CASE STUDY

OAKLAND BAY BRIDGE SKYWAY SEGMENT CASTING YARD
STOCKTON, CALIFORNIA

Application: Kiewit Pacific's casting yard for the Skyway segments of the new San Francisco–Oakland Bay Bridge was 70 miles up the Sacramento–San Joaquin River Delta. The site was large enough to accommodate the 1.4-mile length of precast bridge segments and had a sufficiently deep channel for barging operations.

But it required significant geotechnical improvement to accommodate the heavy loads and tight tolerances of a massive precast facility.

The yard's 'driveways' were designed for this custom-engineered 300-ton straddle carrier which lifted, transported and placed 452 wing-shaped precast bridge segments at the facility.

The Challenge: A total of 452 individual precast reinforced concrete segments weighing up to 800 tons apiece would be produced at the facility. A custom-engineered 300-ton straddle carrier was selected to lift and transport the segments at the site. For its safe and efficient operation, the site needed to be unusually level. That required regrading about 40,000 cy of the surface, principally along the site's lower east side. Past filling had left about 5 feet of a sandy 'mantle' over much of the property. Underlying that was alluvial silty clay and clayey silt – the notoriously weak and compressible 'bay mud' – and shallow groundwater. Rutting of the 'driveways' was a major concern for straddle carrier operations. Two inches was thought to be a practical maximum under some 1,000 full-load repetitions. Similarly, the casting beds themselves, and the fixed gantry cranes

PROJECT HIGHLIGHTS

Project:
Oakland Bay Bridge Skyway Segment Casting Yard

Location:
Stockton, California

Installation:
Mid 2002–Early 2007

Design Section (Straddle Carrier 'Driveways')
~16-in. crushed limestone aggregate base atop Tensar® BX1200 Geogrid

Quantity:
~100,000 square yards Tensar BX1200 Geogrid

Owner/Developer:
CALTRANS

Design Engineer:
Jim Morrison, Kiewit Engineering Company

Geotechnical Engineer:
Golder Associates
Neil O. Anderson & Associates

General Contractor:
KFM–Kiewit Pacific Company (lead) with FCI Constructors and Manson Construction

Tensar INTERNATIONAL

CASESTUDY

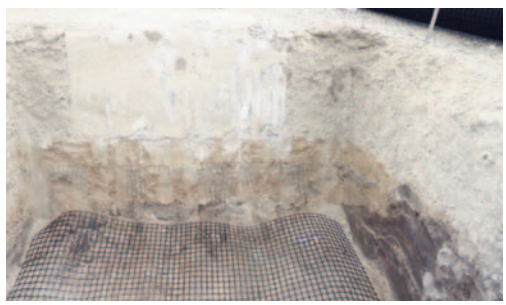
servicing them, had to be stable and unyielding to ensure segment lengths to within 1/8" of specifications. Kiewit simply couldn't afford excessive deformations under live- or dead-loading; they needed cost-effective and durable working surfaces for the 4.5-year service life of the facility.

Alternative Solutions: One early alternative was to treat the entire area with lime. Preliminary cost estimates put that option at $650,000, but its effectiveness was doubtful considering the nonreactive sandy constituency of the surficial mantle. Mechanical stabilization was chosen over chemical stabilization.

The Solution: Over the majority of the site, 12 in. of imported 'select' crushed aggregate base was placed atop Tensar® BX1200 Geogrid. The regraded and compacted sandy 'mantle' beneath provided a suitable subbase for the composite section. Approximately 8,000 cy of 'select' import was required. Under the gantry crane foundations, two layers of Tensar BX1200 Geogrid were placed within the 'select' fill, 12 in. apart. Similarly, in the highly channelized traffic area of the dock where the straddle carrier placed the precast segments on barges, two layers of BX1200 were used within a 24-in. section of 'select' fill.

Performance: As expected, within 'driveways' frequented by the straddle carrier and its cargo, acceptable rutting occurred. To prevent these from accumulating beyond the 2-in. rut depth operational limit, aggregate base was periodically added. At the completion of the project, these areas had approximately 16 in. of aggregate base over a single layer of Tensar BX1200 Geogrid. The double-layer gantry crane foundations performed well without any issues, as did the double-layer dock area.

A gantry crane foundation was extended part-way into the project.



Structural fill beneath the 4-ft-wide shallow spread footing was reinforced with two layers of Tensar® BX1200 Geogrid.

Excavation revealed the nominal 12-in.-thick section of imported crushed aggregate atop Tensar BX1200 Geogrid. Geogrid reinforces the aggregate and separates it from the underlying cohesive soils.

Tensar INTERNATIONAL

Tensar International Corporation
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328
800-TENSAR-1
www.tensar-international.com