

application

location

product

Embankment/Sludge Lagoon

Columbus, Ohio

FW402 and HP1500

THE CHALLENGE

The extension of I-670 into downtown Columbus, Ohio had been on the drawing boards since the mid-1980s. The only alignment available was across a one-half mile stretch of gravel pits that had been filled with lime sludge from an adjacent water treatment plant. A 40 foot high embankment was required over the sludge lagoon. The sludge had a pH of 10 and was so soft that one could not even walk on it. Because of environmental consequences, it could not be removed from the site. The choices were a bridge or a geosynthetic reinforced embankment. The embankment design would save \$10 million.

THE DESIGN

A fully instrumented test fill was constructed and monitored for two years.

The test fill was reinforced with a high-strength Geolon HP-Series Geotextile. Data was collected using strain gages, extensometers, pneumatic pressure cells, inclinometers, piezometers and settlement gages. After analyzing the test data, a final design was achieved. The design required geosynthetic reinforcement of 2400 lbs/in at 5% strain to maintain an acceptable factor of safety.

CONSTRUCTION

A monofilament woven geotextile, Mirafi® Filterweave® 402, was deployed over the sludge lagoon (Figures 1 and 2). All seams were field sewn using a hand-held Union Special 2200B sewing machine. A prayer seam developed a grab tensile strength of 216 pounds, plenty for the design. Next, a layer of sand, three feet in thickness, was placed. Wick drains

were installed on a 6' by 6' grid to dry the sludge. The design called for a composite strength of 2400 lbs/in at 5% strain. To accomplish this design, three layers of high modulus, polypropylene, multifilament, woven geotextile, Mirafi® Geolon® HP1500, were installed 1 foot apart for reinforcement as the embankment was being built (Figure 3).

The final embankment was 40 feet above the level of the sludge with 2H:1V side slopes (Figure 4).

TC Mirafi provided the geotextiles and all field sewing through its local distributor, Site Supply, Inc.

Figure 1



JOB OWNER

City of Columbus/Ohio DOT

ENGINEER

Clyde E. Williams and Associates

CONTRACTOR

Kokosing Construction Company

DISTRIBUTOR

Site Supply, Inc.

PERFORMANCE

Nearly \$1 million of geosynthetics were used. Embankment continuity was maintained during construction as the structure settled approximately 10 ft. The embankment was constructed in 1997/1998. Final pavement will be placed after the surcharge is removed.

Figure 2



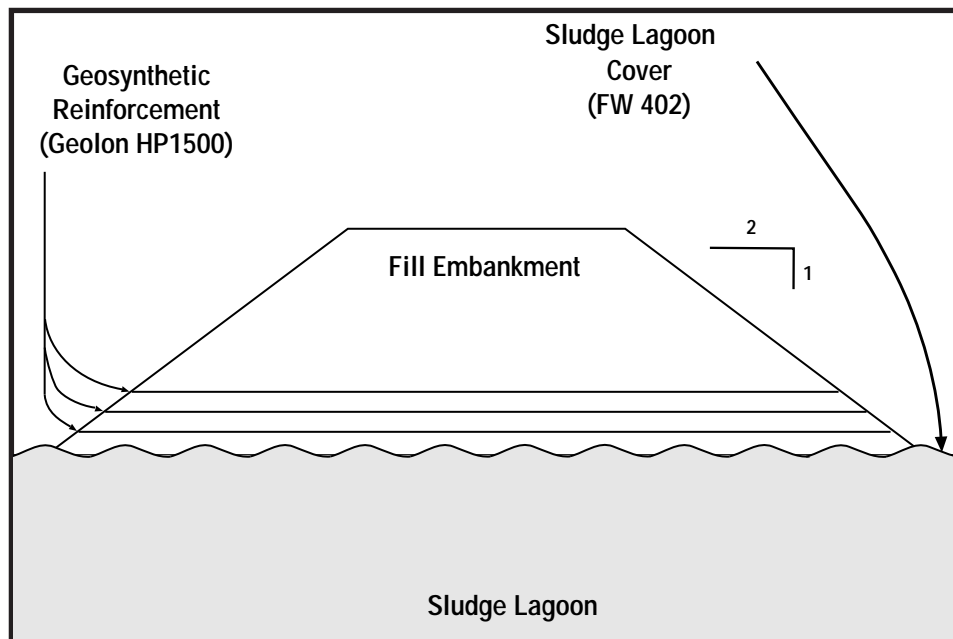
Figure 3



Figure 4



Cross-section of I-670 Project Embankment



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