



## Drainage Application in Tunnels Subjected to Intense Groundwater Inflow

Intense and continuous groundwater inflow encountered in tunnel projects is one of the primary engineering challenges that must be addressed. Inadequate drainage of groundwater increases the risk of damage to the tunnel lining concrete, shortens the service life of the structure, and directly threatens uninterrupted and safe operation. For this reason, tunnel drainage systems must be designed not only to provide short-term water discharge, but also to ensure long-term performance through the use of high-quality and durable drainage solutions.

The Kırık-İspir Tunnel Crossing is located along a route of critical regional importance where transportation is frequently disrupted due to harsh winter conditions. The tunnel is constructed as a twin-tube (2x2) road tunnel with a total length of 7,110 meters. Once completed, the project will shorten the existing route by 33 km, provide approximately one hour of travel time savings, and offer a safe, comfortable, and uninterrupted transportation corridor.



### Challenges Encountered:

Due to the hydrogeological characteristics of the region, intense and continuous groundwater inflow has been encountered along the tunnel alignment. Under these conditions, conventional drainage solutions based solely on invert drainage proved insufficient. Effective control of groundwater before it reaches the tunnel lining required a drainage system capable of continuously collecting and conveying water around the entire perimeter of the tunnel. As a result, a peripheral drainage system covering the full tunnel circumference was required.

**Industry:** Geosynthetics Applications  
**Application:** Tunnel Insulation  
**Location:** İspir-Kırık, Erzurum, Türkiye  
**Product:**



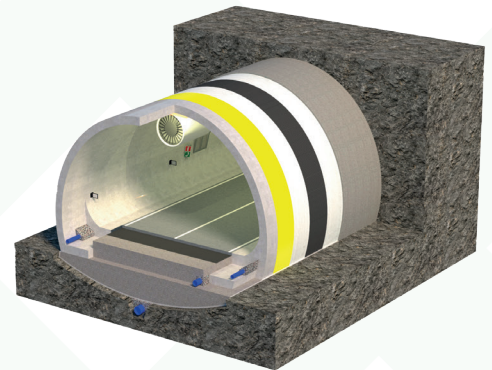
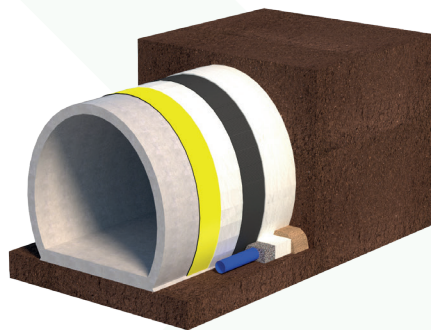
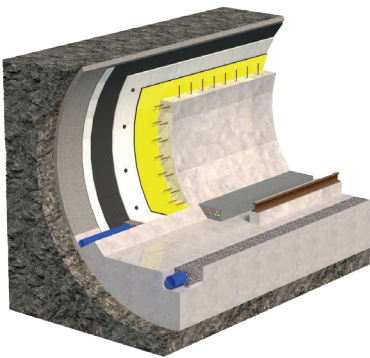
## Case Studies

# Solution

In response to these hydrogeological challenges, a peripheral drainage approach was adopted for the project. Within this scope, TekDrain Star YKL 250 Drainage Board was installed in tunnel sections exposed to intense groundwater inflow, enabling controlled and continuous drainage before water could reach the lining structure.

Thanks to its high drainage capacity, TekDrain Star YKL 250 ensured effective groundwater collection and discharge when applied along the full perimeter of the tunnel. Its durable and long-lasting structure provides a reliable drainage solution that minimizes maintenance requirements in structures with limited accessibility such as tunnels. Moreover, the continuity of the peripheral drainage system significantly reduced the water pressure acting on the tunnel lining concrete.

With this application, TekDrain Star demonstrated that, beyond its widespread use in foundation drainage and waterproofing systems for buildings, it also provides an effective and reliable solution for tunnel projects subjected to high groundwater inflow rates.



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