Load and Resistance Factor Design of Drilled Shafts in Shale Using SPT and TCP Measurements

ABSTRACT

Missouri Department of Transportation (MoDOT) designers currently follow American Association of State Highway and Transportation Officials (AASHTO) design methods for design of drilled shafts in shale and other weak rock. These methods are generally based on Load and Resistance Factor Design (LRFD) methods that relate uniaxial compressive strength measurements of rock cores to the side and tip resistance for drilled shafts. However, shale and other weak rock can be notoriously difficult to effectively sample and test, which poses practical problems for those tasked with designing drilled shafts in such materials.

The difficulty in sampling shale has lead geotechnical engineers to consider in-situ tests, such as the Standard Penetration Test (SPT) and the Texas Cone Penetration test (TCP), as surrogates for conventional coring and laboratory testing. In order to utilize results of in-situ tests for design of drilled shafts using Load and Resistance Factor Design (LRFD), it is necessary to correlate in-situ test measurements with side and tip resistance and to establish calibrated resistance factors that account for the reliability of the correlations and the in-situ test measurements. This thesis describes efforts undertaken to develop improved correlations among in-situ test measurements and drilled shaft capacity and to develop resistance factors that produce established target reliabilities for different classes of roadways.