

Client:

ABE Enterprises, Inc.

Location:

Atlanta, GA

Services Provided:

- Design and installation of instrumentation system and monitoring of support of excavation
- Design review of Excavation Support System
- Numerical analysis to predict cause of excessive movements and predict future movements
- Recommend remediation measures to limit wall deformations

Value Provided:

- Determined most likely cause of unexpected support deformations
- Provided recommended remediation measures to minimize future deformations
- Coordinated remedial measures with the building designer and contractor
- Projected long-term wall movements so final design of permanent wall could incorporate appropriate allowances for future movement

Background & Project Challenges

Two 12-story towers for the Cox Technical Expansion in Atlanta, GA required 390' by 420' by 35' deep excavations through saturated residual soils. The support of excavation walls consisted of soldier piles with wood lagging held in place using 3 rows of tiebacks. Geocomp was initially contracted to install instrumentation and provide monitoring services for the support of excavation walls. Excessive vertical and horizontal deformations were observed and Geocomp was engaged to determine the cause and subsequently recommend remedial actions. The analysis was challenging because of the potential for the clay soils to lose strength over time from drainage. Finite element analyses were performed to evaluate the deformations and factors of safety for various stages of the construction process. Since the deformations were continuing, there was a possibility of wall failure, and Geocomp had to work closely with the building designers and contractor to determine what the future long term deformations might be.



Geocomp Role & Accomplishments

Geocomp monitored lateral movements and settlement of the excavation support system (ESS), existing parking deck and road adjacent to the 35' deep excavation. The movement was monitored using a robotic total station and 65 survey prisms. Nearly 9" of lateral movement into the excavation and 11" of settlement was experienced at one point next to a major road that developed over a long holiday weekend. Alerts from Geocomp's *iSiteCentral*TM brought site personnel back in to take remedial measures to stabilize the situation. These remedial measures were evaluated for effectiveness by Geocomp.

There was a concern that the vertical movements were caused by excessive bearing loads at the base of the soldier piles for the ESS from the vertical components of the ground anchor forces. Geocomp performed a drained and undrained finite element analysis and determined that a large component of the vertical force was ongoing consolidation of the dewatered silt and silt sand. The deformations were further exacerbated by excavations made near the toe of the wall for a tower crane pad, and low factors of safety against global stability.

Geocomp used the results from the finite element model to evaluate remedial measures which included installation of a fourth row of tiebacks in one area and installing a row of auger cast piles at the toe of the wall. The auger cast pile solution was beneficial to the project cost and schedule because the contractor was already on-site installing auger cast piles for the proposed building. Geocomp worked with the structural engineer to identify surplus capacity in the foundation auger cast piles and reduce the number of piles required to increase the global stability of the wall.