Florida Department of Transportation Research

Rapid Hydration of Mineral Slurries for Drilled Shafts
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University of South Florida researchers have developed an effective new method for mineral slurry preparation for drilled shaft applications. Typically, mineral slurries require long preparation times and specialized equipment to perform properly and maintain the stability of open excavations during drilled shaft construction. The new method is rapid and requires minimal storage.

Researchers used a common slurry mixer, the Venturi hopper, to quantify the performance of various slurry products at different mixture concentrations. They noted several drawbacks: the hopper can clog; slurry must recirculate through the device until it meets state specifications; and mixing time for large slurry batches can delay construction. These issues and the storage needs of large slurry batches often prevent slurry use on small jobs.

A different Venturi device, an "eductor," is used in several manufacturing processes. Researchers chose this device as the basis for a new slurry mixer because it was readily available and easily incorporated into drilled shaft construction operations. The eductor generates a vacuum so that a hose attached to it can suck up dry slurry clay at a fairly constant rate. The interior of the eductor is Teflon, so no clogs formed in the device, and the even water flow through the device mixed slurry without clumping.

A single eductor was efficient but unable to mix large amounts of slurry quickly, so they connected eight eductors in parallel. This system mixed 2000 gallons of slurry in 15 minutes, producing slurry that met state specifications on the first pass. Slurry was improved by recirculation in the holding tank.

Researchers took the multi-eductor system out into the field to use it in real-world applications. Performance was good, but the researchers and the work crew came up with recommendations that will make future use of the system more efficient.

The multi-eductor system developed by USF researchers mixed large amounts of slurry rapidly and within state specifications.

The new system will make slurry excavation techniques available on more projects, including small-scale drilled shaft operations typically involved with constructing foundations for miscellaneous structures and urban projects where limited space is a concern for storage of contractor's equipment. Projects where slurry excavation techniques are in use will also run more efficiently because hydrating slurries to meet state specifications will be faster, reducing overall construction time.

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