CASESTUDY

Kiewit

LAKE PONTCHARTRAIN AND VICINITY (LPV) – 145
CHALMETTE, LOUISIANA

Background: On August 29, 2005, Hurricane Katrina struck the gulf coast of the United States, inflicting catastrophic damage – particularly associated with flooding in and around New Orleans. In the aftermath, a Congressional review and evaluation mandated a Hurricane and Storm Damage Risk Reduction System (HSDRRS) for southeast Louisiana, calling for levee, floodwall and pump station improvement projects throughout five New Orleans-area parishes. The HSDRRS portion designed to provide future hurricane surge protection for St. Bernard Parish became locally known as the Chalmette Loop Levee System, and that portion between Bayou Bienvenue and Bayou Dupre was named LPV-145. Kiewit led a joint-venture team called Chalmette Levee Constructors (CLC) that was awarded the $357 million LPV-145 project in late 2009. The work included the construction of almost 6 miles of floodwall designed to meet 100-year storm protection criteria.

The principle working surface of LPV-145 shown above. Here, geogrid is atop geotextile with sand subbase being advanced over the geosynthetics from left to right.

The Needs: Erection of the floodwalls required Manitowoc 999's, and they required stable working platforms. But before the platforms could be constructed, heavy-duty haul roads had to be built to enable inbound transportation of 100-foot-long H-piles, sheet piles, concrete wall panels, tons of rebar, and concrete mixers; and of course, provide walkable paths for the 999's. And furthermore, when construction began, the site was only assessable via boat.

Since the construction of almost 6 miles of floodwall required the construction of over 7 miles of heavy-duty haul roads, Kiewit wanted to minimize the amount of required material while maximizing the all-weather performance of the roadway sections. And since the first 1.5-miles of road was built with materials, equipment and personnel that had to be barged-in, this minimization and maximization was even more important.

PROJECT HIGHLIGHTS

Project:
LPV - 145

Location:
St. Bernard Parish, Louisiana

Installation:
December 2009 – July 2010

Quantity:
1,140,000 sq yds Tensar Geogrid

Owner:
U.S. Army Corps of Engineers, New Orleans District

Working Surfaces Design Engineer:
Jorge Santos, Kiewit Engineering Company

Contractor:
Chalmette Levee Constructors, a joint venture of Kiewit Federal Group, Traylor Brothers, Inc. and Massman Construction

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CASESTUDY

The Challenge: The swamp-marsh adjacent to the toes of both sides of the existing, isolated levee consisted of predominately organic clays, fat clays and peats with occasional sand and silt layers. Soil test borings, CPT's, and laboratory and DCP testing indicated the upper 18-24 inches of adjacent levee fill material had an undrained cohesion value of approximately 500 psf and CBR-values in the range of 0.9–1.2. Since the road on the protected side would serve as both a lifeline for the entire project and an access and side-storage area for all work, it was imperative it be trafficable in virtually all-weather conditions and there be limited interruptions for maintenance. And, since all of this work had to be completed by June 2011, speed-of-construction was a must.

The Solution: In order to minimize the expense of crushed aggregate base material and to use locally-abundant fine-to-medium sand, yet ensuring mandated performance and trafficability, the roadway sections were constructed as follows:

1. One layer of Tensar Type 1 geogrid was placed directly on the existing natural ground, immediately adjacent to the edge of the toe-of-the-slope of the levee.

2. Eighteen inches of a fine-to-medium sand was placed, in a single lift, on top of the Type 1 geogrid.

3. A second layer of Tensar Type 1 geogrid was placed on top of the sand layer.

4. Six inches of an aggregate base course – which served as a wearing course – was placed, and compacted atop the second layer of Type 1 geogrid.

The Results: The sand layer was a critical part of the Tensar-reinforced roadway sections, in that it not

Locally dredged river sand was sandwiched between two layers of Tensar Geogrid (upper layer shown) and topped with crushed granular fill (in background).

only saved hundreds-of-thousands of dollars in material costs when compared to an all-coarse-aggregate section, but also served as a conduit for internal drainage of record rainfalls that occurred during construction. Kiewit Grading Superintendent Greg Brown recalled, "As it turned-out, we had the wettest month of December on record in this part of the country." Indeed, within a single 8-day period, the project site received over 5 inches of rain on each of two days, over 4 inches on a third day, and over 3 inches on a fourth. As such, the drainage and storage capacity of the sand layer was critical in the overall performance and trafficability of the sections, and required only occasional spot repairs and grading maintenance.

The properties of the aggregate base course were important to the overall success too; as the more rainfall that was shed by the base course, the shorter the length-of-time the sand layer experienced saturation. Thus to ensure maximum runoff of the wearing surface, an aggregate base course material with 7-10% fines – i.e., passing a No. 200 sieve – was used. As such, the combination of Tensar Type 1 geogrid, sand and aggregate used for the base course provided an access road that enabled uninterrupted conconstruction of floodwalls during weeks of unprecedented rainfall.

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