Solutions for Crane Platforms

Tensar

GEOGRID STABILIZED WORKING PLATFORM

Working platforms are an important aspect of many construction projects. They provide stable and safe working areas to support heavy static and dynamic loads from cranes, piling rigs and general construction equipment. Often placed over weaker subgrades, working platforms are typically built using well-graded, compacted granular fill or other costly conventional ground improvement techniques such as stone columns and deep soil mixing. Tensar provides a cost-effective and proven working platform solution by incorporating an InterAx® geogrid layer to the granular fill to form a mechanically stabilized layer.

The geometrical shape of the InterAx geogrid allows the aggregate to mechanically interlock with the aperture and restrains the particles against translation and rotation as shown in Figure 1.

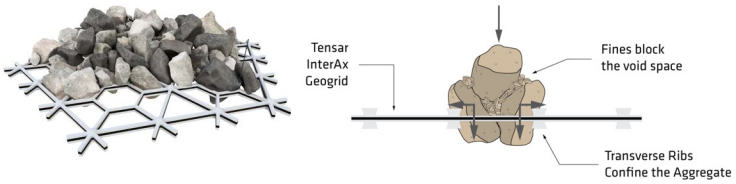

Figure 1

This effect leads to an increase in shear strength and greater ductility of the stabilized aggregate layer compared to unstabilized aggregate (Figure 2).

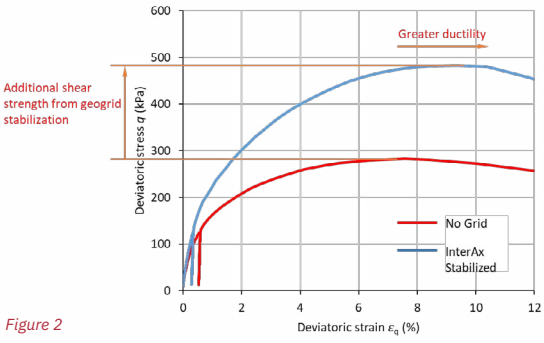

Figure 2

The enhanced aggregate strength allows the load to be distributed over a wider and deeper zone into the subgrade, effectively reducing the applied stress and increasing surcharge transfer as shown in Figure 3.

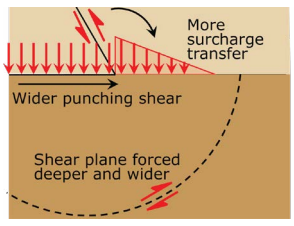

Figure 3

THE TENSAR ADVANTAGE

The Tensar geogrid stabilized platform provides many benefits, including:

- Reduce cost, construction time, and provide a stable platform without thick aggregate layers or costly ground improvement techniques
- Avoid or reduce over-excavation and disposal of potentially contaminated subgrade soil
- Improve safety and reliability by increasing bearing capacity and bridging subgrade variability
- Enable the use of lower quality or recycled aggregate, such as recycled concrete and construction debris
- Minimal site preparation required and can be built directly on top of existing subgrade with high groundwater or groundwater at the surface
- Reduce platform maintenance and improve site productivity
- Reduce the potential for differential settlement
- Reduce carbon footprint by decreasing aggregate and trucking requirements

DESIGN GEOGRID STABILIZED WORKING PLATFORMS

The use of geogrids in working platforms has been established by The Guide to Working Platforms, produced by EFFC and DFI. This document allows other design methods to be used where appropriate when proper testing and validation has been completed. T-value using Tensar InterAx geogrid is a bearing capacity design method that has been developed based on laboratory tests and field validations. The T-value method enables the performance of the composite geogrid-stabilized aggregate to be analyzed for a range of working platform materials and different ground conditions.

Large scale triaxial test – 36" high x 18" diameter

The performance of Tensar InterAx geogrid in various aggregate types was derived using large-scale triaxial cell testing, finite element analysis and then validated through full-scale load tests. Details of the design method can be found in the publication, "The design of mechanically stabilized working platforms" (Lees & Kawalec 2022). The working platform design with InterAx geogrid can be performed using the free, cloud-based software at www.Tensarplus.com.

PROVEN PERFORMANCE

SAN DIEGO AIRPORT TERMINAL: CRANE AND DRILL RIG SUPPORT

A new terminal is being constructed at the San Diego Airport and will be supported on deep foundations consisting of auger-cast piles(ACP). The applied load from the equipment was on the order of 9,800 pounds per square foot with a footprint of about 3½ feet by 15 feet. To construct the piles, cranes and drill rigs would depend on support from 18 inches of cemented soil and the underlying fill and Bay Deposits. However, during construction, the 18 inches of cemented subgrade encountered failure cracking through the layer. Turner Engineering Group (TEG) reached out to Tensar for help.

Collaborating with Tensar, the project team used FEA to determine the insitu material strength based on the observed failure. Using this information within Tensar+ software, design engineers proposed a section using 4 layers of Tensar InterAx geogrid with 4 feet of aggregate base to support the cranes and drill rigs. This solution was quick to calculate and approve, allowing construction to continue with only a slight delay in schedule.

GOOGLE HUFF AVE. OFFICE: MITIGATION OF BEARING CAPACITY FAILURE

Google's innovative architectural designs require carefully thought-out construction and so sequencing of events creates a critical path. A portion of the building's foundations needed to be constructed before the columns could be built from those foundations. To construct the columns, the contractor needed a large crane that would impose surcharge loads on the existing footings. However, the footings were not designed to experience the additional surcharge. Additionally, the crane would need to track around the structure to achieve the required picks.

Tensar collaborated with the contractor and geotechnical engineer to develop a crane pad platform using InterAx geogrid. InterAx geogrid interlocks with aggregate forming a mechanically stabilized layer (MSL) that can experience more stress with less strain. Using Tensar's innovative T-Value method, the aggregate thickness could be thinner and achieve the same performance compared to a thicker, unstabilized section. This solution offered a considerable cost savings compared to crane mats. The T-Value method also provided quantifiable benefits to the Engineer of Record and gave the owner and contractor a reliable foundation.

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