

SEPTEMBER 2012 MEETING

Wednesday, September 12, 2012 (1.0 PDH)

TECHNICAL PROGRAM:

New Developments in Auger Pressures Grouter (APG) Piles

Speaker: Mr. Tracy Brettman, P.E., D.GE Berkel & Company Contractors, Inc.

Mr. Brettman is the Vice President/Regional Manager for Berkel and Company Contractors in Houston. He has been involved with the design, installation, and quality control of deep foundations for more than 20 years. Mr. Brettman received his B.S. in Civil Engineering from the University of Nebraska and his M.S. in Geotechnical Engineering from the University of Texas at Austin. Mr. Brettman is a registered Professional Engineer in Texas and Louisiana. He is a past President of the Deep Foundations Institute (DFI) and was previously the chairman of DFI's Augered Cast-in-Place Pile Committee. He was previously a project manager at the geotechnical consulting firm of Fugro (formerly McClelland) in Houston. He has authored many articles and technical papers including feature articles published in Geo Strata Magazine, Civil Engineering Magazine, Deep Foundations Magazine and the Journal of Geotechnical Engineering. He has taught several continuing education courses for the DFI, the Geo-Institute of ASCE, the University of Houston and the University of Texas at Arlington.

PRESENTATION SUMMARY

To a room of about 65, Tracy Brettman, P.E. gave a presentation entitled, "New Developments in Auger Pressure Grouted Piles."

Mr. Brettman's presentation included the design, construction, and testing of Auger Pressure Grouted (APG) piles, also known as Augered Cast-In-Place (AGIP) piles. He listed advantages over other types of piles as: faster to install; higher capacity; more economic; minimal vibration; and independent of soil conditions. He said his company can install APG piles down to 120 ft. penetration and with diameters as large as 36 in. Static load tests can be performed in the field. Other non-destructive methods of testing pile integrity are available. Pile capacities can reach 500-600 tons.



Mr. Brettman said his company also installs APG piles that are partial or full Displacement (called APGD), for use in loose or soft soils. APGD piles take considerably less grout than APG. The drill string consists of a short auger with a solid collar above and a smooth and smaller-diameter drill stem to the surface. The collar displaces the soil cuttings laterally to help keep the hole open. A special drill rig from Europe is needed to install APGD piles that has several times the torque than the crawler cranes used for AGP piles provides.

Mr. Brettman said the steps for constructing AGP piles are:

1. Drill to depth
2. Blow the end plug by pumping grout
3. Continue pumping through the drill string to build a grout head at the tip
4. Withdraw the auger at a constant rate while pumping 115% to 150% of theoretical volume
5. Remove the spoils at the surface
6. Install reinforcing and/or sonic tubes as applicable
7. Adjust pile cap to final elevation.
8. Provide final quality control testing

Mr. Brettman also discussed a low headroom AGP that could be installed with as little as 8.5 ft. overhead clearance. This method entails the use of short auger joints, a forklift for lifting and lowering (rather than a crawler crane), and a budget of 3 to 5 times that of comparable AGP piles installed with a crane.

According to Mr. Brettman, the best design methods to follow are: TxDOT or APR-RP2A for AGP piles in clay (but use $\alpha = 0.7$ rather than API's limiting value of 0.55); FHWA or Stephanoi's Beta Method for AGP piles in sand; and NeSmith's (2002) method for APGD piles. Normal 28-day compressive strength (f'_c) used for the grout is 4000 psi, although 3000 psi and 5000 psi may also be used depending on design loads, amount of reinforcing, and the boring logs. IBC 2003 allows a bearing pressure on AGP piles of $0.33f'_c$, whereas IBC 2000 only allows $0.25f'_c$. Reinforcing steel used in the piles is normally $\frac{1}{2}$ percent of the pile cross-section.

Mr. Brettman said current testing and quality assurance procedures available include (1) automated pile installation monitoring equipment, (2) non-destructive testing (NDT), and (3) grout maturity strength testing procedures. While the more reliable NDT methods include casting PVC sonic tubes for dropping transmitters and receivers down the length of the pile, Mr. Brettman felt using the grout maturity method was the better approach. This method requires that sensors be cast along the pile and that ASTM C1074 be followed.

Failure of AGP is normally defined as vertical movement of 5% of the diameter, or about 1 inch for a 20 inch diameter pile. The smallest diameter pile available is 12 inch. APG can be used in residential foundations, though they are normally not competitive as ballpark costs may be around \$20,000 for equipment mob/demob plus \$20/ft/pile.

To view Mr. Brettman's slide presentation, [click here](#)

To view Mr. Brettman's previous FPA presentation, click on the link below

July 2006 - [Auger Cast Piles](#)