Koralm tunnel - Current Status of Construction Works

Gerhard Harer
ÖBB-Infrastruktur AG, Graz - Austria
Project overview

Koralm tunnel - overview of investigation and construction lots
Project overview

Koralm tunnel – geological framework

E

KAT1
Tertiary sediments

32,9 km

KAT2
Crystalline basement

Investigation tunnels

KAT3
Tertiary sediments

W
# Koralmtunnel - present status of investigation and construction works

<table>
<thead>
<tr>
<th>Contract</th>
<th>Period</th>
<th>Overall tunnel meters</th>
<th>Advance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation shaft/ -tunnel Paierdorf</td>
<td>2004-2010</td>
<td>5.616 m</td>
<td>completed</td>
</tr>
<tr>
<td>Investigation tunnel Mitterpichling</td>
<td>2004-2007</td>
<td>2.516 m</td>
<td>completed</td>
</tr>
<tr>
<td>Investigation tunnel Leibenfeld</td>
<td>2005-2007</td>
<td>2.226 m</td>
<td>completed</td>
</tr>
<tr>
<td>KAT1</td>
<td>2008-2013</td>
<td>4.825 m</td>
<td>completed</td>
</tr>
<tr>
<td>KAT2</td>
<td>2011-2019</td>
<td>39.928 m</td>
<td>at present 12.1 km excavated (NATM 4.0 km, TBM 8.1 km)</td>
</tr>
<tr>
<td>Ventilation shaft Paierdorf</td>
<td>2012</td>
<td>-</td>
<td>completed</td>
</tr>
</tbody>
</table>
Koralm tunnel – present status of works

Lot KAT1
Project overview – site installation KAT2

Landfill & aggregate processing
Concrete & segment plant „South“
Tunnel alignment
Concrete & segment plant „North“
Site offices
Feeder line
Project overview – segmental lining KAT2

- **Ring**
  - Medium width 1,90 m
  - Sectioning 6+0 (+ invert element)
  - Outer diameter 9,5 m
  - Segment thickness 35 cm

- **Production**
  - No. of segments 103.500 pcs.
  - No. of invert elements 17.250 pcs.
  - Weight per ring 47,5 t
  - Weight invert element 13,4 t
  - Already produced 32.000 pcs.
Project overview – segment plant & storage place KAT2

- 2 segment plants
- Stock for around 2 x 300 rings
  - 4 portal cranes, 50 m span width, 30/60 t load
Project overview – mass management KAT2

Total excavation 8,6 Mio. to

Concrete 1,5 Mio. to

Open sections 2,9 Mio. to

Dumping 3,0 Mio. to

External recycling 1,2 Mio. to (removal by rail)

~ 60 % of the excavated material will be reused!
Koralm tunnel – present status of works

Material management
KAT2

Total excavation
8,6 Mio. to

View from the top of sieve tower
Project overview – rail logistics KAT2

- 1,200,000 t mucking material
- 350,000 t pea gravel
- 950,000 t cement

are handled by rail
Project overview – TBM-DS KAT2 - scheme
Project overview – TBM-DS KAT2 – shop assembly
Project overview – TBM-DS KAT2 - installation
Project overview – KAT2 – progress with TBM

- Max. daily advance 41 m (with one TBM!)
- Monthly advance in average ~ 500 – 700 m (with each TBM!)
- Max. water inflow 140 l/s
- At present 8,1 km excavated with the TBMs
- We are exactly in time and budget
Key factors of success for construction

- Enough time for a stepwise investigation and design process
- Design, which considers ground quality and behavior
- Construction contract allowing modifications of excavation and support during construction, even more with TBM
- Appropriate monitoring program
- Site organization, allowing a flexible response to changing behavior
- Safety management plan
- Competent staff on site & good workmanship
Key factors of success – matrix organization of ÖBB-project management team

Matrix project organization:
Project responsibility and functional responsibility are networked to each other

Legend:
- Overall project responsibility by the project manager
- Functional responsibility by the specialists
- Continuous combination of project and functional responsibility

Project responsibility

Functional responsibility

Legend:
Key factors of success – we keep schedule and budget stable

- Overall deviation in budget in average < 1%!
- A proper project controlling is essential
  - Clear cost structure is needed
  - Risk management (also during construction) is essential
Key factors of success: site organization

Owner / Client

Contract

… on behalf of the client

- Site Management
- Site Supervision

Contractor
Key factors of success: proper site organization

- Owner / Client
- Site Management
- Site Supervision
- Contractor
- Geotechnics
- Geology
- Hydrology
- Structure
- Objects
- Tunneling expert
- Geotechnical Engineer
- Engineering Geological Documentation
- Geotechnical Monitoring

≅ 5 persons
Because of

- ... properly performed investigation and design (with sufficient time and budget for it)
- ... its appropriate site organization and staff
- ... a client, who is experienced in managing mega projects (targets, strategies, controlling, …)

& … it is important that one does not stop asking!*  *) Albert Einstein
... is a successful project!

Thank you very much for listening!

gerhard.harer@oebb.at