

Underground sewerage installation in Stadtroda, Thuringia/Germany

Straight through rock

By graduate engineer M. Raphael of the company Interra, Crimmitschau and graduate engineer A. Hertrich, STEINZEUG Ltd, Cologne

The water and sewerage disposal company "Thüringer Holzland"(WAH Ltd.) with limited liability in Hermsdorf had the assignment to build a section with especially high standards within the scope of a main sewer to be built to the sewage treatment plant Stadtroda. The section runs along the river "Roda" into the direction of the projected sewage treatment plant.

The commissioned consulting office **DAR** investigated three possible execution variants in order to find the most economical solution for **WAH Ltd**:

- 1) Open construction, partially as pressure line
- 2) Open construction along the river "Roda" as gravity line
- 3) Pipe jacking as gravity line.

After a thorough investigation of the variants, decision was made for variant 3 that proved to be by far the most economical, especially in the long run.

Consequently the following had to be executed by pipe jacking:

- 320 meter diameter 500
- 320 meter diameter 600
- 34 meter diameter 1000

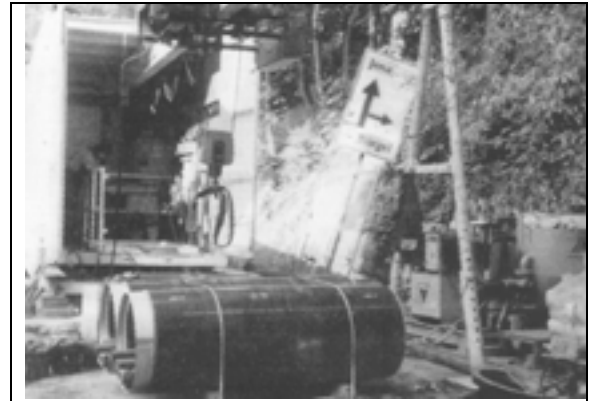
The relevant and effective standards and codes of practice for the pipe jacking, the DIN 18319 (VOB, Part C) and the work sheet ATV A 125 were the basis for the design, call for tenders and also for the later construction work.



The soil testing was done in accordance with DIN 18319 and proved that large parts of the line had to be jacked in consolidated rock with a compression strength above 50 kN per square meter and moreover, a groundwater table one to two meter above the crown of the pipe.

ARGE HS Stadtroda, a consortium of several companies received the acceptance of tender and the companies **TBR** and **Proterra Ltd** in Jena undertook the construction of the start and target shafts. The company **Interra Micro Tunnel Construction**, Crimmitschau, jacked the total length of approximately 700 meter.

The company Interra has been active in the micro tunnel construction since many years and has the quality seal V2 of the quality control organisation "Sewer Construction by pipe jacking". A remote controlled jacking device with a separately powered cutting head was used and the soil transport was made using the slurry spoil removing system. The cutting wheel had been especially equipped with rock cutting disks to coop with the rock. This made it possible to jack spans up to 105 meter without prematurely wearing out the rock cutting tools.



Vitrified clay jacking pipes made and supplied by Steinzeug GmbH were used as pipe material. The starting and target shafts were constructed using shot-concrete. After the jacking of the pipes, prefabricated manhole sections were installed as inspection manholes. For a flexible connection between the pipes and the manholes special adapters recommended by Steinzeug GmbH were used. For this case it was possible to install vitrified clay pipes, one of the most significant pipe materials in sewerage systems. Socketed vitrified clay pipes are being used in Europe since the middle of the 19th century, caused by the increasingly industrialized production of vitrified clay pipes.

"Earthenware pipes" already existed some thousand years before our era.

It is evident that all known proven characteristics such as corrosion resistance, water impermeability, hydraulic smoothness, abrasion resistance, mechanic and dynamic load bearing capacity, environmental consistency apply also to jacking pipes.



Since the beginning of the 80's, with the start of the construction for non-accessible sewers using the microtunneling technique, over 800 kilometres of vitrified clay jacking pipes from Steinzeug GmbH (including house connections) have been installed. Approximately 600 meter of vitrified clay pipes are presently being installed every working day in Germany.

A functioning co-operation between human being, machine and pipe material makes a technical solution, as the Stadtroda main sewage collector, possible.