Performance Monitoring for Accelerated Construction

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Accelerated construction is receiving a lot of attention as one approach to rehabilitating, expanding, and replacing our physical infrastructure with a minimum of disruption to ongoing activities. The American Association of State Highway and Transportation Officials (AASHTO) has identified it as a priority implementation approach for maintaining and upgrading our nation’s highway system.

Challenges Faced By Geotechnical Engineers

Accelerated construction involves several aspects which challenge traditional geotechnical approaches. Time is short. Flexibility is essential. New materials and new methods are the norm. A plethora of new methods are rapidly appearing, such as ACIP (auger cast in place piles), CFA (continuous flight auger piles), CMC (controlled modulus columns), CSP (cased secant piles), CSV (combined soil stabilization), DSM (deep soil mixing), EPS geofoam (expanded polystyrene), GEC (geotextile encased columns), MSE (mechanically stabilized earth) and PSE (pile supported embankment).

These new methods challenge the geotechnical engineer. Typically, they are used in areas with poor foundation conditions. To be competitive, they provide just enough foundation support, but not too much. Little time exists for design verification and construction validation. Most of the work occurs underground where direct inspection is impossible. The geotechnical engineer must wrestle with uncertainties in poor and variable site conditions, limited understanding of the geomechanics of the new methodologies and rapid construction operations involving expensive equipment—all in a fast-paced environment with high consequences from delays.

Figure 1. Monitoring equipment on deep soil mixing rig.

Monitoring Performance

These circumstances invite the use of real-time monitoring devices to help control the construction process, document the installation, and validate the performance of the