Research lays foundation for building on the moon -- or anywhere else

September 29 2010

The key to the stability of any building is its foundation, but it is difficult to test some building sites in advance - such as those on the moon. New research from North Carolina State University is helping resolve the problem by using computer models that can utilize a small sample of soil to answer fundamental questions about how soil at a building site will interact with foundations.

"If you are going to build a large structure, you have to run a lot of tests on the building site to learn how the soil will behave in relation to the building's foundation," says Dr. Matt Evans, assistant professor of civil, construction and environmental engineering at NC State and co-author of a paper describing the research. "How stable is it? How much might the foundation settle over time? Traditionally, that testing process involves a great deal of equipment, time and money."

But in some situations, that equipment, time and money is not available. For example, it would be tough to transport the relevant equipment to the surface of the moon.

"We initiated this project, with funding from the North Carolina Space Grant, to answer questions that are essential to the construction of buildings on the moon," Evans says. "It's cost-prohibitive to do traditional testing on lunar sites, so we developed a technique for applying computer models that can use a tiny sample to tell us about the potential interface between moon soil and anything we might build."

And the model may also have applications closer to home. The model could potentially be used to assess soil conditions for remote building sites where traditional testing is impractical or unduly expensive. For example, it could be useful for military applications or for siting remote research facilities.

The paper, "Analysis of Pile Behavior in Granular Soils Using DEM," focuses on how the model can be used when incorporating Earth-specific variables - such as gravity. However, those variables can be modified to account for conditions on the moon, or even on Mars.

Provided by North Carolina State University