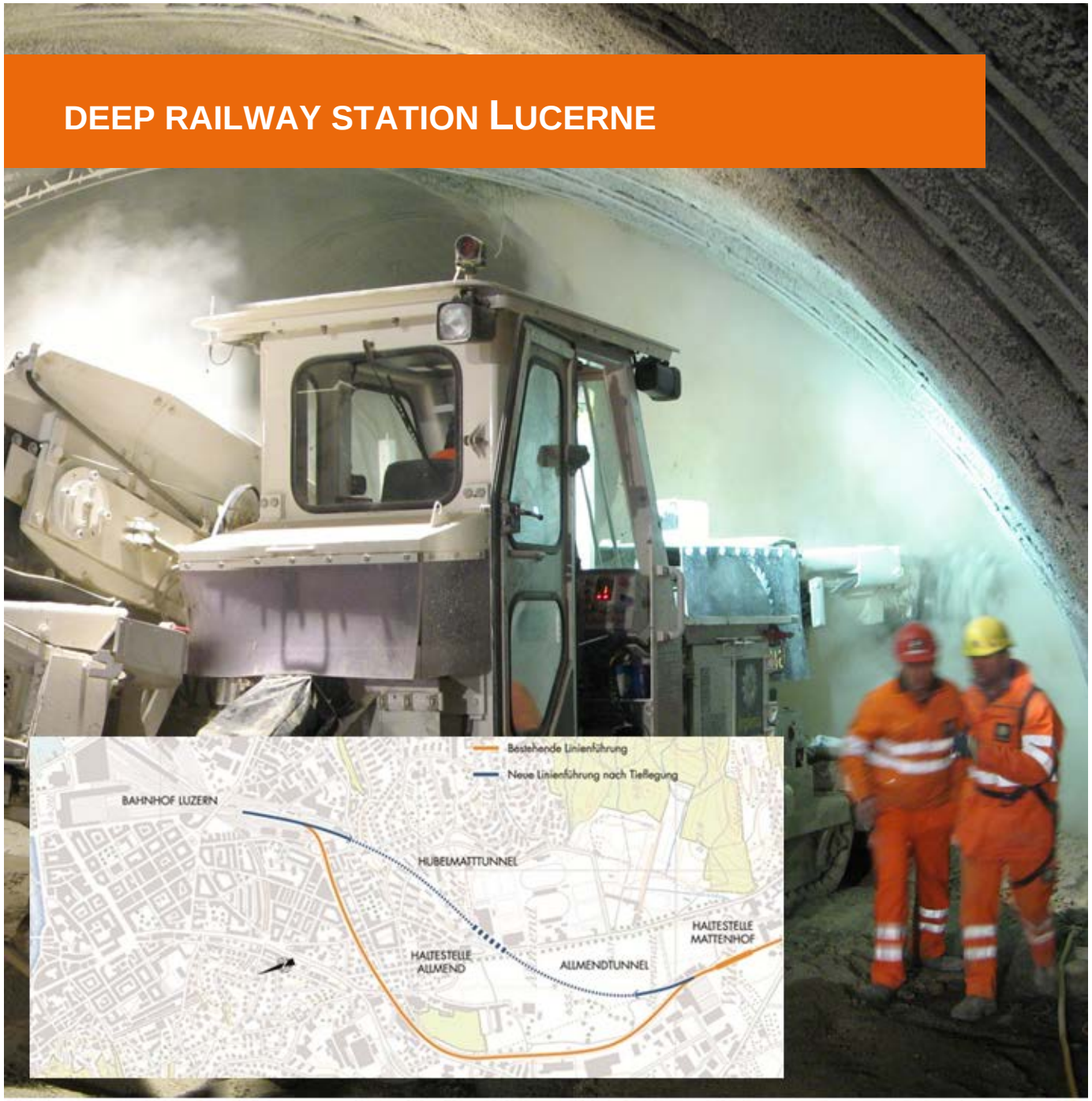
DEEP RAILWAY STATION LUCERNE



Deep Railway Station Lucerne, Switzerland

Double track railway tunnel with single shell lining. The Hubelmatt tunnel underpasses with small coverage the dense urban area between main station and Allmend of the city of Lucerne.

Scope

- Double track railway tunnel with subsurface station
- Hubelmatt tunnel, mined section length 516 m
- Soft ground section Geissensteinring, length 38 m

Challenges

- Complex geological conditions
- Small coverage of the tunnel
- Site in densely populated urban area, sensitive environment with regard to noise and ground settlement

Amberg Services

Sole responsibility for all planning in the phases:

- Construction project and detailed project
- Tender design (technical entrepreneur, TE)
- Realization of structural work for mining section and soft soil section incl. coordination with specialist areas regarding tunnel construction

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- Cut and cover section in densely populated area

- Pilot gallery, extension by semi cutting machine

- Transport logistics for excavated material

AMBERG FACTS

Contracted value Amberg

- Total Amberg CHF 610'000

Project Phases & Duration

- Construction project, tendering 2006 – 2007
- Tendering project (TE) 2007 – 2008
- Realization structural work 2008 – 2012

Project Details

Cut-and-cover section

- Cut-and-cover section with construction pit adjacent to an existing residential building and road
- Discontinuous bored pile wall. Comprehensive evidence protection and surveillance measures for protection of buildings and inhabitants during the construction phase

Mining section in rock

- Pilot gallery using TBM
- Extension with semi cutting machine (road header) for keeping vibrations and noise as low as possible in the city area
- If necessary excavation of the cross-section in parts, first top heading then bench heading
- Heading in portal areas under protection of pipe umbrellas (under passing of buildings and roads)

CLIENT FACTS

Overall costs

- Total CHF 270 Mio.

Overview project

- Pilot gallery with TBM
- Extension with semi cutting machine to minimize vibrations and noise emissions in the city area
- In portal areas heading with pipe umbrella (under passing of buildings and roads)
- Cut-and-cover section in neighbourhood of existing buildings

Geology

Mining section

- Mainly lower Sweetwater Molasses partly heavily weathered and with low coverage

Soft ground section

- Slope sediments, ground moraine and gravel / sand mixtures, partly in groundwater

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CHALLENGES

Tunnel portals in city area

Sites in densely populated city area

- Inner urban conditions
- Logistic development of sites in city area
- Very confined conditions at sites
- Partly low coverage under buildings and roads

ENGINEERING APPROACH

Extension by semi cutting machine

Advancing in city area

- Single shell lining with shotcrete instead of cast in place concrete shell (Optimization of cost)
- Tendering as TE (Implementation project by contractor)
- Clear and non-misleading formulation

TECHNICAL SOLUTIONS

Station Hubelmatt, structural work completed

Excavation of larger cross-sections

- Heading of ventilation gallery with gripper TBM
- Extension with semi cutting machine (because of vibrations)
- Control and surveillance schedule for buildings, roads and inside tunnels with pre-defined intervention measures.

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