

# Transportation Infrastructure in Saudi Arabia Utilises GCP Technologies' Waterproofing Solutions

PREPRUFE® and BITUTHENE® waterproofing were used on the Haramain Railway Stations

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Project	Haramain Railway Stations, Saudi Arabia
Client	Saudi Railways Organisation
Architects	Foster & Partners & Buro Happold
Engineers	Buro Happold, Dar Al-Handasah
GCP Solutions	PREPRUFE® waterproofing, BITUTHENE® waterproofing

# The Overview

## The Project

Linking the holy cities of Saudi Arabia, the Haramain High Speed Railway is one of the largest transport infrastructure projects in the Middle East with the challenge of extreme heat and desert conditions, as well as building four new stations in just four years.

Designed by the joint venture team of Foster + Partners and Buro Happold, in collaboration with local architect, Dar Al-Handasah, this 450 km high speed rail link links Islam's holiest cities Mecca and Medina to the Red Sea coastal city of Jeddah, a key entry point for millions of pilgrims, and to King Abdullah Economic City.



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Hussein Ali Khod, Project Manager, Rawabi Specialised Contracting



Covering an area more than 30 times the size of London's Trafalgar Square, the four stations were built on a fast-track programme. However, aggressive ground conditions and high water tables presented challenges. To meet those issues, the high performance PREPRUFE® waterproofing membrane was used to protect against the destructive effects of groundwater. It provided exceptional transport business protection to all below grade built elements up to levels above the water table in extreme desert conditions.

To further minimise risk and ensure continuity, BITUTHENE®8000 HC waterproofing membrane was specified to provide complete protection for the substructure walls. In total, the stations utilised a staggering 300,000 m2 of PREPRUFE®300R and 150,000 m2 of BITUTHENE®8000 HC.

"The GCP PREPRUFE®300R and BITUTHENE®8000 HC membranes had considerable benefits as the waterproofing solution for the station in Jeddah", commented Hussein Ali Khodr, Project Manager at Rawabi Specialised Contracting. "The nature of the transport infrastructure project and the city stipulated the usage of proven state-of-the-art technology and as an applicator the simplicity and flexibility of installation lead to noticeable savings on engineering man hours".

Designed with synthetic adhesive layers combined with a robust HDPE film, PREPRUFE® membrane provided a permanent physical vapour barrier that protects each structure against chloride and sulfate attack. Unlike other waterproofing solutions, PREPRUFE® ensured the structure remain unaffected by salt and sulphate attack even if their concentration changes over time.

No other system protects a substructure from the harmful effects of water, vapour and gas than PREPRUFE®.

## The Results

GCP's patented ADVANCED BOND TECHNOLOGY™ enabled concrete to aggressively adhere to PREPRUFE®, forming a unique intimate seal that prevents water migration, substantially reducing the risk of leaks. It was applied on wet substrates and was immediately trafficable after installation, which made for fast and easy installation by removing multiple layers and complicated detailing.

With PREPRUFE®, protective layers of concrete or boards were also eliminated, reducing the depth of excavation and spoil and minimising the number of materials. This accelerated the critical path of the transport business project and ensured it remained on track.

With the specification of the PREPRUFE® and BITUTHENE® waterproofing system, GCP once again demonstrated their ability to provide unrivalled waterproofing technologies and solutions for the most challenging projects worldwide.

Blue360<sup>SM</sup> Product Performance Advantage: Because every project, large or small, deserves the best level of protection.