacking and Curved Jacking – Safer, More Reliable and Economic

The Unique Combination of Benefits of HOBAS® Jacking Pipe Systems

Centrifugally cast GRP jacking pipe systems by HOBAS have been utilized in trenchless projects around the world since 1982. They are installed for a large variety of applications, for gravity as well as pressurized lines, and in a broad range of diameters from D_e 272 to 3600 mm. Reason for clients around the world increasingly opting for HOBAS CC-GRP Jacking Pipes is in particular the unique combination of benefits that set them apart from other materials on the trenchless market.

Pressure Pipe & Trenchless Installation – A Two in One Solution

When a force main designed for a working pressure needs to be installed by jacking, two pipes are often utilized to tackle the problem, since other pipes that are designed to withstand jacking forces are not suitable for internal service pressure above 2 bars and vice versa. A pipe designed for jacking but not for internal service pressure (very often concrete) is usually utilized as casing into which a second pipe is inserted, the carrier pipe (e.g. steel, PEHD, etc.) for the pressure application.

Unfortunately, this solution asks for more space, a larger jacked host pipe to accommodate the pre-defined capacity of the carrier pipe, more excavation material to deal with, and larger jacking machinery, etc. Apart from the size issue, there is a considerable increase in construction time since the carrier pipe needs to be assembled and inserted into the jacked casing. Needless to mention the increased costs regarding the above points as well as of course pipe material costs that may almost double and in many cases a second supplier to come to an arrangement with.

Thanks to the production procedure of HOBAS Pipes Systems, the jacking pipes can be designed to withstand high thrust forces as well as internal working pressure. This practical two in one solution can be exemplified by the [project Fusina](#), an environmental project launched to protect the Venetian Lagoon in Italy: In order to cross the Lido sandbar 351 meters of HOBAS CC-GRP Pipes DN 1400, SN 140000, PN 6 have been installed by microtunneling within one month only. "It took a long time for us to find a pipe that suits our requirements," explained engineer Meneghini, site manager from the general contractor Mantovani SpA. "We needed a jacking pipe that would also be fit for an operating pressure of 6 to 10 bar. After a long research period we chose HOBAS CC-GRP Jacking Pipes since these inherently possess the characteristics necessary for jacking as well as for pressure pipes: mechanical strength and optimal hydraulic properties. Normally, two different pipe systems would have been utilized to match all requirements."



HOBAS Pressure Pipe Jacking under the Lido of Venice, IT

Benefits regarding HOBAS GRP Pressure Pipe jacking:

- Less costs (time, material, machinery size, less spoil, etc.)
- Installation time considerably shorter
- Smaller jacking machine necessary
- Less excavation material to deal with
- No extra decision making regarding a second pipe (casing or carrier)
- Coordination with one pipe supplier only

Driving Pipes around the Bend

A further essential benefit of HOBAS GRP Pipes results from the linear-elastic properties of the pipe and the possibility to accommodate angular deflection in the flush stainless steel or GRP joints: jacking on curved alignments. Dividing the drive into straight sections with bends located inside the shafts necessitates the use of more numerous and in many cases deeper pits. With curved drives the quantity and the depth of these jacking pits can often be optimized. The linear-elastic properties of HOBAS CC-GRP Jacking Pipes allows the pipe to react to eccentric loads by means of spigot deformation. Therefore, the contact between the pipes for the transmission of jacking forces remains at an optimal level so that wooden joint packers are unnecessary allowing to more precisely follow the path prepared in front of the shield. The high compressive strength of the material is a further plus.

It comes as no surprise that designers and clients increasingly specify curved pipe jacking for economic and environmental reasons. HOBAS CC-GRP Pipes have been used for curved jacking already in the year 2000, in Krefeld, Germany, where 2.9-m-long pipes were jacked on a 160 m route on a 1500 m radius bend. 2009 in Basel, Switzerland, **pressure jacking pipes have been installed beneath the Rhine on a 1000 m radius curve.** The successfully implemented small radii alignment in Stuttgart, Germany, (R= 175 m) and Gifu, Japan (R= 125 m) are particularly noteworthy.

Main benefits regarding installation on curves:

- Fewer to no intermediate jacking stations
- Pits less deep
- No wooden packers necessary
- Precise pipe routing
- Various pipe lengths available to achieve different radii

Optimal Pipe for Installation & Operation

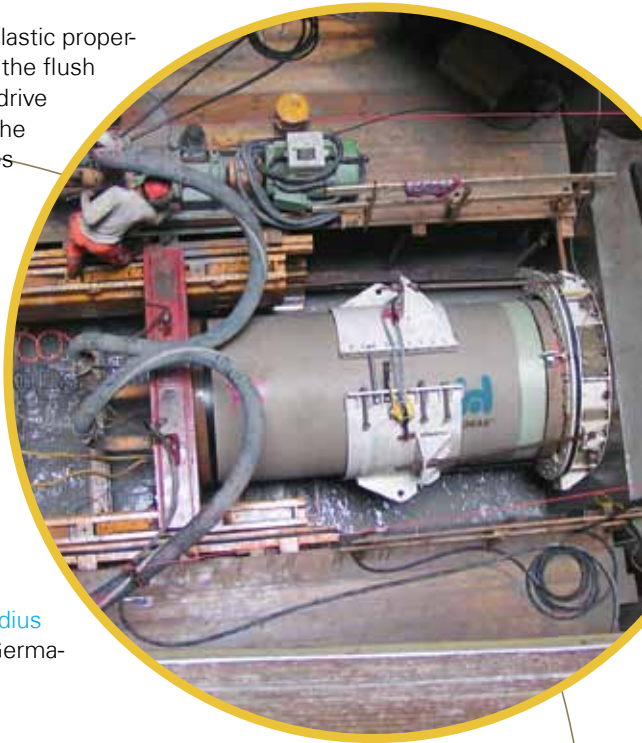
In trenchless projects, pipe material is often evaluated by its benefits regarding installation. However, HOBAS Pipes' many unique attributes provide installation as well as operation benefits, a combination unavailable with other materials.

Main benefits regarding operation:

- Pipe designs for a broad range of applications (water, wastewater, hydropower, industry)
- Pressure as well as gravity applications
- High corrosion resistance
- Leak-tight system for maximum loss-free flow
- Very smooth inner pipe surfaces minimize friction and pressure loss
- Single-source system solution including manholes and fittings
- Compatibility with other materials
- High abrasion resistance
- High structural load capacity
- Low operating and maintenance costs
- Service life of at least 50 years

In short, the use of HOBAS Pipes results in generally improved reliability, reduced risk, and lower costs.

Fmd: [HOBAS Jacking Brochure](#)



HOBAS Curved Pressure Pipe Jacking beneath the River Rhine, CH

HOBAS® Pressure Jacking Pipes for a Sea Outlet in Bulgaria

Precise Jacking in Sensitive Environment

420 meters of HOBAS Pressure Pipe D_e 860, SN 640,000, PN 6, have been jacked in Bulgaria to convey purified wastewater from a treatment plant into the Black Sea.

Golden Sands is a popular sea resort at the Black Sea in Bulgaria. In its north, lies a wastewater treatment plant which was built 25 years ago to serve a population of 12,000. It is currently technically modernized, enlarged and extended by tertiary treatment (removal of nitrogen and phosphorus). In future, the treatment plant will have a capacity to serve 72,000 people – according to a forecast, this is how many there will be by 2030. Riviera, Chaika and Alen Mak are also planned to be added to the plant's catchment area. The project is financed by the European Union and the Country.

When construction works commenced in 2009, the municipality examined different possibilities for conveying the purified water through a pressure pipe one sea-mile into the Black Sea. After consulting with HOBAS Bulgaria, the designer Plamen Kitipov suggested a solution for which pipes are jacked from the artificial pier to the water treatment plant and from the pier into the sea. This option would neither affect the beach with its protected dunes nor the artificial quay wall of the harbor. Alternatively, the wall could have been circumvented, which would have increased the project's costs considerably. Jacking therefore became the installation method of choice.

The smooth outer surface of HOBAS Pipes that ask for lower jacking forces and the compact wall structure, thanks to which there is less excavation material to dispose of, convinced the decision maker. Stoyan Kerin about relying on other pipe producers: "On a project with this much responsibility, we prefer utilizing the original – HOBAS Pipes."



After a lot of preparatory work – a circular shaft was excavated at the pier and repairs were made on the treatment plant – installation started at the end of the season. It was not possible to install an intermediate jacking station on the two times 210-m-long jacking alignment since a pit in the sea would have been too costly. This is why the HOBAS Pressure Pipes were produced with a high stiffness of 640.000 N/m², despite ideal soil conditions (wet sand), and were jacked on one drive. A Herrenknecht jacking machine first made its way from the quay beneath the artificial bay, and in a second step pressure pipes were jacked from the quay out into the sea.

After the installation was completed, Boris Karadenchev, Vice Mayor of Varna, felt relieved: "This project proved quite tricky regarding pipe installation. HOBAS however once again proved that apart from high quality pipes, there are also first-class consultants who accompany you through the complete project."

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Year of construction
2013

Construction time
3 weeks

Length of pipeline
2 x 210 m

Diameter

D_e 860 mm

Pressure class

PN 6

Stiffness class

SN 640 000 N/m²

Application

Sea outlet for treated wastewater

Client

Varna Municipality

Designer

Ozon

Constructor

DZZD Devnya Trade

– Struma Imoti

Advantages

the beach is not affected, fast and easy installation, outstanding hydraulic properties, comparably smaller diameter, high stiffness classes available

HOBAS® Jacking Pipes Premiere in Chile

HOBAS® Pipes provide Sierra Gorda Mine in the Atacama Desert with Process Water

Within less than three weeks, 203 meters of HOBAS Pipe were jacked in the Antofagasta region in Chile. The line will convey seawater to the Sierra Gorda Mine for copper and molybdenum extraction.

Chile is one of the world's leading regions regarding the exploitation of natural resources. Copper mining is particularly important. In the north of the country, in the middle of the Atacama Desert, lies the little town Sierra Gorda. Here is the mine which is still under construction and operated by the Polish company KGHM and Sumitomo from Japan. Once all construction works have been completed, primarily copper and molybdenum shall be extracted by flotation. This process asks for the supply of 1.5 m³/sec of seawater. A 142-km-long pipeline shall first bring it to the thermic power plant owned by Suez Energy where it is used as cooling water. The water is subsequently pumped to the mine, 1626 meters away from the plant. A part of the line traverses the plant in 8 meters depth.

Open trench installation was not possible beneath the plant. Pressed for time, the client sought for a quick and safe solution for this section. Trenchless jacking installation presented itself as the rescue at hand. The decision makers based their choice mainly on the following requirements:

- The pipe material should be resistant to sea water, have a long service life, and be suitable for jacking.
- The space at the construction site is limited, so that only one starting and reception were feasible.

Year of construction	Application
2013 – 2014	Process water line carrying sea water
Construction time	Client
3 weeks	Minera Sierra Gorda (KGHM International Ltd. und Sumitomo)
Total length of pipe	Contractor
203 m	Bessac/Soletanche Bachy Chile
Diameter	Benefits
D_e 1099	little construction space, little excavation material, fast and simple installation
Pressure class	
PN 1	
Stiffness class	
SN 100000	



- Microtunneling through sandy desert soil with an AVN 800 jacking machine.
- Longtime, extensive experience in pipe jacking was a must.
- Delays should be kept to a minimum and no obstacles were expected in 8 meters depth.

At the end of August 2013, HOBAS was commissioned together with their local partner Buildtek. HOBAS delivered a total of 203 m of jacking pipes D_e 1099, SN 100000, PN 1. With a wall thickness of 51 mm the jacking pipes were designed for a maximum jacking load of 3,348 kN – perfectly suitable for the installation beneath the power plant. The installation per se was conducted by the French company Bessac/Soletanche Bachy Chile.

Apart from pipes, HOBAS also delivered 86°-bends, couplings, and reducers to connect the pipeline to the system. The construction works were completed within 3 weeks only and to the complete satisfaction of all parties involved. The client very much appreciated the professional project handling and the timely deliveries and was more than happy with the HOBAS Products and their fast and simple installation. Thanks to the perfect cooperation of Soletanche Bachy/Bessac, HOBAS, and Buildtek nothing stands in the way of starting up the mine very soon.

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HOBAS® Pipes Jacked 40 Meters beneath the Gardens of Prague Castle, CZ

After the successful completion of the Prague Sewer Project COIII in 2012, for which more than 1 kilometer HOBAS GRP Gravity Pipe DN 1800, SN 12500 has been installed in a tunneled duct, a follow-up project utilizing HOBAS Jacking Pipes was launched toward the end of 2013.

Since the sewer was to be installed in 40 meters depth beneath the gardens of Prague Castle, jacking presented itself as sole solution for pipe installation. Company Energie - stavební a báňská a.s., the same contractor who had already been contracted for COIII was assigned for the job. Due to the light material and good experience with HOBAS, a total of 207 meters HOBAS Jacking Pipes De 1940, SN 50000, PN 1, were utilized on the project.

Poor in situ soil conditions posed a challenge to the contractor for the so-called Letná-shale when crushed and mixed with water turned into sticky sludge that presented a challenge to the pumps. Apart from a resulting slight delay, installation progressed well, not least thanks to timely deliveries and the easy handling of HOBAS Jacking Pipes. As usual, HOBAS Experts shared their experience and offered advice from inception to completion.

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Year of construction
2013

Construction time
1 month

Total length of pipe
207 m

Diameter
D_e 1940

Pressure class
PN 1

Stiffness class
SN 50000

Application
SewerLine

Installation method
Jacking

Client
SNC Process Group

Contractor
**Energie - stavební a
báňská a.s.**

Benefits
**Light material, practi-
cally any installation
depth possible**

