



GEOTEX[®] REPORT

A Geotextile Case Study From Synthetic Industries

High Strength Geotextile Stabilizes Offshore Structure Fabrication Yard

Background

Aker Gulf Marine, a fabrication facility for offshore structures such as oil platforms, recently purchased additional property adjacent to their existing fabrication yard in Ingleside, Texas. This added property expanded their manufacturing ability, increased their waterfront berthing and launching frontage and created new jobs for the surrounding community.

Introduction

This newly acquired property included an old boat slip with a mudline of approximately 5 feet (1.5 meters) of soft, loosely deposited material continuously inundated by seawater. This soft material accumulated over a long period of time, primarily as siltation from commercial ship traffic within the adjacent inter-coastal waterway traveling to and from the Bay of Corpus Christi.



Construction of closure dike.

Nearly 28 feet (8.5 meters) of stabilized fill was required because the mudline elevation was 28 feet below final grade. Since the property could not be dewatered, the initial stages of construction were carried out underwater, and considered the most critical stage of the project.

Kiewit Engineering considered several stabilization solutions before selecting a high strength geotextile to reinforce and separate the fill soil from the soft mudline. This cost-effective method allowed for expedient construction because the soft material remained in place.

Design

A 200 foot wide by 700 foot long (61 x 213 meter, respectively) closure dike was constructed to close off the mouth of the basin (see Figure 1). A design methodology for lagoon closures was selected utilizing Synthetic Industries' Geotex[®] 4x4 high strength woven geotextile. This product was chosen for its ability to function as biaxial reinforcement during fill-soil stabilization. The design required the geotextile to be constructed on-site into one continuous panel measuring 440 x 280 feet (134 x 85 meters). The panel was deployed over the existing soft material by floating the geotextile on the water's surface and anchoring it along the lagoon's edges using high soil anchor berms measuring 12 feet (3.6 meters) wide and 2 feet (0.6 meters) high.

Once several feet of fill-soil were placed over the entire lagoon, the anchor berms were removed enabling the geotextile to shift along side slopes as the mudline consolidated. The geotextile served as reinforcement of the soft material until a stable construction platform was established. After the platform stabilized, the geotextile provided the additional benefits of separation and filtration, and the fill-soil adequately supported the construction equipment.

Vertical wick drains and horizontal sheet drains were chosen to aid in the dissipation of pore water pressure and removal of pore water, which decreased the consolidation time of the soft soil. The vertical wick drains were installed on a 6 foot (1.8 meter) triangular grid spacing, while the horizontal sheet drains were installed on alternate rows with the tails of the wick drains overlapping the horizontal sheet drains (see Figure 1).

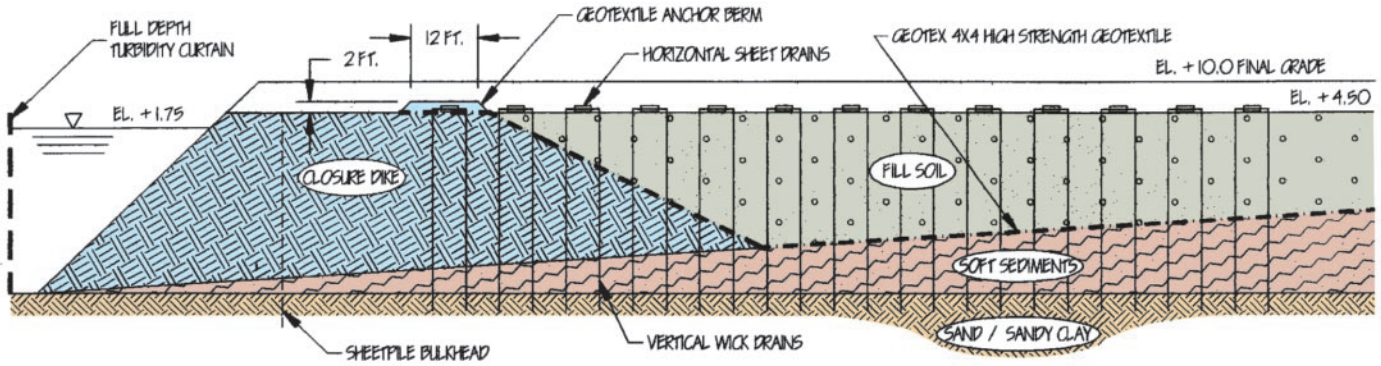


Figure 1 - Typical cross-section of complete project

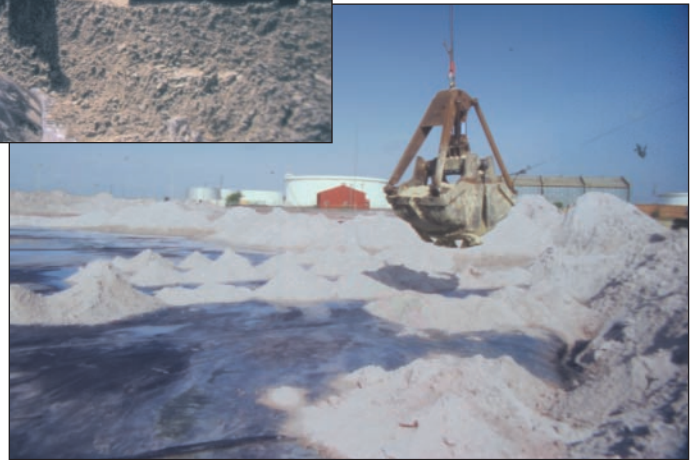
Construction

Kiewit Engineering, with the assistance of Synthetic Industries' engineering staff, selected a "finger fill" placement technique for deployment of the fill-soil onto the geotextile.

Construction began in April, 1997. A distributor from Englewood, Colorado was contracted to fabricate, deploy and install the Goetex® 4x4 high strength woven geotextile and install the drains. After the geotextile was deployed, the fill was placed onto the geotextile. Two methods of deploying the fill soil using "finger fills" were used. The first was accomplished using a low ground pressure dozer. The second used fill broadcasting via a clamshell bucket.



Construction of "Finger Fills." Left: Using the bulldozer. Below: Using broadcasting.



Geotextile deployed and anchored.

Conclusions

The lagoon closure and reinforcement of the property was successfully and quickly achieved using the Geotex 4x4 high strength geotextile. Consolidation of the soft mudline material was successfully achieved by means of the fill-soil's dead weight. Vertical wick drains and the filtering ability of the Geotex 4x4 accelerated the dissipation of excess pore water pressures. Horizontal sheet drains successfully transported the pore water away from the closure area, providing a timely solution for reinforcing the new fabrication area at Aker Gulf Marina.



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