GENESIS OF COOL SPRINGS

Location: Franklin, Tennessee

Project Type: Commercial

DUROTERRA™

DUCTILE IRON PILE ADVANTAGES

- Easy site access in constrained working area
- Low vibrations near existing structuress
- Adaptable pile lengths for variable bedrock elevations

PROJECT DESCRIPTION

The project consisted of a multi-story showroom and office addition to the existing Hyundai dealership in Franklin, Tennessee. The new construction has column loads on the order of 250 kips, with wall loads up to 12 kips per linear foot. Additionally, several of the braced frames would have net tensile loading, resulting from transient loading conditions.

GEOTECHNICAL CONDITIONS

Soil conditions consist of an upper stratum of lean clay fill, which was encountered to depths of 2 to 19 feet. The fill is underlain by firm to stiff residual lean and plastic clay (CL or CH) encountered to depths ranging from 6 to 18 feet. Below the residuum, borings terminated with auger-refusal on bedrock. Groundwater was not encountered during drilling.

PROJECT CHALLENGES

The site was not suitable for shallow foundations due to the presence of deep fills and overall moderate structural loading. Local karst knowledge led the design team toward a deep foundation system that would bear on the variable bedrock. The new construction would be adjacent to the existing dealership, and work needed to take place in, and around typical traffic patterns associated with a large automotive dealership.

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DESIGN AND CONSTRUCTION SOLUTION

The design team chose Ductile Iron Piles due to the system's adaptability to the variable bedrock conditions and small equipment footprint associated with medium-sized excavators.

The project structural engineer designed the foundation system for Ductile Iron Piles (DIPs) to provide compression and tension capacity. For compression-only piles, non-grouted (exterior) Series 118/9.0 DIPs were designed with 118 mm HD shoes to provide up to 25 tons of end-bearing support on the underlying limestone bedrock. For piles subject to compression and tension, Series 118/9.0 DIPs were designed to be exterior-grouted with 220 mm (8.7-in) diameter conical grouting shoes to provide up to 10 tons of tension capacity.

Rembco Geotechnical Contractors was awarded the work in a competitive bidding process and installed more than 160 production piles using a Hitachi 210 LC excavator equipped with a Rammer BR2577 percussion hammer. Rembco installed drilled micropiles in interior areas where ceiling heights (approximately 13 feet) were too short for DIP installation equipment. Pile load testing was performed to verify the performance of the project and work was completed with minimal disruptions to the retail activities of the dealership.

PROJECT TEAM
DIP Installer: Rembco Geotechnical Construction
Geotechnical Engineer: UES
General Contractor: Concord Building Group
Structural Engineer: Atlantic Engineering Services