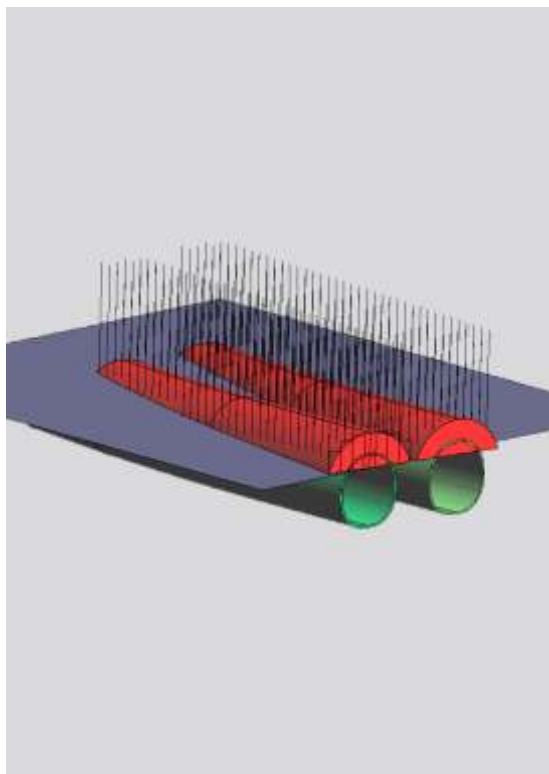


PROJECT

## METRO LINE U3 MUNICH OLYMPIAPARK GROUTING UNDER COMPRESSED AIR



### PROJECT NAME

Metro Linie 3 Munich Olympiapark

### CLIENT

Underground Works Department of the city of Munich (Germany)

### ENGINEER

Munich Underground Works Dept.

### GENERAL CONTRACTOR

Joint Venture ZÜBLIN AG,  
and Max. BÖGL AG

### SPECIALIST CONTRACTOR

**RODIO** GmbH

### CONTRACT VALUE

EURO 4.0 Mio CHF 6.0 Mio

### BEGINNING OF WORKS

MAY 2003

### END OF WORKS

AUGUST 2004

### ■ JOB DESCRIPTION

Cement grouting of ground around the two single track tunnels was performed from inside the galleries under compressed air (0.5 to 0.9 bar) and also from the surface. Grouting was performed using pvc manchette pipes who were placed into the Munich quaternary formation who consists of very permeable gravels and sand intercalated by few thin lenses of clayey silt. Goal of grouting process was to reduce the permeability of soil to values equal or smaller 10-5 m/sec, in order to minimize the losses of compressed air around the tunnels.

### ■ WORK QUANTITIES

Grouting from ground level:

1.240 Holes, Total drill length: 13.600 m, 1.720 m<sup>3</sup> of injected soil

Grouting from inside the two tunnels under compressed air:

370 holes, Total drill length: 7.900 m, 760 m<sup>3</sup> of injected soil

500 m<sup>3</sup> of cement grout with 150 ton of cement/limestone admixture

### ■ MAIN EQUIPMENT

1 Special tunnel drill rig **RODIO** SR510

1 Full automatic Mixing Plant **RODIO** IM20

1 Grouting Container **RODIO** CIRO10 equipped with 10 Pumps

Drill parameter recording by means of **RODIO** PAGURO System

Operation and monitoring of the whole grouting process for the first time by means of the complex computer software SOFIA



RODIO GmbH Spezialtiefbau  
Siemensstraße 2a  
D-86356 Neusäß  
T +49 821 450 428 0  
F +49 821 450 428 20  
E-M admin@rodio.de  
www.rodio.de

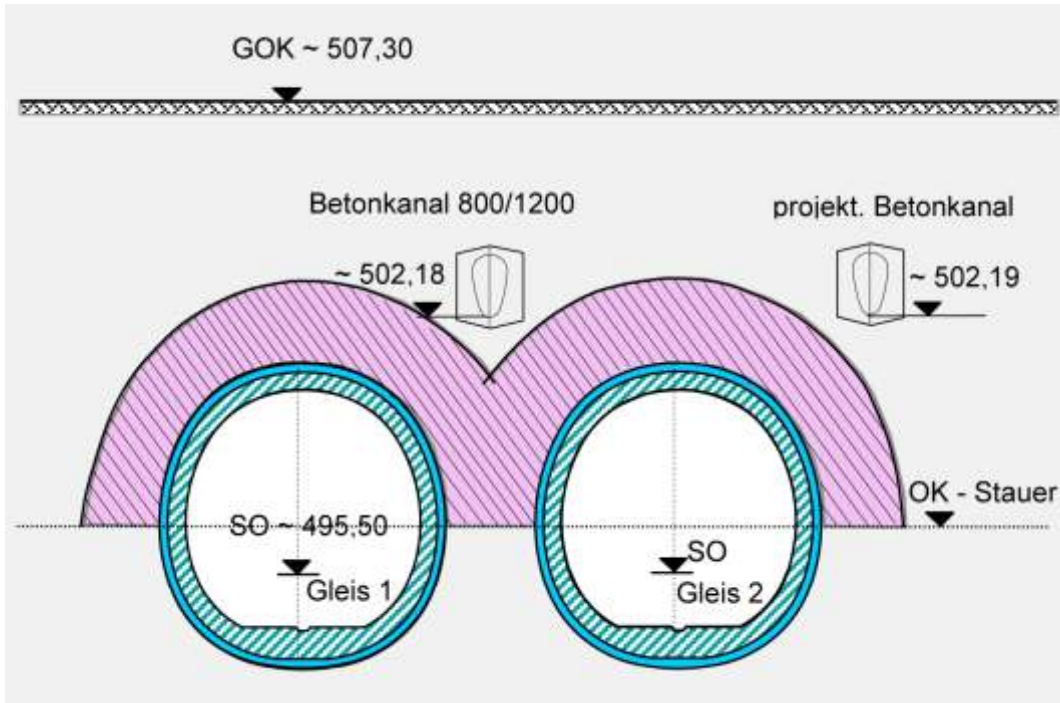


RODIO Geotechnik AG  
In der Luberzen 17 P.O. Box  
CH-8902 Urdorf ZH  
T +41 43 500 09 30  
F +41 43 500 09 31  
E-M admin@rodio.ch  
www.rodio.ch



PROJECT

## METRO LINE U3 MUNICH OLYMPIAPARK GROUTING UNDER COMPRESSED AIR



Grouted zone above the crown of the two tunnels



Tunnel drill rig **RODIO** SR 510 working under compressed air



RODIO GmbH Spezialtiefbau  
Siemensstraße 2a  
D-86356 Neusäß  
T +49 821 450 428 0  
F +49 821 450 428 20  
E-M admin@rodio.de  
www.rodio.de



RODIO Geotechnik AG  
In der Lüberzen 17 P.O. Box  
CH-8902 Urdorf ZH  
T +41 43 500 09 30  
F +41 43 500 09 31  
E-M admin@rodio.ch  
www.rodio.ch



RODIO  
SINCE 1921