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Ohio DOT Constructs I-670 over a Water Treatment Sludge Lagoon in Columbus

by Gene Geiger, P.E.

The Ohio Department of Transportation has completed construction of roadway embankment for a section of future Interstate 670, just east of Grandview Avenue in Columbus. The project is unique in that a roadway embankment 20 to 40 feet in height was constructed over a City of Columbus water treatment sludge lagoon for a distance of approximately 2000 feet. The sludge lagoon is



Aerial view of the I-670 stub before construction. Sludge lagoons are visible towards the top of the photo.

a former gravel pit into which the Dublin Road Water Treatment Plant discharged lime sludge from 1965 to 1977. The sludge, generally having the consistency of toothpaste, is only able to support the weight of a human during dry seasons when the upper one or two feet becomes desiccated, or when frozen. It varies in thickness up to a maximum of 25 feet. Based on the results of test borings and laboratory testing during the design phase, there was concern for the stability

of the embankment and the potential for post-construction settlement of the roadway. Alternative designs considered included excavation of

the sludge and replacement with a more suitable material. This option would be expensive and raised environmental concerns for transporting and disposing of the sludge. Another alternative would have been to construct a bridge over the area, but this too was deemed too costly.

Prior to the actual construction, a test embankment was constructed in 1992. The purpose of the test embankment was to establish design values to predict the strength and

settlement characteristics of the sludge and to demonstrate the feasibility of constructing an embankment on the sludge. Because the sludge as it existed in the lagoon would not support the weight of the embankment and had drainage characteristics that made settlements take longer than was practical, several features were incorporated into the design. A layer of geotextile and a three-layer of sand was placed on the surface of the lagoon in order to provide a working surface for construction equipment. Vertical wick drains were installed in various patterns through the sludge within the footprint of the embankment. The wick drains facilitate the drainage of the sludge, thus serving to relieve water pressures induced by placement of embankment which could cause a failure, and to speed up the settlement process. Three layers of a high-strength geotextile were used as reinforcement along the base of



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“If people concentrated on the really important things in life, there’d be a shortage of fishing poles.” Doug Larson