PROJECT DETAILS

Customer:
OSAFL Iceland

Location:
Akureyri, Iceland

Project Duration:
2013 - 2017

Products Offered:
- CarboPur WX
- CarboPur WF
- SK90 Injection Pump
- Additives & Accessories

Industry Sector:
Construction - Infrastructure

Applications:
Water control

MINOVA

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VADLAHEIDI TUNNEL CASE STUDY.

Minova supported the Vadlaheidi tunnel in Iceland to inhibit the heavy inrush of geothermal water. Our successful and timely intervention allowed for the excavation to be continued uninterrupted.

CHALLENGE

Vadlaheidi tunnel was designed to complete the ring-road around the country and connect the towns of Akureyri with Fnjöskardalur. The single tube tunnel is 9.5 m wide and stretches 7200 m from West to East with a cross-section of 66 m^2. During construction, an unexpected, heavy inrush of geothermal water with temperatures reaching up to 65 ^oC brought excavation to a halt.

SOLUTION

Different solutions were used at different chainages.

Chainage 1870 - 1970: Invert injection was used to reduce the amount of water and thereby to reduce the inflow, air temperature and humidity. 4 invert umbrellas of 12 boreholes (each 12 metres deep) were drilled. All boreholes were fitted with hydraulic injection packers.

Due to the hot conditions and the expected pressure, 2 - 3 packers were coupled together to ensure safety.

The injection sealing made use of Carbopur WX and accelerators, while at extreme cases at the location, Carbopur WF and additives were injected.

After the invert injection, several boreholes were drilling into the wall to seal off the water source. Upon the completion of all injection works, the water amount was reduced by 80 % to 120 l/sec (from approximately 600 l/sec). The customer was extremely satisfied with the result and subsequently decided to collect and guide the rest of the inrush water into drainage pipes and out of the tunnel.

Chainage 3405: Three 18 m deep injection umbrellas were drilled; 10 m, 15 m, and 20 m in front of the face at an angle of 15°outside the tunnel profile. Carbopur WX and accelerators were injected to get a fast set. After completing the umbrella support, drilling and injection was done in boreholes up to 25 m deep directly into the face. Technical support accessories included a SK90 injection pump, hydraulic packers as well as steel-and plastic feed pipes. After the completion of all face-umbrellas in pre-and post-grouting, the water inrush was completely eliminated.

RESULT

Both the client and the contractor were very pleased to be able to continue the tunnel progress after a delay of 8 - 9 months. Both expressed their satisfaction with the quality and results achieved by the Minova application team.

ACHIEVEMENTS

- The water ingress was inhibited.
- Air humidity and temperature were reduced to the optimum.
- Despite the extreme challenges, with our support breakthrough of the longest road tunnel in Iceland was achieved in April 2017.

SECURING PERFORMANCE. TOGETHER.

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