PROJECT: COUNTRY CLUB OF DETROIT, GROSSE POINTE FARMS MICHIGAN

FIRM: G2 CONSULTING GROUP ANN ARBOR, MICHIGAN

Deeper Foundations Support New Facilities

In December 2016, the Country Club of Detroit completed a major renovation of its historic Tudor-style clubhouse, but not without some clever geotechnical and structural engineering. Located on 212 acres in Grosse Pointe Farms, Michigan, the club was founded in 1897, although the clubhouse was not built until 1927.

The renovation was part of a long-range plan to offer club members a resort-like experience. It consisted of reconfiguring what was originally the natatorium wing by moving a first-floor bowling alley down to the basement level in place of a long-unused swimming pool and providing a new first-floor fitness center.

Although club management specified the project could not alter the building's architectural character or footprint, additional headroom was required for both the bowling alley and fitness center. That left just one way to go: down.

"So, there was the challenge: to build something underneath an existing facility, maintain its look and not damage it during the process," says project manager Mark Stapleton, associate with the geotechnical engineering firm G2 Consulting Group, Ann Arbor, Michigan.

Providing the taller ceilings and larger interior spaces in the basement and on the main level meant the bowling alley would be moved seven feet below the existing foundation. The challenge was further complicated by the variability of the soils on-site.

"Our borings confirmed that the ground conditions couldn't have been worse," Stapleton says. "It's a small footprint, but the soil conditions varied wildly. On one side of the building we had water-bearing sand, and on the other side we had clay."

G2 designed a system of 120 steel mini piles to underpin the building. Using open cut excavation, the underpinning proceeded in 25-foot increments. Pipe piles attached to the existing foundation were hydraulically pushed down into place, essentially putting each section of the building foundation on stilts while not subjecting the historical structure to damaging vibrations of traditional pile installation.

Concrete foundation walls were then formed and poured to encapsulate the stilts, thus providing stability for the renovations in the short term and adequate bearing for the long term. Throughout the underpinning, sensors monitored foundation displacements, which amounted to only 1/100th of an inch throughout the entire construction process.

Backfilling the excavation presented another challenge because of the horizontal soil pressure it would create on the newly extended foundation walls. By using geofabrics, crews minimized active soil pressure on the foundation.

Mark Stapleton

The bowling alley was moved down to the basement level, now seven feet below the original foundation.