



PROJECT BOOSTS CAPACITY OF PRAGUE SEWER

The terminal overflow chamber in the "C" interceptor

in Prague - Bubeneč



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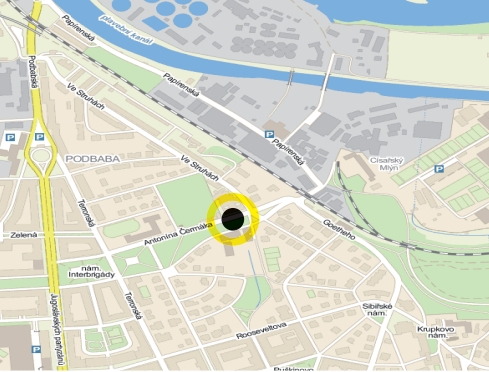


Figure 1
Location of the new overflow chamber in Prague – Bubeneč



Figure 2
Original overflow chamber – “frog mouth”



Figure 3
Inflow into the chamber through a well hole

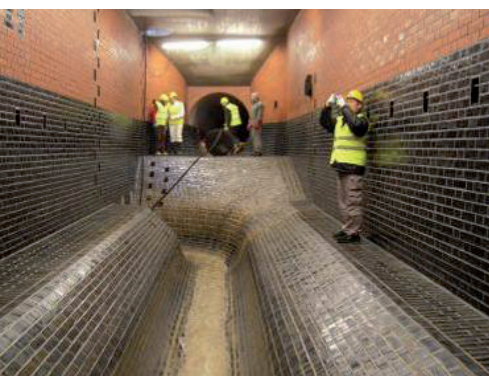


Figure 4
Sewage flow in the chamber



Figure 5
Connection to the “K” interceptor (1200/1800 mm profile)

INTRODUCTION

Construction of a new terminal OK_1C overflow chamber located beneath Mažarska Street in the Bubeneč area of Prague has recently been completed. The ‘C’ interceptor replaced the original ‘frog mouth’ type chamber. The primary function of the new chamber also fulfils a control function in addition to partial retention.

ORIGINAL CONDITION

The overflow chamber acts as the terminal chamber of the LII header in the ‘C’ interceptor, prior to its connection to an inflow labyrinth of Prague’s wastewater treatment plant (WWTP).

The catchment area of the ‘C’ interceptor covers an extensive area of northwest Prague, comprising the southern part of the Petřiny housing estate, as well as Břevnov, Střešovice, Bubeneč, Dejvice and Hradčany. The entire area, with the exception of a small area around the Břevnov Monastery, is drained by a combined sewer system. The original ‘frog mouth’ type overflow chamber (Figure 2) was found to have insufficient capacity, and no longer met the quality requirements for discharged overflow water as defined in the city’s General Plan of Sewer and Drainage. The inflow to the chamber was fed through two egg-shaped sewers matching Prague’s Normal (PN) dimensions, (PN X 1500/2300 mm and PN IV 900/1600 mm), converging at the front of the chamber in a brick (1800/2600 mm) egg-shaped sewer. The outflow from the chamber was also fed through a brick PN I (600/1100 mm) egg-shaped sewer. The storm water flowed separately through a circular sewer (NB 2000 mm) to the drain line and further on to the Vltava river.

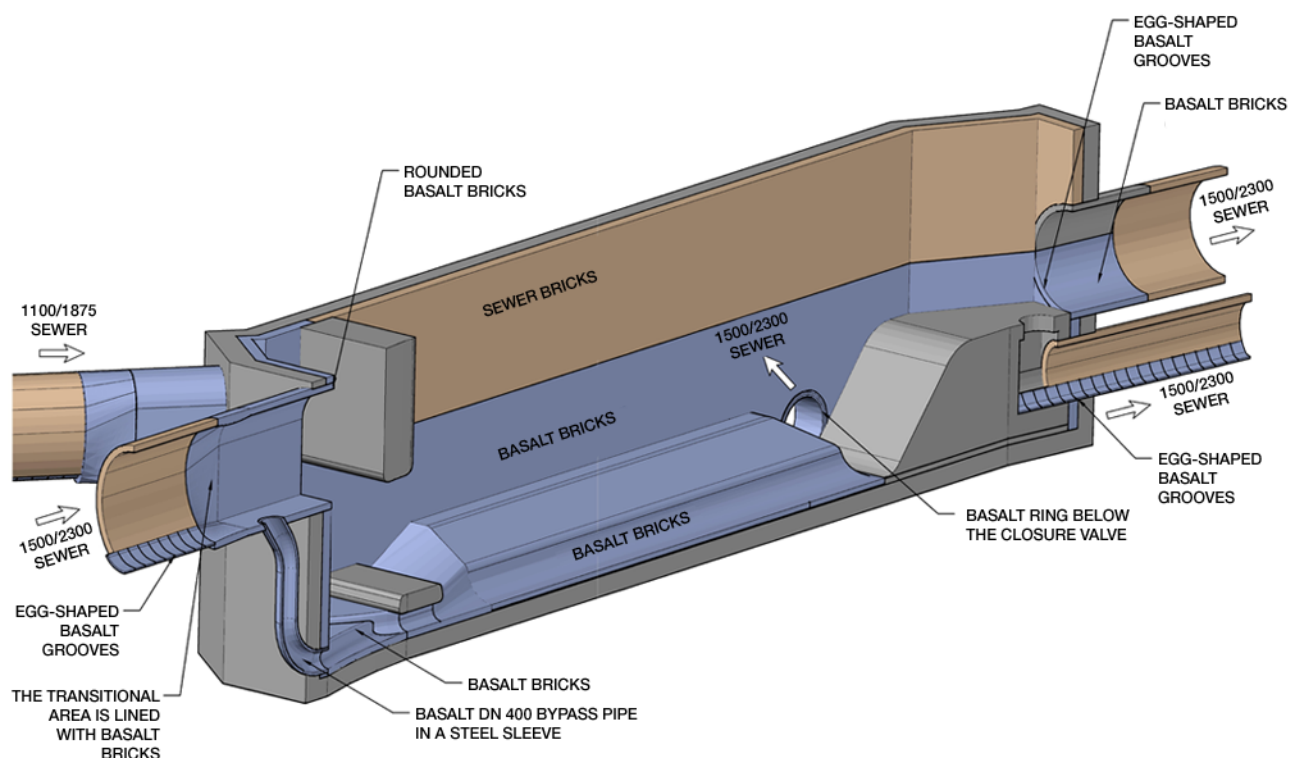
NEW CHAMBER

The primary use of the newly built overflow chamber is to allow for the diversion of sewage and storm flow from the ‘C’ interceptor to the ‘K’ interceptor, through a constructed connection. This diversion will relieve the terminal sections of the ‘C’ interceptor prior to its connection to the inflow labyrinth of the Prague WWTP. As a result, part of the storm water, which would also have been discharged into the Vltava river, will be brought to the plant. In terms of hydraulics, the overflow chamber is designed as a discharge type, with a straight crest. The ground plan of the chamber is rectangular with a sight size of 4m x 22 m;

The reinforced concrete structure of the chamber was designed to use C30/37-XA2 concrete, with a maximum in-depth leak of 40 mm so a concrete 50 mm cover was implemented. For reinforcing the concrete, B500B steel and B500 welded mesh was recommended. The basic dimensions of the rectangular reinforced concrete structure are 4.5m x 23 m, with a depth of 5.65 m and a wall

Figure 10
The construction
of the connector to the
"K" interceptor





thickness of 400 mm. The installation of the construction joints was addressed by utilising sealing sheets with an insulating coating applied to both sides.

Both the inner surface and the shape of the chamber were constructed using a brick lining. Cast basalt bricks were used in the lower section, while above standard sewer bricks were used (figures 3-5). The cast basalt is attached to the structure using specially formulated adhesives such as Eufix.

Ensuring adhesion levels greater than 1.5MPa. Jointing is also applied using this mortar, which withstands exposure to the chemicals contained in the sewage water. Cast Basalt was chosen in preference to other commonly used materials to minimise lining failure and maximise the service life of the sewer, based on an anticipated transport speed greater than 56 m/s. The tests performed clearly indicated that, of all the materials tested, cast basalt also had the highest degree of resistance to abrasion. By combining cast basalt and high-quality concrete a durable structure was created that was able to withstand the long-term impact of waste water flows.

OUTFLOWS FROM THE CHAMBER – CONNECTION TO THE “K” INTERCEPTOR

A new outflow from the chamber – the sewer connecting to the ‘K’ interceptor, was used to divert sewage and a portion of the storm flow. The walled connecting structure with a 1200/1800 mm egg-shaped profile is led via a new route that has direct connections the ‘K’ interceptor. The connecting structure was lined with cast basalt sewer bricks with a hewn crest at the inlet to the inceptor. The total length

of the connection was 33m, with a longitudinal gradient of 14.3 0/00. A measuring shaft was located in the path of the connection to control the permanent specific profile of the wastewater running in front of the WWTP (figure 5). The construction of this connection was executed by means of tunnelling. The temporary structure of the tunnel comprised of K21 steel frames and Union boards.

CONCLUSION

The new overflow chamber provides maximum utilisation of the existing space and operational handling options for wastewater treatment in interceptors prior to its actual inflow to the WWTP. By combining cast a basalt and sewer brick with high-quality concrete a highly durable system was created. One able to withstand the long-term impact of wastewater flows and with a service life expectancy of more than 150 years!

The proposed conceptual solution for the entire catchment area of the ‘C’ interceptor is now processed into the General Management Plan of Sewer and Drainage of the City of Prague.

The construction of the new overflow chamber was carried out over 17 months from 2010 to 2012 and the project was delivered on time and with minimal impact, disruption or any major technical hitches.

Investor: Prazska vodohospodarska
spolecnost a.s. (PVS)
Designer: KO-KA s.r.o.
Contractor: Cermak&Hrachovec