Dealing with Sabkha - The Smart Way

Link Road Upgrade E11 to Madinat Zayed

CLIENT'S CHALLENGE

The link road connecting the E11 Madinat Zayed was to be rehabilitated and widened. The road improvement project was let as a design build contract. For this section of road over sabkha (see right) the contractor was faced with having to excavate the existing embankment and rebuild a wider embankment, having first removed a layer of sabkha across the full embankment width over a 7km length. The engineers were seeking a less expensive, more sustainable, and quicker approach that would minimise road closures.

TENSAR SOLUTION

The Tensar solution was in three parts. For the existing embankment, rather than full excavation to remove and replace the sabkha, a Tensar stabilised subbase layer to reduce differential settlement was constructed over the existing embankment after removal of the deteriorated pavement layers. Subbase material obtained from the existing pavement was re-cycled for use in the stabilised subbase layer. For the widening, a Tensar geogrid was placed directly over the sabkha to stabilise the embankment above. A Tensar stabilised base layer using locally available marginal fill material was then constructed over the widened embankment to strengthen the full pavement width.

BENEFITS

- 15% reduction in overall cost
- No importation of expensive high-quality aggregates
- Reduced construction time due to elimiaton of excavation, dewatering and replacement



Tensar.

PROJECT DETAILS

Constructed In 2022

Client

ALDAR

Contractor Nael & Bin Harmal Hydroexport, Abu Dhabi (NBHH)

Contractor's Design Engineer CORE Engineering Consultancy LLC., Abu Dhabi

Tensar Distributor

Pioneers of the Middle East Bridges and Tunnels Maintenance L.L.C - O.P.C



Sabkha soils are formed by the evaporation of saline groundwater. Salt evaporites remain cementing the soil particles. Sabkha is unstable, susceptible to heave and collapse.

Subgrade Stabilisation | No. 501

| PROJECT BACKGROUND

The E11 highway runs westward along the coast from Abu Dhabi. A 2-lane link road branches off south to connect Madinat Zayed to the main highway. Deterioration of this 50km road prompted a major rehabilitation project to improve and widen the road to four lanes.

The first 7km runs on a 2m high embankment over an area of sabkha with a high-water table and high salt content. This section was severely deteriorated and required a complete rebuild. The traditional approach would involve removal of the existing embankment to allow removal of the sabkha below. The sabkha would also be removed from below the widened embankment. Sections of the road would need to be closed to traffic over lengthy periods to allow the work to proceed.

The Contractor was appointed on a design build basis. They sought to reduce the cost and disruption associated with complete removal of the embankment and removal and replacement of sabkha. The Contractor's design consultant approached Tensar for a proposal.

Tensar was able to offer a solution that avoided removal of the sabkha below the embankment. The existing embankment was left in place and only the upper 200mm and deteriorated pavement removed. The use of Tensar stabilisation geogrid below the widened embankment and above the existing embankment provided strength and stiffness, reducing the potential for differential settlement. A Tensar geogrid was also incorporated into the granular base layer to strengthen the pavement.

The Tensar solution saved construction cost and time, while significantly reducing disruption to traffic during the works.

"By using a Tensar solution, the contractor was able to accelerate the construction program, compared to alternative solutions which involved large scale excavation, dewatering, soil replacement and backfilling. We were able to provide multiple solutions featuring Tensar's Mechanically Stabilised Layer (MSL), tailored for site conditions and project requirements. The contractor recognised the technical and commercial value that Pioneers of the Middle East added to the project and they were especially pleased with the simplicity of Tensar system's installation."

Amjad Khofash | Operations Manager | Pioneers of the Middle East Bridges & Tunnels Maintenance LLC - OPC

let us help you with your next challenge: tensarinternational.com email: tensarinfo-ae@cmc.com



We're CMC. You'll find our products strengthening and reinforcing the infrastructure nearly everywhere on the planet – in sports stadiums and public buildings as well as highways, bridges, railways and other structures. To serve this global market, CMC maintains facilities across the United States, Europe and Asia. These sites include everything from local recycling centers, steel mini-mills and micro-mills to large-scale fabrication centers, heat-treating facilities as well as other operations. **cmc.com** ©CMC 2024