Monday 3/13/2017

12:15–1:45 p.m.

Geosynthetics Research & Modeling 2

Chairs: Jose Clemente, Bechtel NS&E; James McKelvey, Earth Engineering Inc.

Local Stiffness Quantification of Geogrid-Reinforced Aggregate Base Materials using Shear Waves under Repeated Loading

Yong-Hoon Byun and Erol Tutumluer, University of Illinois at Urbana-Champaign

Geogrid-aggregate interlock provides enhanced local stiffness in the vicinity of the installed geogrid and is a responsible mechanism for the improved performance of geogrid base reinforced pavements. The objective of this study was to establish innovative approaches to quantify the local stiffness increase of geogrid-stabilized aggregate samples. Two pairs of bender elements were installed at two different heights of cylindrical specimens in a repeated load triaxial testing device. Resilient modulus testing was conducted on both geogrid reinforced and unreinforced specimens. Through the use of bender elements, the shear waves were measured during the resilient modulus tests. Experimental results show that the shear moduli estimated from the shear wave velocities increase with bulk stress, regardless of geogrid reinforcement. The shear modulus estimated in the vicinity of the geogrid was always greater than that estimated farther away from the geogrid. According to the preliminary tests conducted so far, geogrid-aggregate interlock related local stiffness increase in unbound aggregate base layers can be effectively quantified by using shear waves.

Laboratory Measurement of the Linear Thermal Expansion of Geomembranes Using a Dynamic Mechanical Analyzer (DMA)

David Beaumier, Patricia Dolez, and Eric Blond, SAGEOS/CTT Group

Thermal expansion is a critical property of geomembranes as it can affect the formation of wrinkles during their installation as well as for exposed applications. When an excessive number of wrinkles has developed because of an excessive dilatation of the geomembrane, these wrinkles may become interconnected, which increases the risk and extent of leakage. This paper introduces the test procedure that should be followed to permit the evaluation of thermal expansion characteristics of geomembranes using a Dynamic Mechanical Analyzer. It is shown that the test should be conducted with low applied stress and very low heating rate. In addition, the effect of the specimen width and length is analyzed. Finally, differences in behavior between machine and cross direction are characterized. Overall, it is concluded that this technique provides an effective tool for measuring the linear thermal expansion of geomembranes under conditions simulating their use in the field.

Effect of Geogrid Geometry on Interface Resistance in Pullout Test

Jongwan Eun, New York University Abu Dhabi; Rajiv Gupta, Geosyntec Consultants; Jorge Zornberg, University of Texas at Austin

This paper presents the effect of aperture size on the low displacement stiffness response of geogrids subjected to pullout loading. The aperture size of geogrid was varied by cutting ribs of geogrids in the pullout tests. Two types of geogrids were tested at two normal pressures (21 kPa and 35 kPa). The Soil-Geosynthetic Composite (SGC) model was used to compute the low displacement interface stiffness (KSGC) of the geogrids. Based on the analysis of laboratory tests using SGC model, the results showed

response of geogrids was highly dependent on the aperture size. The geogrid with original aperture size showed the highest KSGC value. As the size of the aperture increased, the KSGC decreased possibly due to reduction in the passive resistance of transverse members and the loss of confinement at the junctions of the geogrid.

A Modular Approach for Dune Protection and Shoreline Stabilization in East Hampton, N.Y. Using Geotextile Sand Containers

Chris Timpson, TenCate Geosynthetics

Recent storm events, such as the storms in the fall of 2009 and Superstorm Sandy in 2012, have eroded beaches and dunes in the downtown Montauk, NY area. The culmination of these storms have created a potentially imminent hazard that has left many commercial buildings along the shoreline vulnerable to damages from future storms. Beach and dune erosion caused by Superstorm Sandy has partially undermined several shorefront structures in downtown Montauk, leaving the area vulnerable to damage from future storms. A stabilization project was developed in cooperation with the Army Corps of Engineers, New York State Department of Environmental Conservation, and East Hampton, NY town officials. A unique component of this project was the use of modular geotextile containers instead of geotextile tubes for the core of the dunes. Geotextile containers can provide an alternative over traditional geotextile tubes; they are fabricated with high capacity seams to produce bag or pillow shaped containers. When filled with sand or other soils, the geotextile containers are used to construct revetments and other hydraulic structures such as filling in scour holes, closing breached dykes, and as basic armor units for erosion protection works. Geotextile containers are engineered to provide strength, durability, and soil tightness to perform during installation and during operational life. They are easy to use and can be rapidly mobilized if necessary for emergency works. This paper will discuss the material selection, development, construction, and installation of this stabilization effort utilizing geotextile containers for dune protection.

Unique Approaches of Coal Ash Management Using Geotextile Tubes

Chris Timpson, TenCate Geosynthetics

Recently the Environmental Protection Agency established national regulations for the safe disposal of coal combustion residuals (CCRs) from coal-fired power plants. These CCR byproducts, such as fly ash and bottom ash, can be a real challenge for both small and large facilities to remove and manage. The Environmental Protection Agency's comprehensive set of requirements addresses the risks from coal ash disposal like leaking of contaminants into ground water, blowing of contaminants into the air as dust, and the catastrophic failure of coal ash surface impoundments.

Geotextile tube dewatering technology can provide a unique approach for the management of coal combustion residuals. By incorporating geotextile tube technology, coal-fired facilities can dewater and contain CCRs. This technology can be utilized in the operation of existing surface impoundments, efforts to beneficially use consolidated ash, and the continued operation of coal-fired operations by direct sluicing the daily flows from the plant into geotextile tubes. This paper will discuss several unique approaches involving the remediation or clean closure of surface impoundments, beneficial use of dewatered CCRs, and direct sluicing operations incorporating geotextile tube technology for the safe disposal of by-products from coal-fired power plants.