

BELOW

# THE SURFACE



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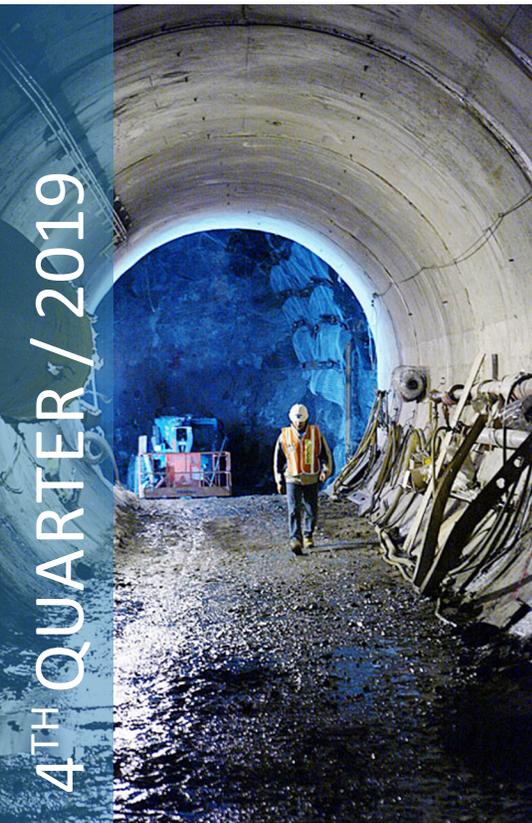
## Honolulu Airport Pavement Instrumentation



The Hawaii DOT is working to remove the existing flexible asphalt layer of pavement at the Honolulu airport to a depth of three inches and replace it with a new asphalt wearing course. With these changes, the DOT wants to evaluate the performance of this method by measuring structural response to airplane loading and various aircraft wheel configurations.

In the early stages of construction, Geocomp worked to develop project specific instrumentation. The monitoring system implemented by Geocomp includes 56 Asphalt Strain Gages to measure pavement strains under aircraft wheel loads and 2 Geocomp temperature strings to measure temperature gradients in the finished profile. A stand-alone, solar powered, remote access data acquisition captures data when planes pass by. The project also includes low-light cameras triggered by sensor readings to document types of aircraft and wheel configuration for correlation to measured data.

Over the next several years, the University of Hawaii will be collecting and analyzing the data.



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## Structural Health Monitoring: iSite Application



*Above: Powder Mill Bridge in Barre, Massachusetts*

Structural Health Monitoring can provide quantitative and objective data on a bridge's condition for the future. A new system of architecture for SHM has created a reliable interface for sending data from multiple bridges to a cloud server where data are available to engineers in real-time.

The condition assessment and future predictions of bridges can be accessed through a Fatigue Health Portal (FHP) by researchers and engineers. In this portal, engineers are automatically notified if the bridge is receiving a high stress from operational behavior. For steel bridges, cyclical loading by heavy trucks is the main cause of damage. The Fatigue Health Portal can be used for any structural system subjected to cyclic loading such as wind turbines, airplanes, nuclear power plants etc.

The Powder Mill Bridge in Barre, MA had a data acquisition system installed in 2009 by Dr. Masoud Sanayei, a professor at Tufts University and his team. The system includes 100 strain gauges, 69 temperature sensors, 16 uniaxial-accelerometers, 16 biaxial-tiltmeters, and 2 pressure plates. The sensors are connected to Geocomp's high speed data boxes that then upload the information to the cloud. For 9 years, Geocomp's *iSite*<sup>TM</sup> units have worked to successfully collect data on service fatigue with the plan to continue indefinitely into the future.



*Above: Data acquisition system underneath the bridge*

# ANNOUNCEMENTS

## GeoTesting Express Soil Abrasivity Test



*A GTX Employee performing Soil Abrasivity Testing*



*Standard Abrasion Value Cutter bits (left), Soil Abrasivity bits (right)*

Soil Abrasivity Testing is a relatively new test that has been added to GeoTesting Express capabilities. Originally developed by NTNU in Trondheim, Norway, this test is a further development of the existing abrasion tests for rocks. Soil Abrasivity Testing provides abrasivity characteristics for both soil and weak or weathered rock types that can not stand up to Rock Drillability Testing. Based on rock testing, the content of quartz and other hard minerals like garnet and epidote have a major impact on the abrasion of the test pieces, but grain shape and binding may also contribute substantially.

There are only a few abrasivity tests for soil. In the past, the Miller Test was accepted as the go-to test for determining abrasivity on Slurry TBM drives. The idea behind the Soil Abrasivity Test is not focusing on abrasivity in slurry only conditions, but the abrasivity of the material itself. In comparison, the Soil Abrasivity Test can be performed in a moist condition as a modified test in order to compare how moisture affects the abrasivity.

The test is similar to the current Abrasion Value Cutter Steel testing offered as part of the Rock Drillability Suite by GTX. This test is gaining popularity with Horizontal Drilling, Micro Tunneling, and TBM Design programs. GTX performed Soil Abrasivity testing for the I-64 Hampton Roads Bridge - Tunnel Expansion preliminary investigation. This testing was used to help determine if whether to use bored-tunnel method or immersed tube methods. Abrasivity values were a valuable component in deciding which method would be the most cost effective. More Recently, GTX performed this test for the Vineyard Wind project. Determining the abrasivity of the on-land sands is a critical component to the Horizontal Directional Drilling program for the off-shore windfarm.



## UPCOMING EVENTS

*DFI Annual Conference: Chicago, IL October 15, 2019*

*TSP2 Regional Congerence: Bismark, ND October 15, 2019*

*STGEC 2019: Chattanooga, TN November 11, 2019*

*Dreamforce: San Francisco, CA November 19, 2019*

