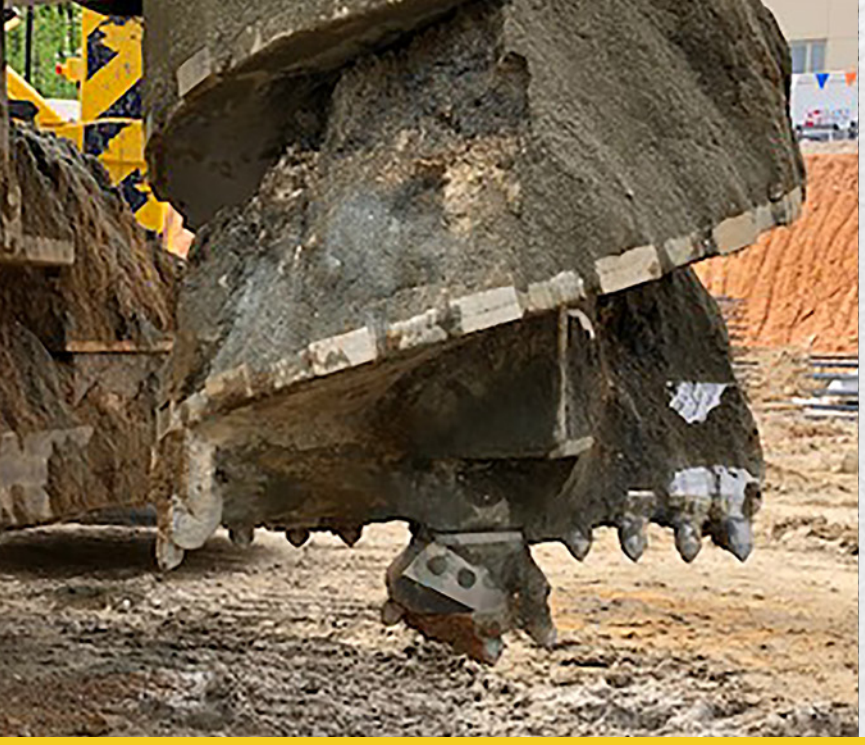


PROJECT DESCRIPTION

THE CARDINAL AT NORTH HILLS
RALEIGH, NC

MORRIS-SHEA PROJECT COMPONENTS
CFA PILES
24 INCH DIAMETER - 70 PILES
36 INCH DIAMETER - 129 PILES

MORRIS-SHEA BRIDGE CO., INC.
BIRMINGHAM, ALABAMA

MORRIS-SHEA

THE CARDINAL at NORTH HILLS

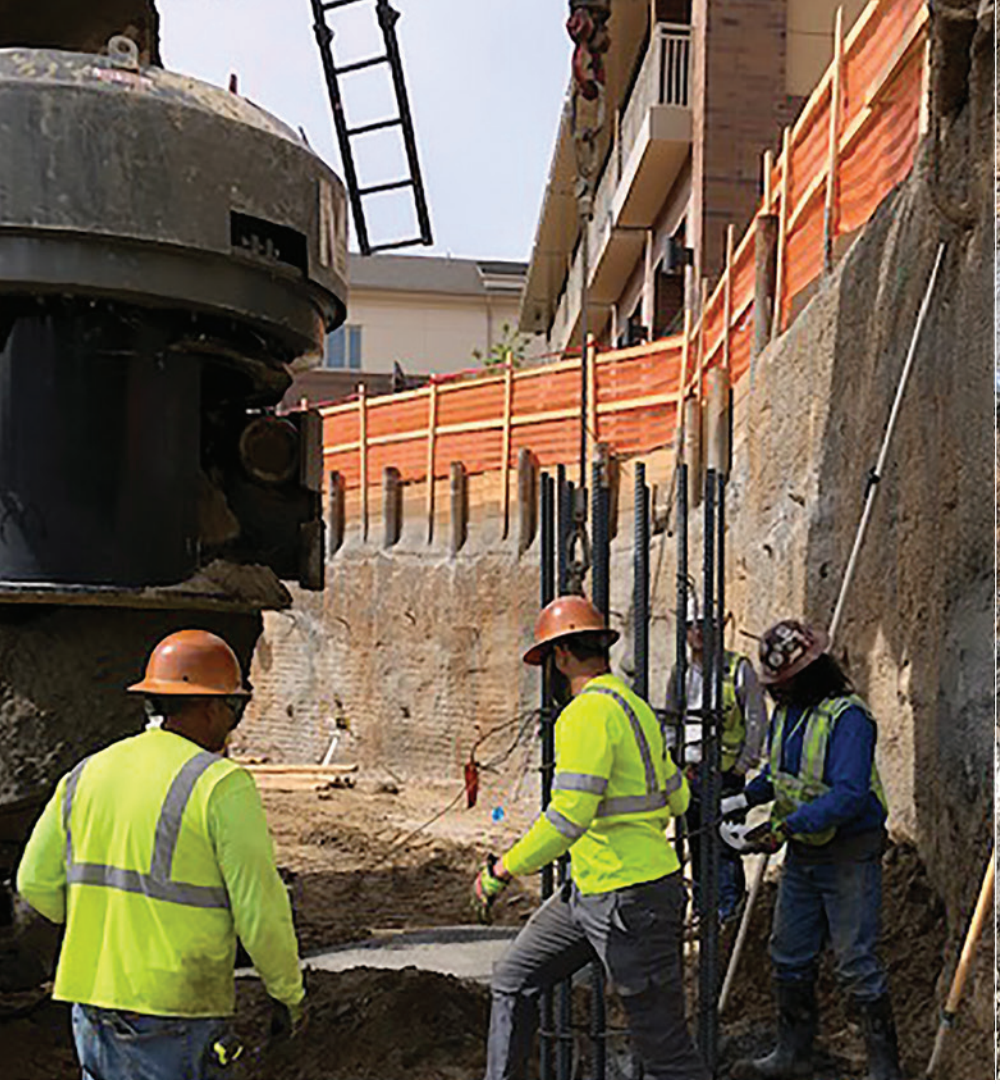
CFA PILES:
- **Improved load capacity**
- **Faster installation time**
- **Reduced overall schedule**
- **Vibration-free**
- **Low noise**

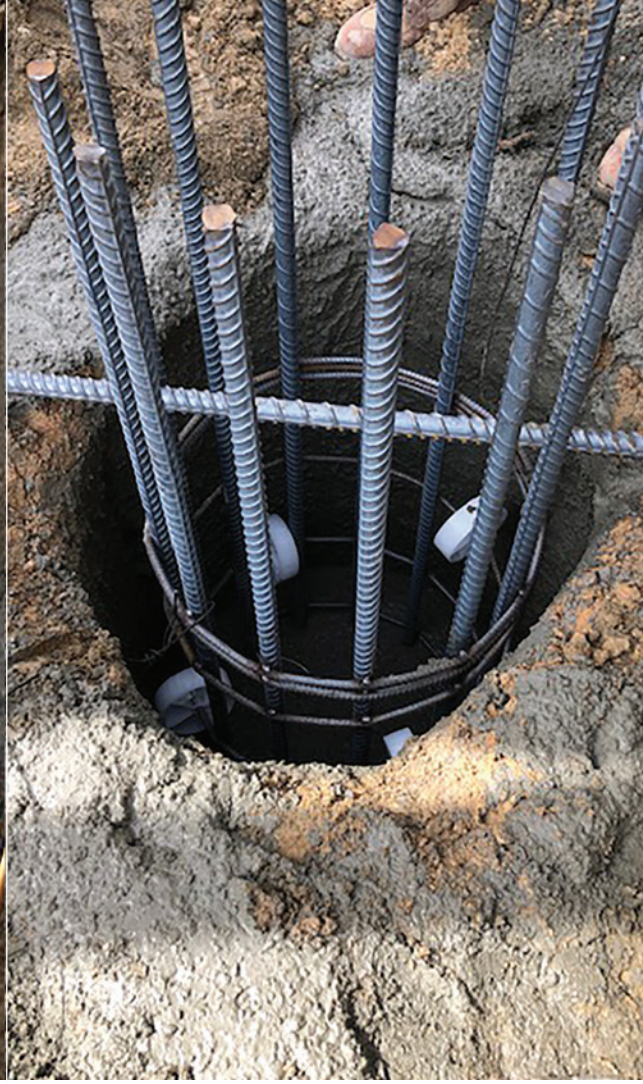
PROJECT OVERVIEW

Morris-Shea installed Continuous Flight Auger (CFA) piles for the deep foundation of the new highrise at The Cardinal at North Hills. The 18 story expansion of the Raleigh, NC senior living facility required the installation of 199 CFA piles to underpin a single level of below ground parking and 191 housing units in the new tower. Morris-Shea drilled 24" and 36" CFA piles to depths of 24' to 68' to satisfy all load requirements. Morris-Shea CFA piles provided a deep foundation solution that was economical and environment-friendly. CFA piles also offered a vibration-free, low noise alternative to driven piles when installed in close proximity to existing housing units at The Cardinal.

CFA PILE INSTALLATION METHOD

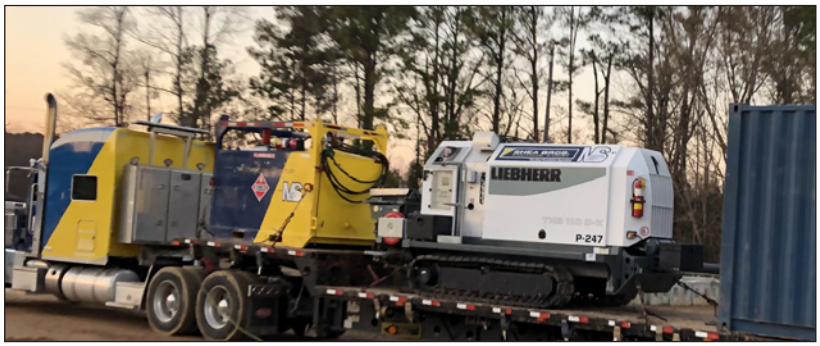
CFA tooling was advanced with high torque rotation and crowd so installation could proceed rapidly and without over-rotation. The hollow stem of the tooling was connected by hose to a high-powered mobile concrete pump. A self-consolidating, coarse aggregate concrete mix was pumped under pressure (6000 psi) through the CFA tool to the base of the borehole. Drilling parameters were observed in real time by the rig operator utilizing Morris-Shea's Automated Monitoring System. The AME display presented the volume of concrete being placed. It also provided the rig operator with a target extraction rate that ensured the construction of a quality monolithic concrete shaft.





INSTALLATION EQUIPMENT

24" CFA piles with 3'-15' sockets and 36" CFA piles with 5'-12' sockets were drilled into partiaily weathered rock with a Fundex 3500 drill rig. A P-250 Liebherr concrete pump, maintaining critically controlled pressure, fed concrete to the bottom of the borehole. A steel reinforcing cage, manufactured by Morris-Shea, was then placed into each pile.



SOIL CONDITIONS

Silty sand, low to high plasticity clayey silt, and low plasticity clay were found between 3' and 25'. Underlying residual soils of silty sand and low to high plasticity silt extended to partially weathered rock (PWR).

LOAD TEST SUMMARY

Two 24" Diameter Compression Test Piles with 8' and 15' sockets and one 24" Tension Test Pile were installed with strain gauges to successfully demonstrate pile capacity.

MORRIS-SHEA

609 South 20th Street Irondale, AL 35210 205.956.9518 800.875.1583 morrisshea.com