Post-Grouting, Load Testing, and Long-Term Performance of Drilled Shafts on Broadway Viaduct Project

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Abstract
Pressure grouting beneath the tips of drilled shafts has been employed in many countries around the world to increase the mobilized unit end-bearing resistance of drilled shafts within service displacement limits. The 2010 Broadway Viaduct reconstruction project in Council Bluffs featured the first use of post-grouted drilled shafts by the Iowa DOT. Statnamic tests were previously performed at the site on one 55 ft long control shaft, and two shafts 55 and 65 ft in length which were post-grouted via the port sleeve (tube à manchette) approach. However, a lower than expected increase in end bearing resistance was observed for the grouted shafts in these tests. For the present study, O-cell load tests were performed on two additional 75 ft long test shafts in conjunction with the viaduct reconstruction, with one shaft post-grouted via the flat jacking approach. Despite the use of staged grouting and a rather large grout take of 5.7 cubic yards, the design grouting pressure was not achieved. However, grouting on all 53 production shafts on the project was essentially successful, with most shafts reaching their design grouting pressure or uplift criterion. Grouting and load testing of the drilled shafts are discussed, in addition to a forensic investigation performed to determine the reason for the lack of performance of the 75 ft grouted test shaft. Long term performance monitoring data on four instrumented production shafts is also briefly discussed.

Keywords: Drilled shaft, deep foundation, post grouting, load test, performance monitoring

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