

# Waterproofing the Tel Aviv – Jerusalem Railway Tunnel (A1)



## The Challenge

The fast Tel Aviv – Jerusalem railway line (A1) consists of a number of sections. The third section, that connects the Sha'ar Hagai area to Mevaseret Zion, is particularly complex.

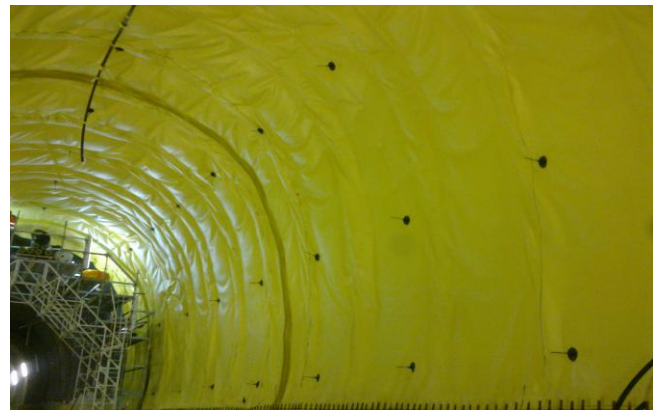
The track gradients, apprehension of environmental impact as well as the mountainous terrain in this area lead to the decision that this section should be tunnel based.

In order to maintain the quality of the tunnels, the safe use thereof and the integrity of the concrete and the electrical and control systems, a sealing system that will prevent the penetration of ground water into the tunnel was required.

## The Solution

The sealing system that was installed by Admir Projects comprised a number of geotechnical products:

- ◆ **Multiply PVC Sikaplan sealing mats**  
High resistance mats that are used to seal tunnels in a substantial number of projects.
- ◆ **Non woven geotextile mats**  
Protecting the sealing system and preventing mechanical damage.
- ◆ **Delta NP Drain drainage mats**  
Dual ply mats for efficient control of the drainage system and for creating an efficient and rapid conduit path for excess runoff water.  
These mats excel in high resistance to loads.



## The Execution

The sealing technology implemented by Admir includes the use of special scaffolding that was modified for this project.

- ◆ NP Drain type drainage mats were spread horizontally on the bottom of the tunnel, to drain water under the sealing layer.
- ◆ Sikaplan sealing mats were laid over the initial shotcrete concrete layer, that was covered with non woven geotechnical mats. The mats were joined together using hot air welding and affixed to the concrete using dedicated anchor bolts.
- ◆ Water stops were fitted between the poured concrete edges to obtain strong and flexible seals between the concrete slabs and to enable demarcating the sealing areas into sections to alleviate the execution of repairs, as required.
- ◆ Fitting anchor bolts to suspend steel mesh over the sealing mats.



## The Results

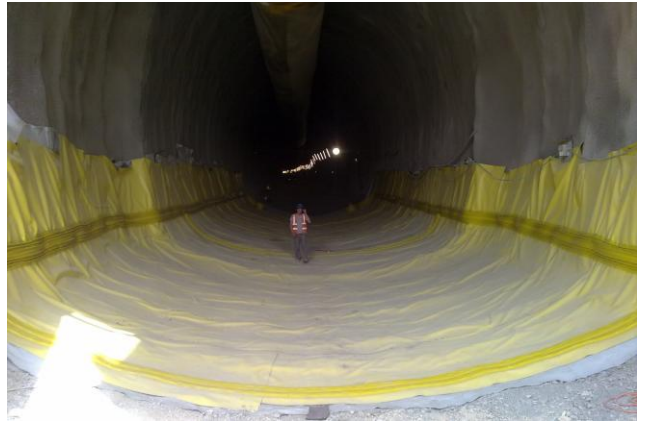
The tunnel waterproofing was carried out in accordance with the Swiss Sealing Standards (SIA 280).

Tracking the work and quality control were strictly enforced throughout all the stages of the performance – from selecting sealing equipment and up to testing carried out at each stage.

Air pressure testing and various field testing was carried out daily for all seams and joins.

The conditions and loads that a tunnel must bear are numerous and complex and sealing a tunnel is essential in maintaining the quality of the tunnel and the safety of its use.

The sealing technology offered by Admir has been implemented in numerous projects in Western Europe. This technology integrates with the overall execution of every project and ensures preserving the integrity of the structure.



- ◆ Customer -
  - ◇ Shafir Civil and Marine Engineering LTD
  - ◇ Impresa Pizzarotti & C.S.p.A
- ◆ Design - Amy Metom Engineers & Consultants LTD
- ◆ Supervision - YuGan Engineering LTD
- ◆ Execution – Admir Projects, 2012