
SWIETELSKY

Modernization of the ÖBB Tauern Tunnel, partial renewal of the slab track

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AGENDA

1. Project presentation
2. System overview, existing structure and new construction
3. Construction phase – construction process, resources, construction technologies
4. Question and answer session and open discussion

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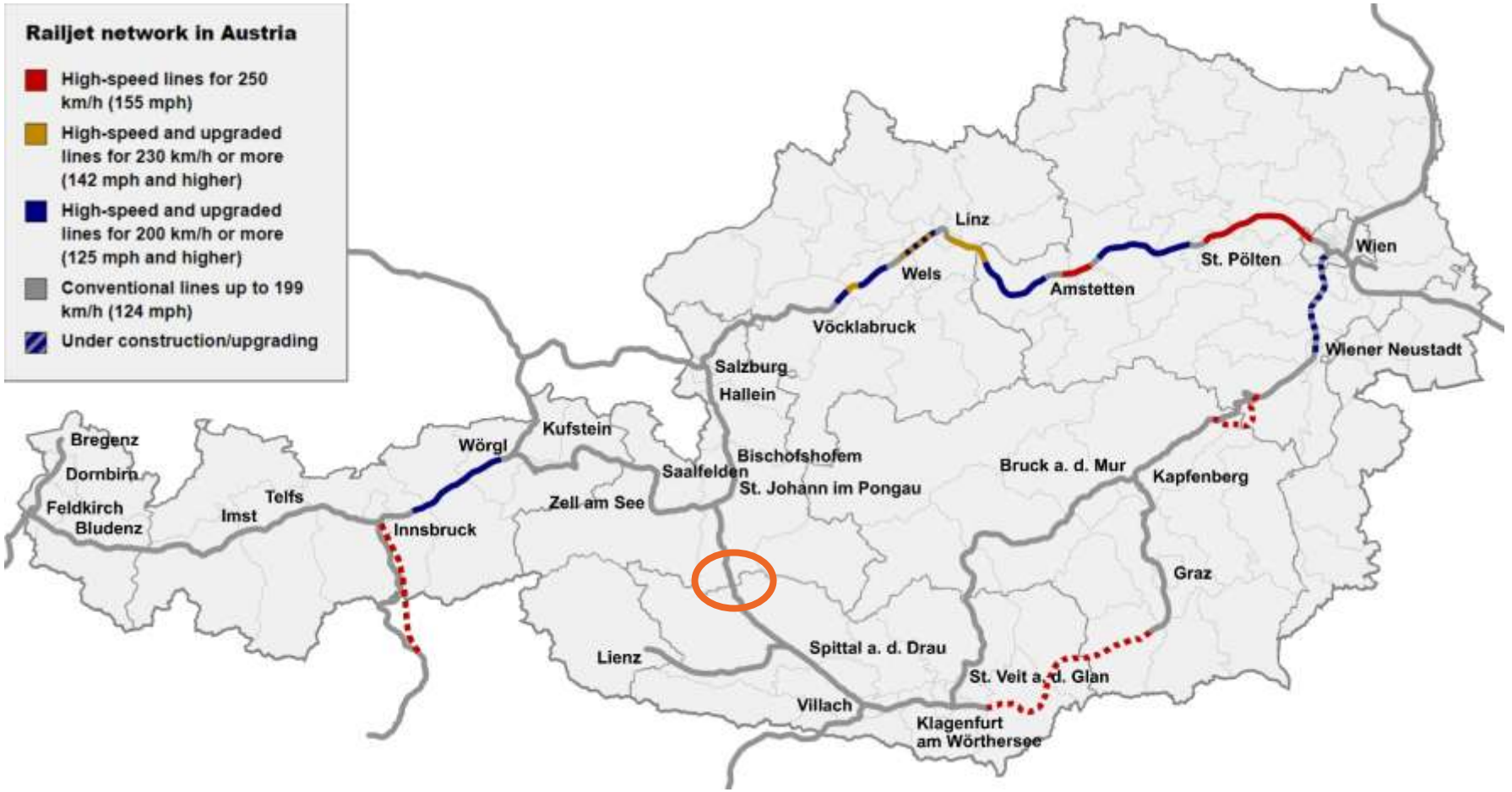
Project presentation

1

Project presentation

Modernization of the Tauern Tunnel, stage 1 – 2024/25

- Location ÖBB Tauern Tunnel



Project presentation

Modernization of the Tauern Tunnel, stage 1 – 2024/25

- The Tauern Tunnel was completed in early 1909 after 7.5 years of construction and originally had a length of 8,550 m.
- As part of the 2001-2003 project to optimize safety equipment and improve the route at Böckstein station, the tunnel was shortened by 179 m and is now 8,371 m long.
- Water ingress in the areas near the portals, especially in the scree section in the northern and southern sections of the tunnel, regularly leads to ice formation in the tunnel during the cold season.
- Water ingress of varying intensity and frequency also occurs in the tunnel section in solid rock. Although this does not cause ice formation, it damages the building fabric, creates high humidity in the tunnel, and leads to corrosion of the rail fastenings of the superstructure and the signaling, telecommunications, and electrical engineering systems.
- To ensure high system availability in the coming decades, extensive reinvestment is required in all areas (tunnel construction, track, energy technology, signals, telecommunications, overhead lines, etc.).

Project presentation

Description of the existing tunnel

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Project presentation

Description of the renovation measures

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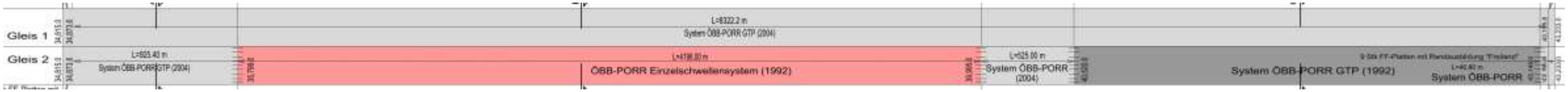
Project presentation

Superstructure of the existing structure

- Superstructure
  - The superstructure in the Tauern Tunnel is double-track. The distance between the track centers is 1.75 m, resulting in a track center distance of 3.50 m between the two tracks. The track gauge is 1437 mm. In plan view, the Tauern Tunnel is straight, but in elevation view, the route has a roof profile. Starting from the highest point at approximately km 40.520, the gradient on the north side is 10‰ and on the south side 2‰.
  - The current inventory dates from the early 1990s and 2000s. In 1992, a single sleeper system in sleeper rubber shoes was installed on track 2 between km 35.799 and km 39.995.

Slab Track System ÖBB-PORR, with track base plate (2004), L=8,322 m



ÖBB-Porr tbp system (2004), L=925 m

ÖBB-Porr single sleeper system (1992), L=4,196 m

ÖBB-Porr tbp system (1992), L=2,629 m

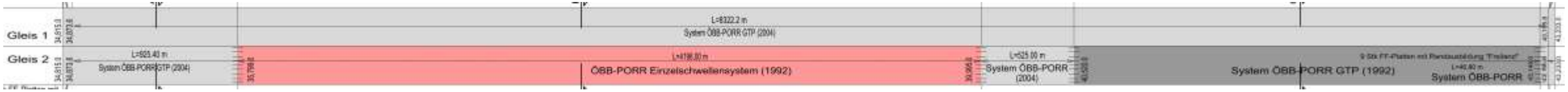
ÖBB-Porr tbp system (2004), L=525m

Project presentation

Modernization of the Tauern Tunnel, stage 1 – 2024/25

- Planned work - Track / superstructure: Replacement of the single sleeper system on track 2 over a length of approx. 4,200 m, as well as replacement of the support points and rails on the remaining track sections.
  - Removal of the existing slab track with the „ÖBB-Porr single sleeper system in sleeper rubber shoes“
  - Installation of the slab track with the Rheda 2000 slab track system
  - Replacement of rails and support points on track 2 – approx. 4,140 m
  - Rail and support replacement on track 1 – approx. 8,340 m

Rail and support point replacement on track 1 – approx. 8,340 m



Rail and support point replacement on track 2 – L=925 m

New slab track – approx. 4,200 m

Rail and sleeper replacement on track 2 L=3,215 m

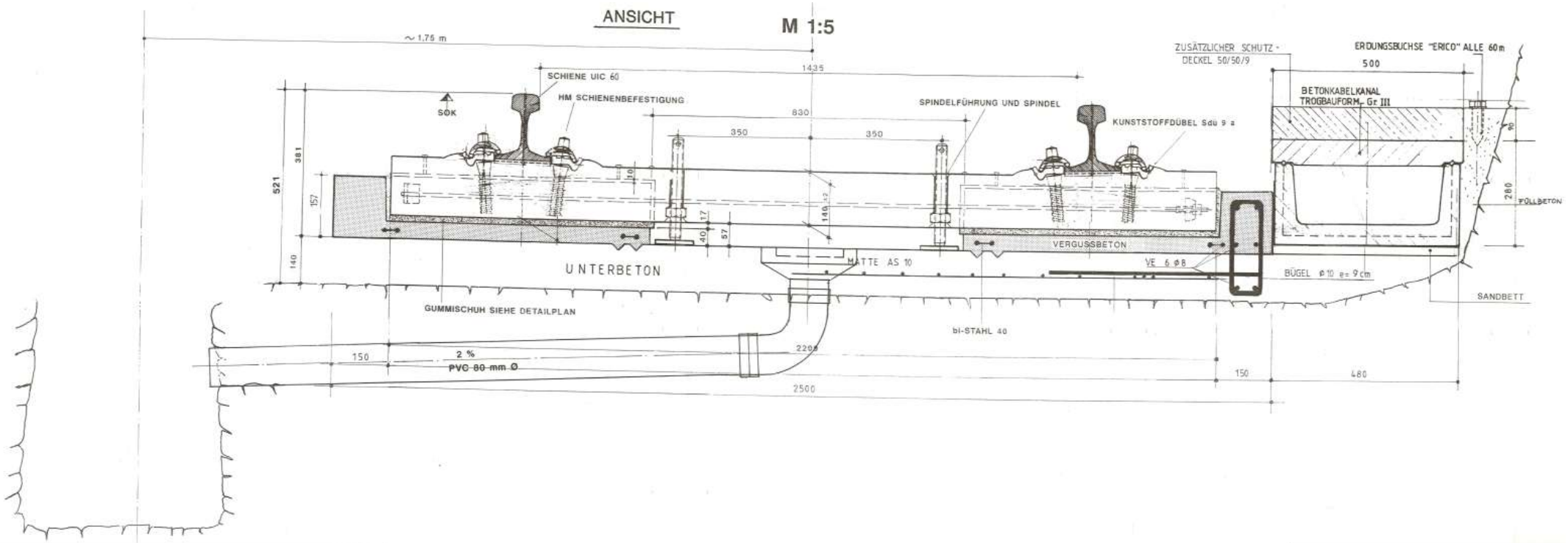
- Working time model: continuous 24/7 construction work from the beginning of February 2025 to mid-May 2025
- Material dimensions for renovation: 40.000 rail support points, 80.000 threshold screws, 450 tons of rail fastening material

System overview, existing structure and new construction

2

Existing System overview

Slab track system, ÖBB-Porr single sleeper system in sleeper rubber shoes– built in 1992



- Single sleeper system – installed in 1992
  - In the area of the slab track system with single sleepers in rubber shoes, the sleepers are grouted with 4 cm thick grouting concrete in the area of the rubber shoes. Underneath the grouting concrete is a 14 cm thick layer of reinforced sub-base/compensation concrete. To the left and right of the sleepers, the grouting concrete is connected to the leveling/base concrete by means of stirrup reinforcement. For safety reasons, walkable gratings are installed between the sleepers. W14 rail fastenings are installed on the single sleepers.

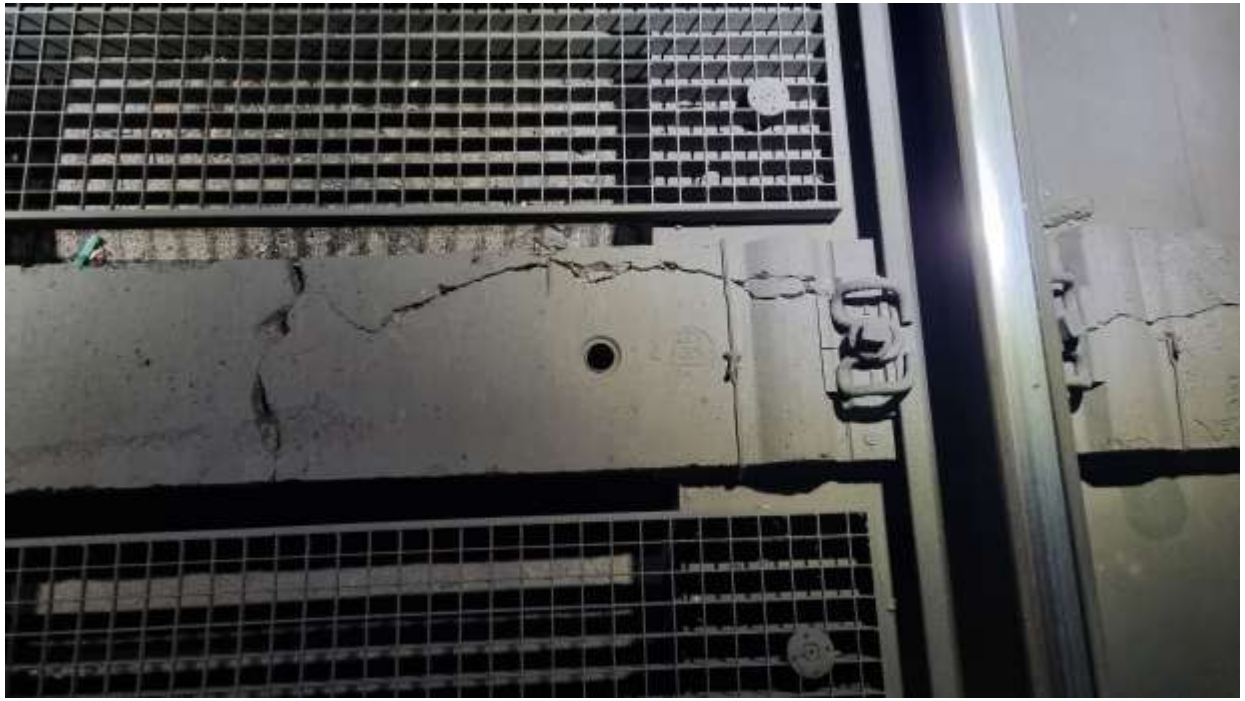
Existing System overview

Slab track system, ÖBB-Porr single sleeper system in sleeper rubber shoes – built in 1992

Existing System overview

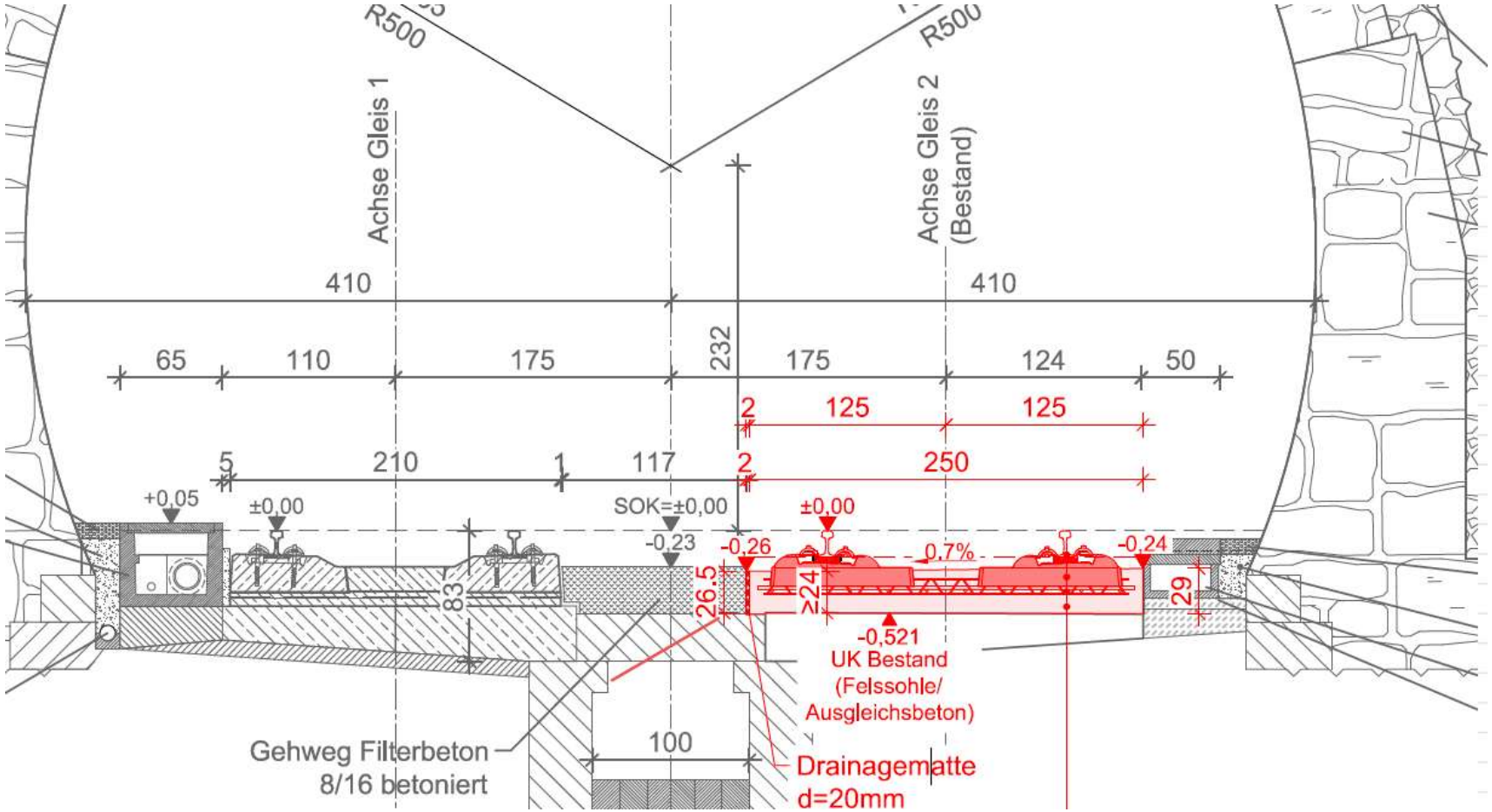
Slab track system, ÖBB-Porr single sleeper system in sleeper rubber shoes – built in 1992

- Damaged and cracked sleepers



System overview - new slab track

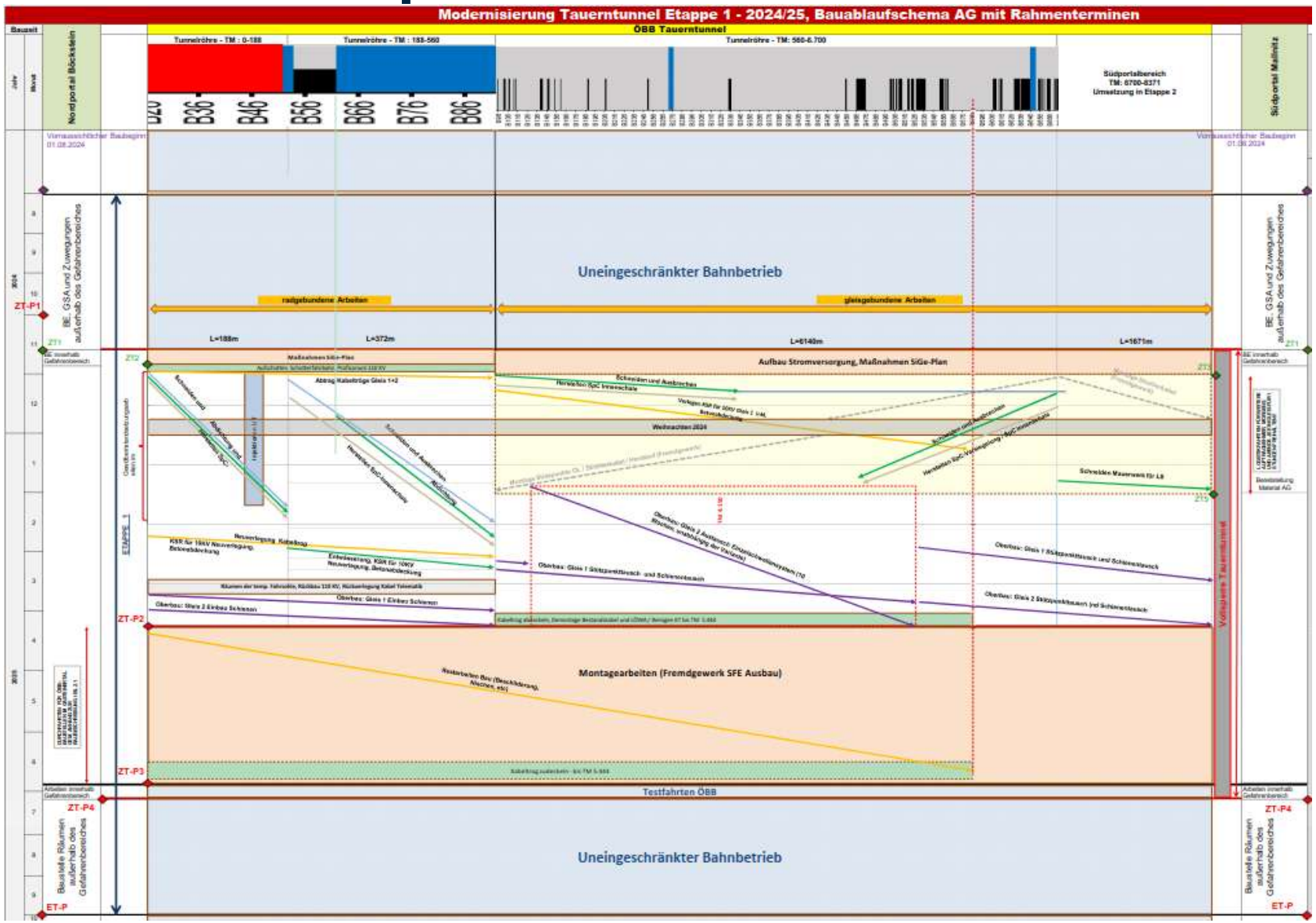
Slab track system Rheda 2000 with sleeper type B355.3 W60M-1437



Construction phase – construction process, resources, construction technology

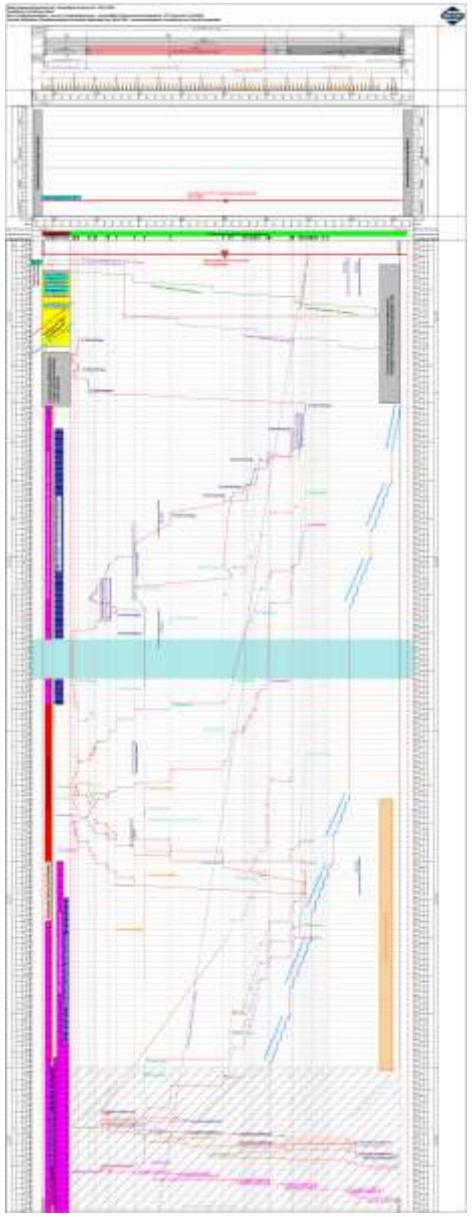
3

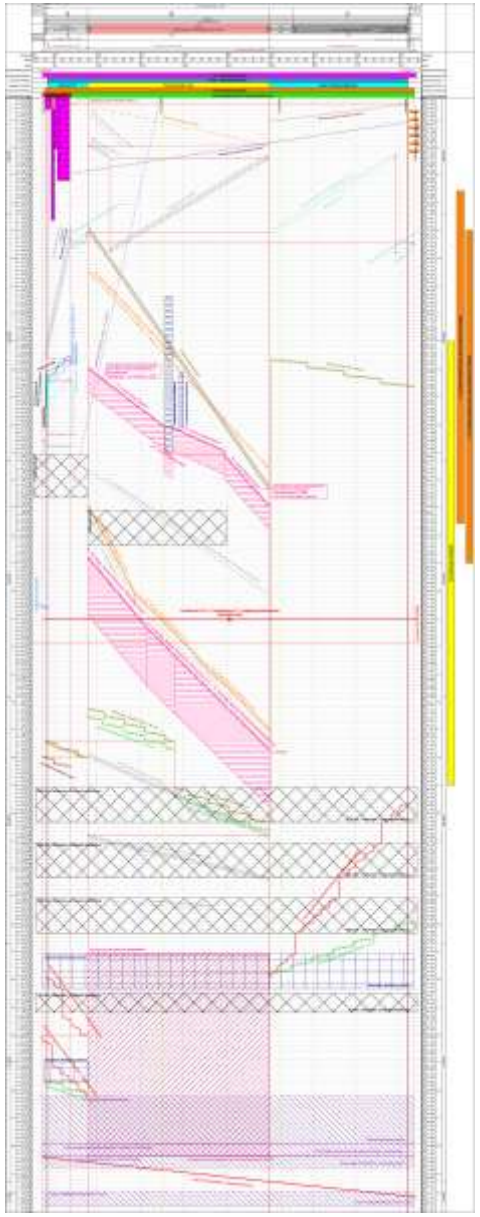
Construction process



Time-distance diagram – Construction process in the tender phase

Construction process

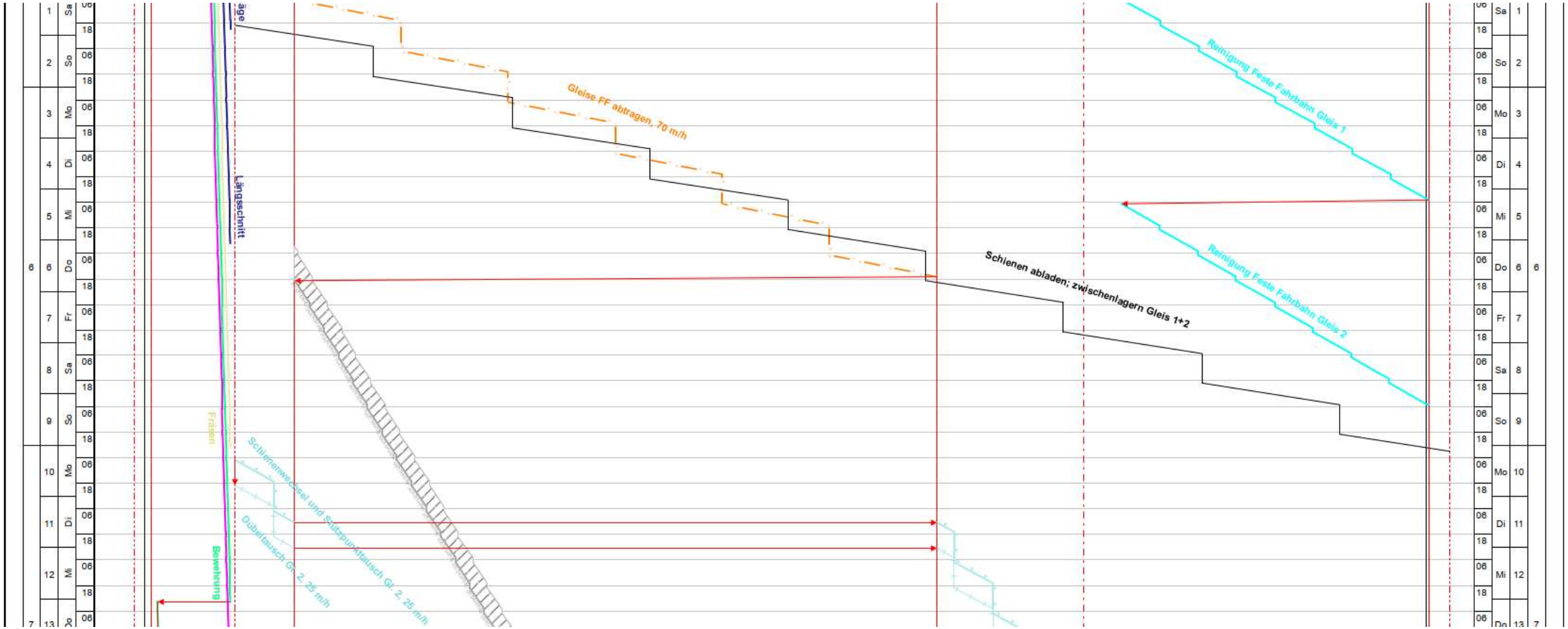




Time-distance diagram –
Construction process in the execution phase

Construction process

Work steps in detail



Construction technology

Removal of the old slab track –> ÖBB-Porr single sleeper system in sleeper rubber shoes.

Construction technology

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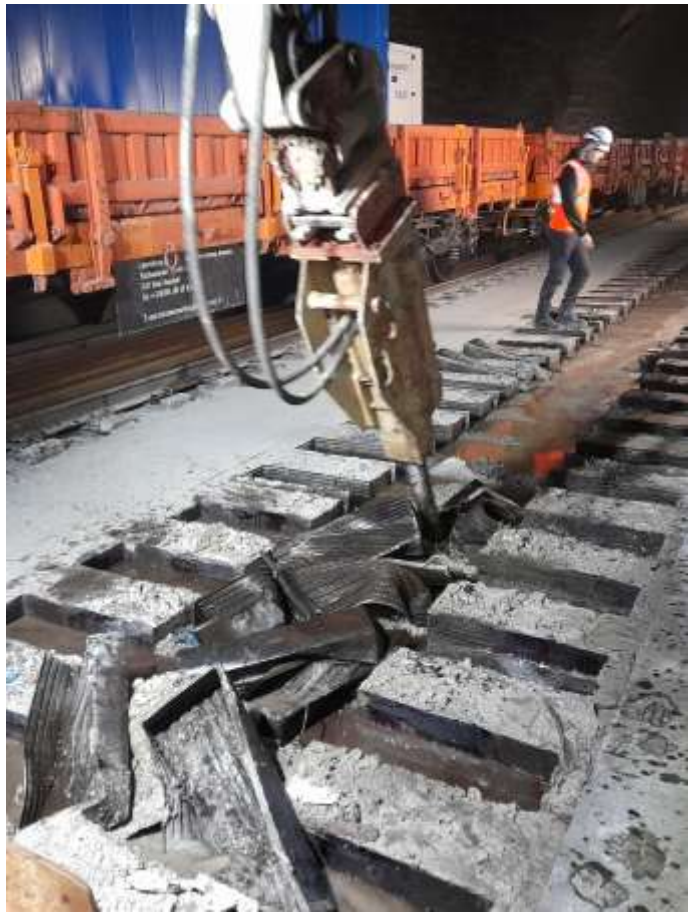

Construction technology

Removal of the old slab track –> ÖBB-Porr single sleeper system in sleeper rubber shoes.

Construction technology

Rail replacement and support point replacement

- The existing system consists of the following individual components:
  - 2 plastic dowels Sdü9a
  - Elastic intermediate plate Zwp 104
  - Base plate GRp21
  - Zw700/85 or Zw692 intermediate layer
  - 2 angle guide plates Wfp15a or Wfp15
  - 2 Skl13 or Skl15 clamping clamps
  - 2 pieces of threshold screws Ss30-230 with Uls7

Construction technology

Rail replacement and support point replacement

- Moisture and heavy contamination in existing structure




Construction technology

Rail replacement and support point replacement

- Severe corrosion on the rail fastenings

Construction technology

Rail replacement and support point replacement

- Severe corrosion on the rail fastenings and broken tension clamps

Construction technology

Rail replacement and support point replacement

- Severe corrosion on the rail fastenings – When attempting to open the screws, the screw head breaks off

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Construction technology

Rail replacement and support point replacement

- Drilling out and turning out the threshold screw with special machines and special tools – developed by ÖBB

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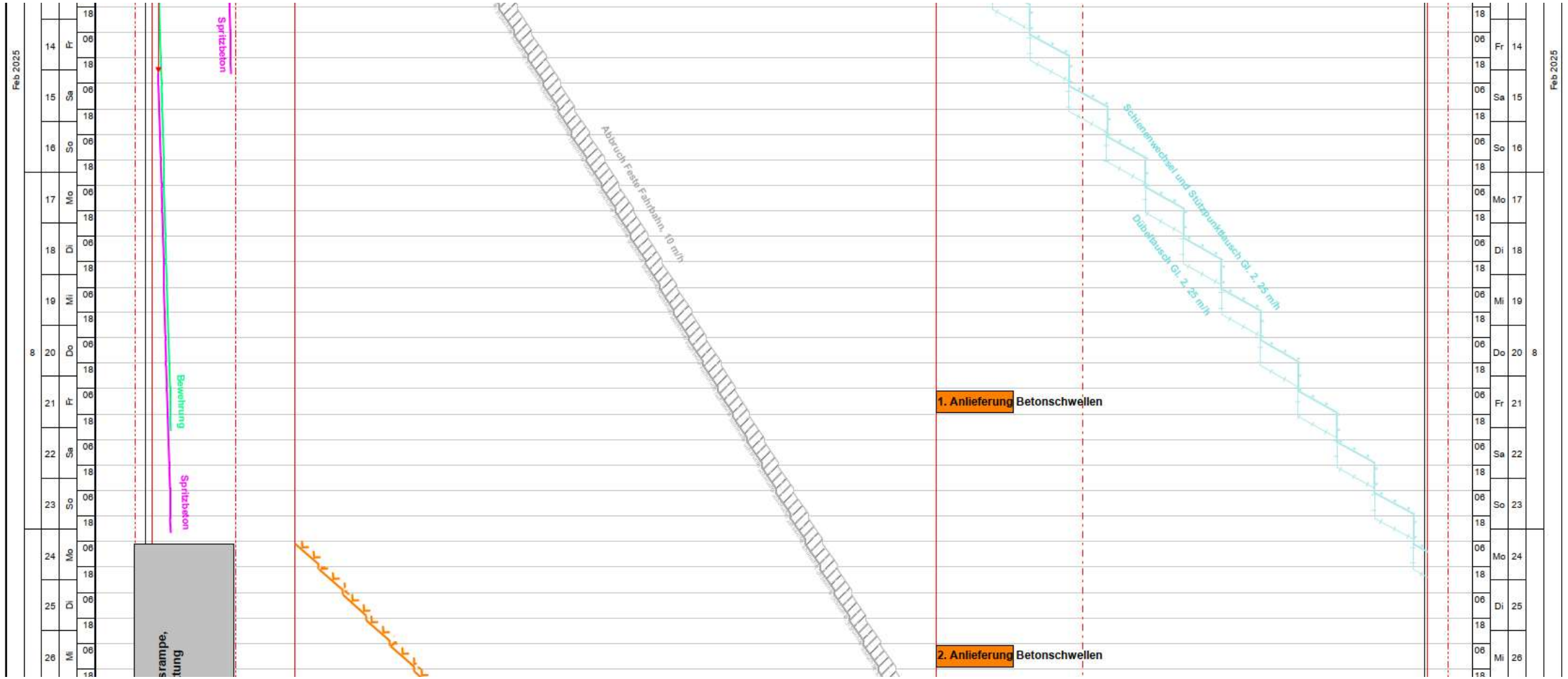
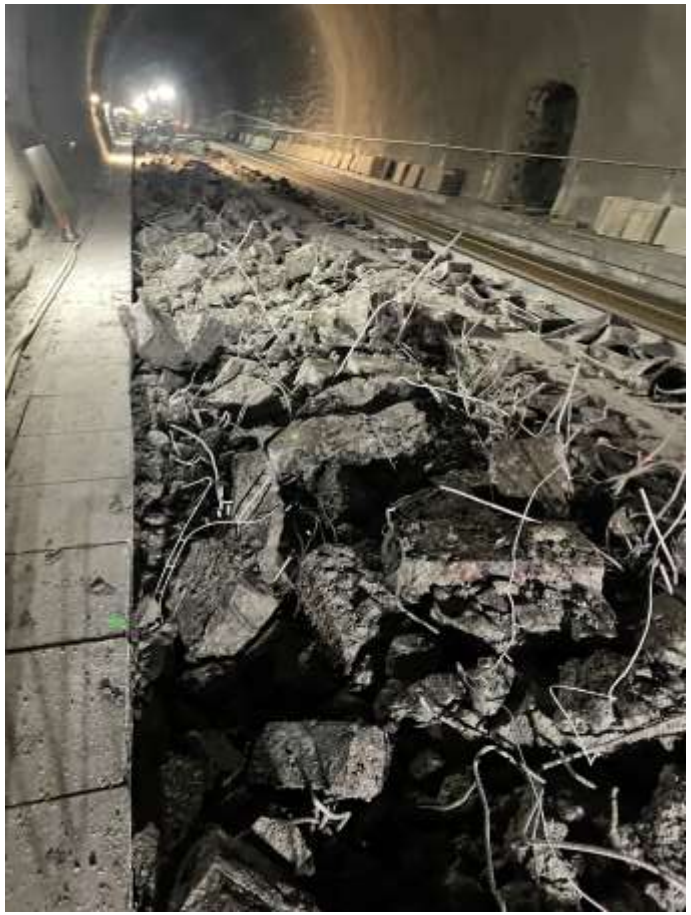
Construction process

Work steps in detail



Construction technology

Demolition of the slab track



Construction technology

Challenges and problems in the construction process and construction technology

- Old substructure – no stable subgrade for the new slab track. A total of approx. 3.500 m³ of ballast had to be removed and transported out of the tunnel.




Construction technology

Challenges and problems in the construction process and construction technology

- Damage of the cable tray and collapse of base channel (central drainage)

Construction technology

Challenges and problems in the construction process and construction technology

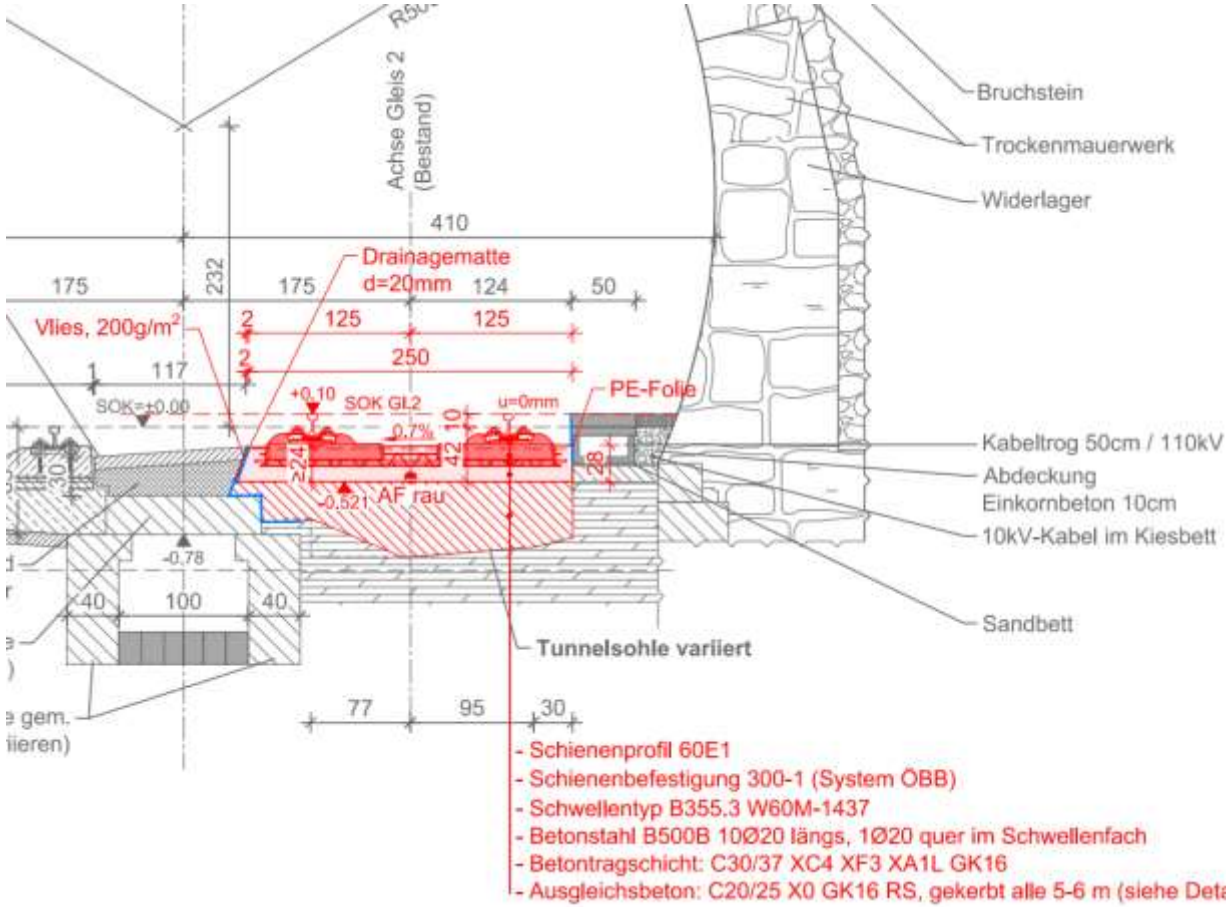
- Damage of the cable tray and collapse of base channel (central drainage)

Construction technology

Concreting of the concrete base layer / leveling concrete, track-bound

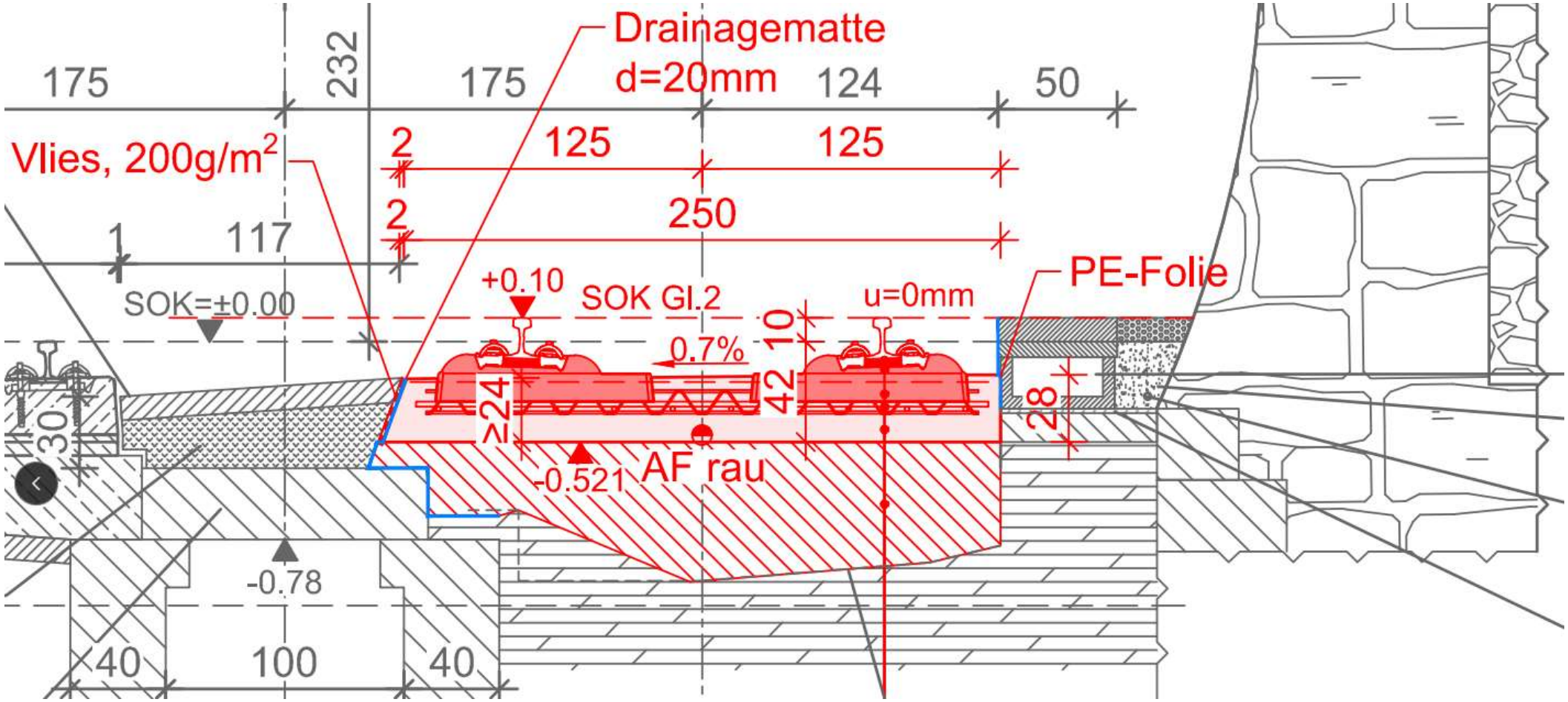
Construction technology

Finished concrete base layer



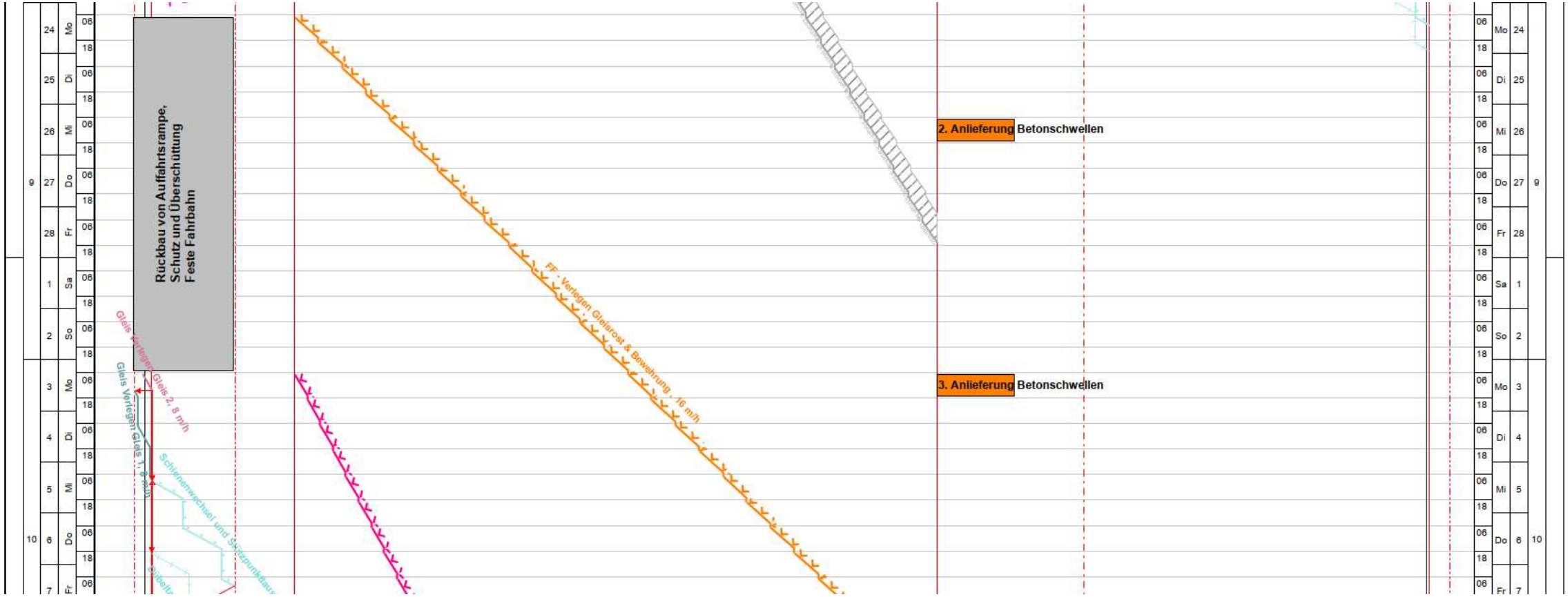
Construction technology

Adapted slab track system Rheda 2000 with sleeper type B355.3 W60M-1437



Construction process

Work steps in detail



Construction technology

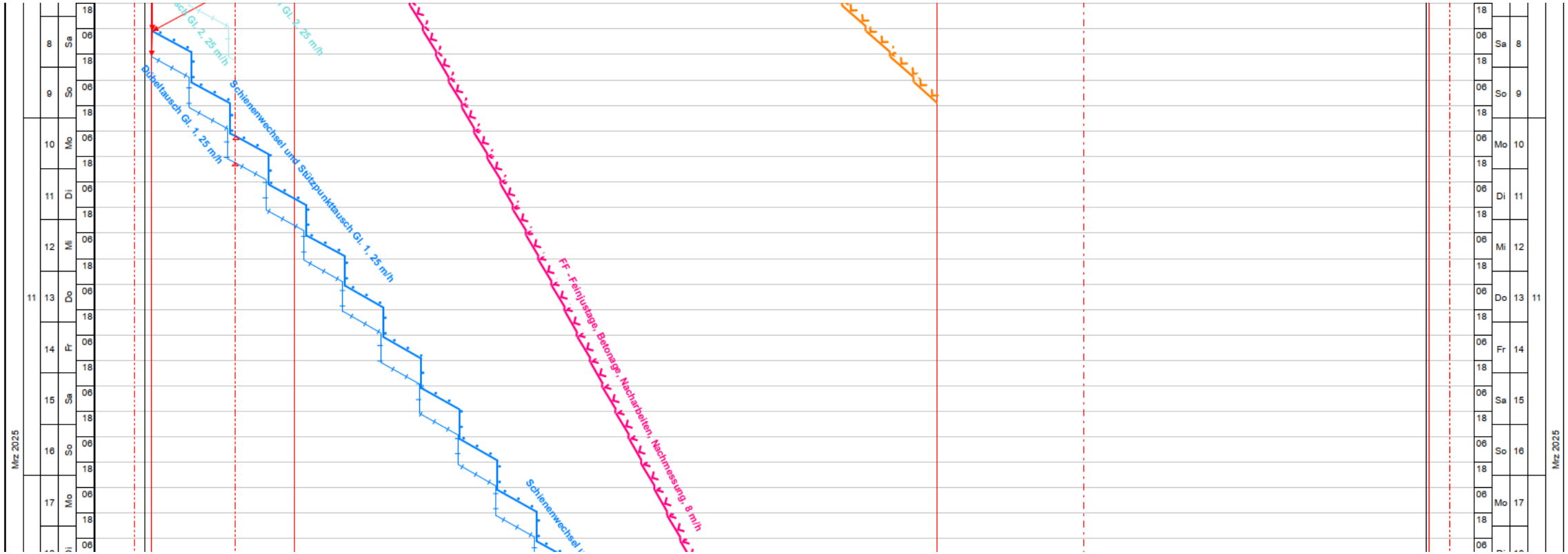
Laying of slab track – track grid and reinforcement, Rheda 2000 system

Construction technology

Installation of the lifting and alignment system

Construction process

Work steps in detail



Construction technology

Finding the right concrete mix – specifically for this construction project

Construction technology

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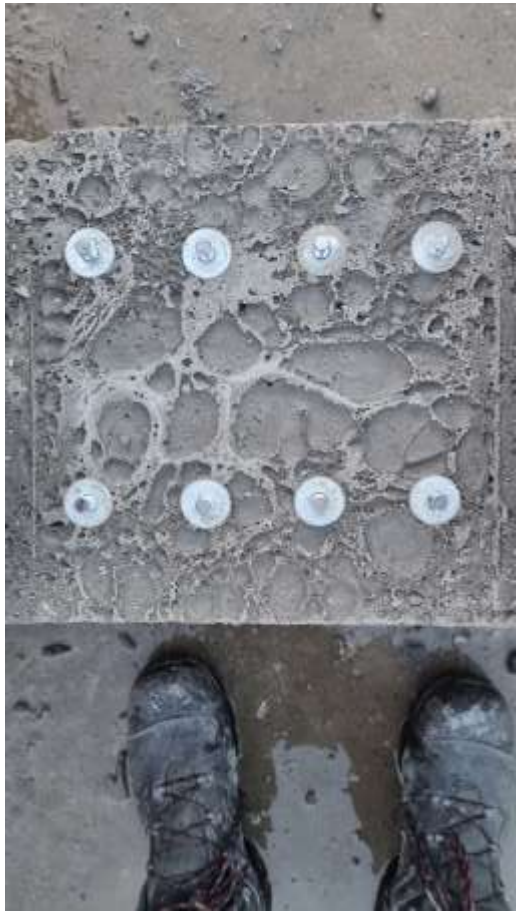
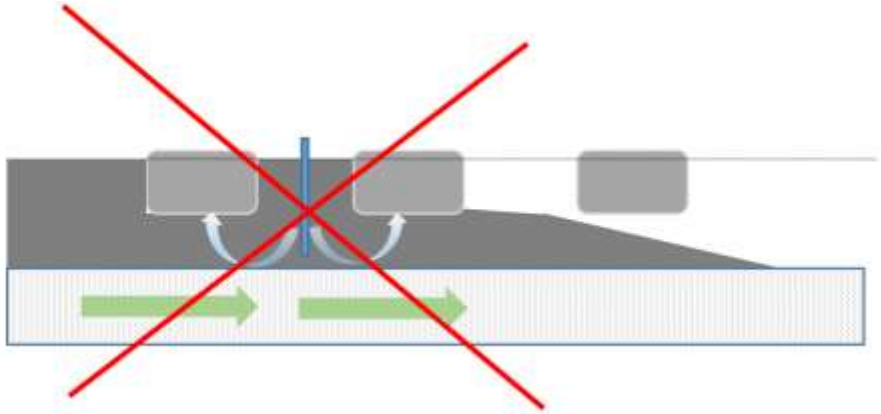
Construction technology

Finding the right concrete mix – specifically for this construction project

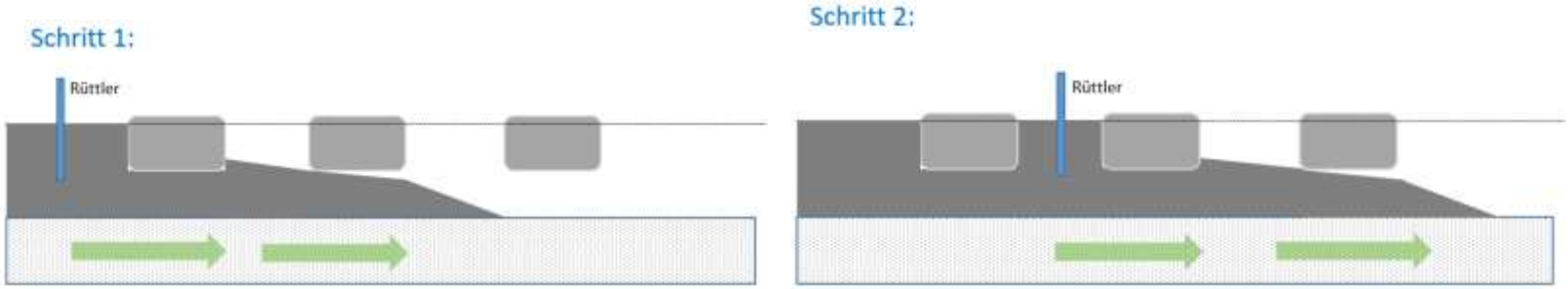


Construction technology

Finding the right concrete mix – specifically for this construction project



- The aim is to allow the concrete to flow to the next but one sleeper and to position the vibrator no more than approx. 5 cm below the sleeper.



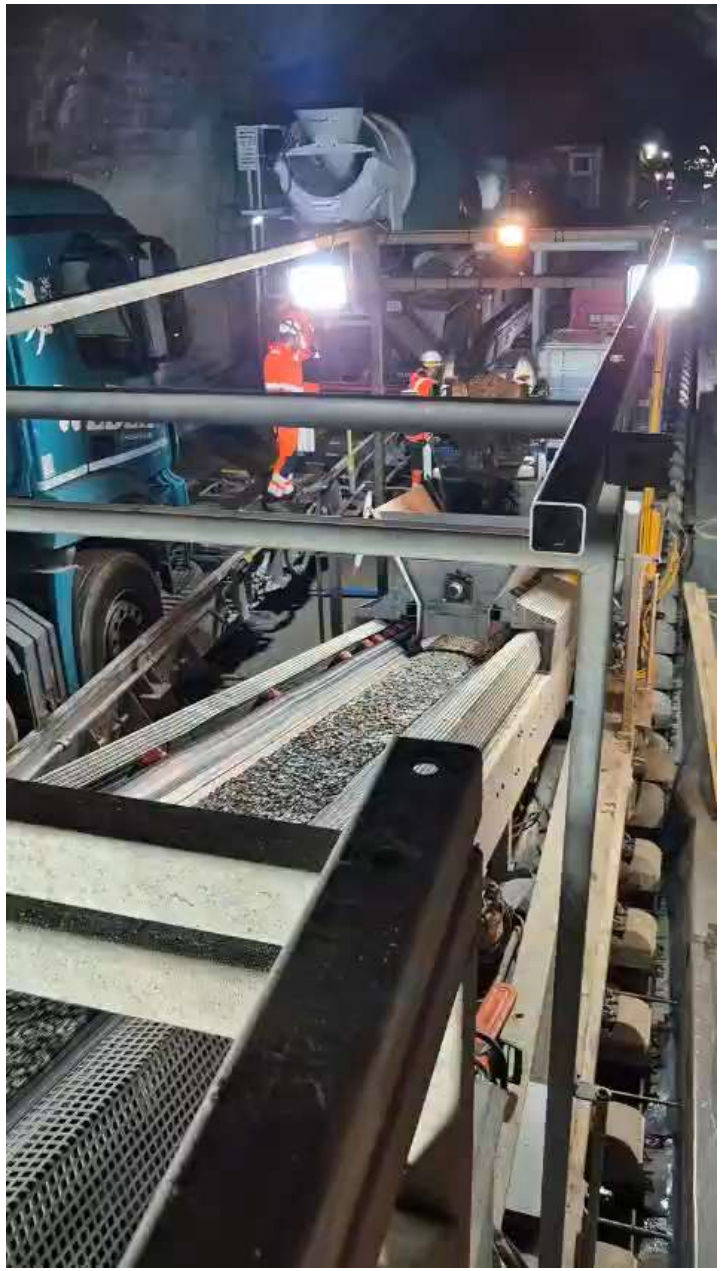
- Concrete mix: C 30/37 XC4 / XF3 / XA1L / GK16 / VV4.0 / VA6.0
  - The consistency range must be between 49 and 57 cm for the spreading dimension !!!

Construction technology

Concreting of the slab track with installation aid (concrete paver)

Construction technology

Concreting of the slab track with installation aid (concrete paver)

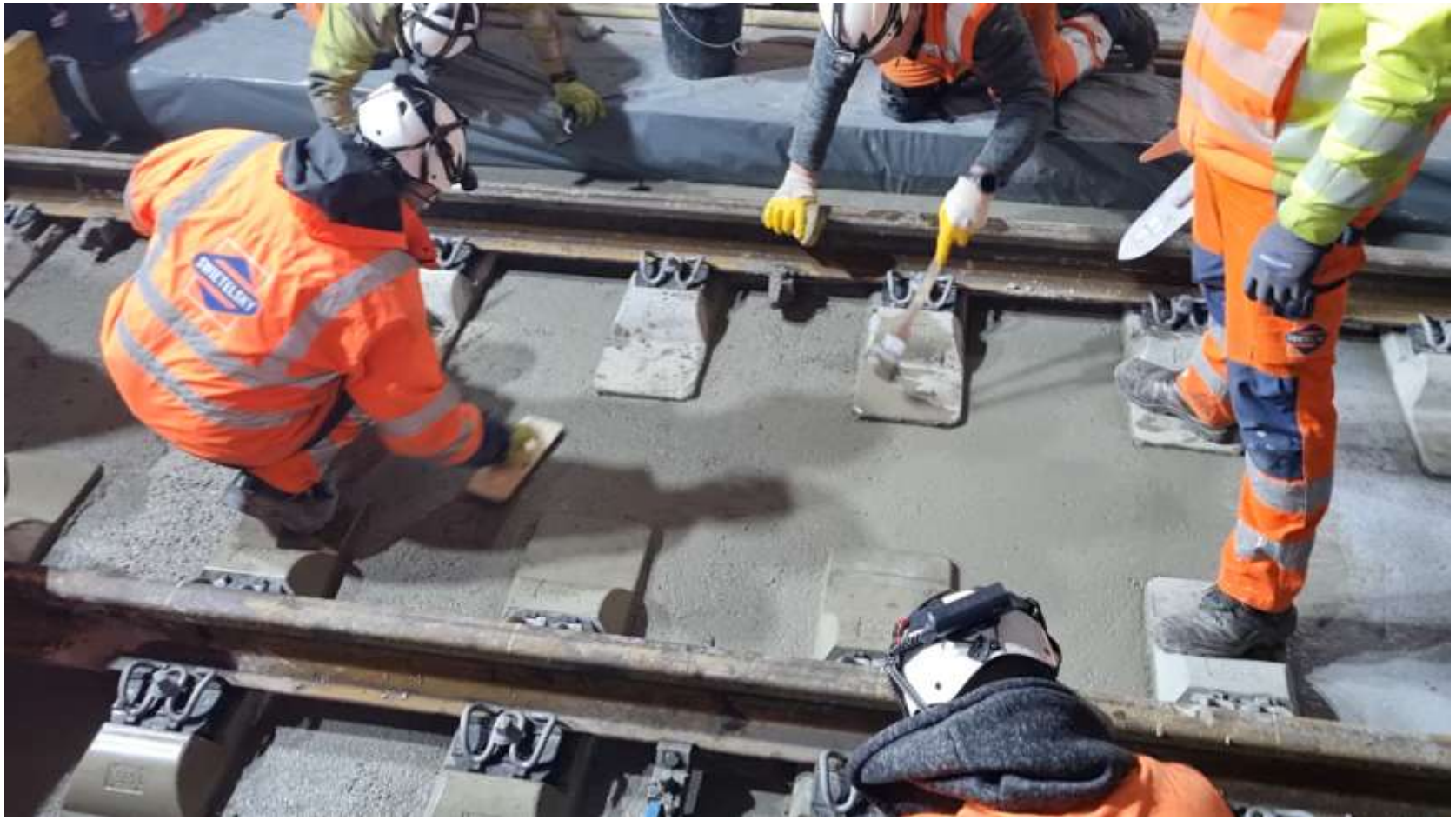


Construction technology

Concreting of the slab track with installation aid (concrete paver)

Construction technology

Processing of the concrete surface



Construction technology

Post-treatment of the concrete slab track with application of an evaporation protection layer.

Construction technology

Precast slab track

Construction process

Work steps in detail

Question and answer session and open discussion

4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