

# HOBAS Case Study

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## Four Kilometers Through Garbage

When a Vienna housing estate built on an old landfill had to be connected to the public sewer system, the experts at the City Council's Sewer Department found the ideal solution: microtunneling. In collaboration with specialized contractors HOBAS carried out the widely acclaimed project notching up another success.



The housing scheme "Am Bruckhaufen" is located in Vienna's 21<sup>st</sup> District on the old course of the river between the Old and New Danube. Built on an old landfill up to six meters high, the estate was not connected to the public sewer system until 1992. The landfill, two thirds of which belong to Eluate Class II and one third to Class III, posed great problems for the engineers: it dated back

some 70 years, but residual settlement of up to 15 centimeters still had to be contended with. It was also to be expected that gas was still forming inside. Under the landfill the soil consisted of Danube gravel and sand with the water table beginning just above this line.

HOBAS were given the task of providing the housing scheme with an optimum sewer system in economic and engineering terms to meet the needs of the nineties. The solution was microtunneling.

### How did they go about it?

A drill equipped with a control unit and an adjustable cutter head is driven horizontally through the soil to the target pit at the required gradient. Monitored and remote controlled from above ground, a laser guidance system displays the exact location and position of the cutting head. As a result, the operators can observe microtunneling progress and easily make corrections at any time if need be.

This method enables extreme accuracy: depending on soil conditions, the gradient can be calculated and complied with to a precision of 0.1 per cent. At the microtunneling face a combination of erosion and mechanical cutting loosened the native soil. A variety of tools

were used in this process, which also involved pumping in bentonite suspension to support the face and aid spoil removal.

The crusher behind the cutter was capable of breaking aggregate of up to a third of the drilling diameter. Crushed material was pumped back in the bentonite suspension as slurry to a settling basin above ground from where it was reused. Similar to conventional pipe jacking, hydraulic jacks controlled tunnel driving and pushed the pipes into the ground at the front end of the drill.

As the cutting head seals the pipeline at the front, the process also permits tunneling underwater. In actual fact, microtunneling underwater can be easier because wall friction is lower and suspension loss is kept to a minimum.



#### Special advantages of microtunneling for sewers

- Long service life: as in conventional jacking, the pipes are designed to take the typical jacking pressures. Such high loads are however never reached under normal circumstances so the pipes are really overdimensioned. In conjunction with ideal bedding conditions, high reliability is achieved.

- Maintenance and inspection at every house connection: the design was such that the sewer could not branch between manholes, therefore tees could only be installed in the pits. The distance between the start and finish pits was however up to 80 meters so intermediate manholes were sunk for individual house connections. Several connections were installed in a star in the manhole with gravity mains joining the sewer. This means that every house connection can be inspected and serviced from the manhole. These house connections were also jacked underground, but because of the short distances microtunneling was not necessary and simpler drilling methods could be used.

#### Why microtunneling for "Am Bruckhaufen"?

The sewage system could have been installed using conventional methods by laying the pipe in a trench cut to the native soil. That process would not only have been substantially more expensive in this particular case, but also posed certain threats as the existing buildings were floating structures, some even without cellars. After installing the sewers, the different degrees of settling between the floating buildings and those with foundations could have led to cracks and other damage. Fractured house sewers and storm-water drains, for example,

would have washed away the subsoil and caused further subsidence. Additional gas formation in the landfill could also lead to gas escaping through the sewer into cellars and therefore terrible explosions.

### Experience gained from four kilometers of jacking

Microtunneling through landfills consisting of domestic trash not only proved possible, but also an ideal solution. Jacking was even successful in material that was not homogenous. Large numbers of nails however caused some hindrance because of the danger of clogging, as did existing seepage pits which resulted in deviations from the planned line. Cavities, such as passages, had to be filled with grouting.

### Advantages for local residents

Although construction took 18 months, most of the local residents were not unduly disturbed and therefore sanctioned the microtunneling project. Indeed, over 95 per cent of households opted to have their sewage pipes laid underground by Vienna City Council Department 30, although they were not obliged to do so.

### Recognition abroad

Being the longest single construction section worldwide, "Am Bruckhaufen" caused quite a stir in the trade and was even presented at a congress in Paris. The microtunneling project proved once again that HOBAS, together with specialized building contractors and engineers, are capable of delivering top-class performance.

<b>Year of Construction</b>	1992
<b>Duration of Construction</b>	18 months
<b>Length of Pipes Laid</b>	4 km
<b>Pressure Class</b>	PN 1
<b>Diameter</b>	DN 600
<b>Stiffness Class</b>	SN 200000
<b>Method of Installation</b>	microtunneling
<b>Application</b>	sewer
<b>Client</b>	Vienna City Council
<b>Contractor</b>	Porr, Vienna

#### **Features**

- Jacking through a landfill
- Long service life
- Inspection and maintenance from each home connection
- Microtunneling much cheaper in this case
- Residents not disturbed