SECTION 31 63 16
AUGER-CAST GROUT PILES

PART 1 - GENERAL

1.01 Related Documents

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Work included:

Furnish all engineering and design services, supervision, labor, materials, services, equipment, and apparatus necessary to perform all work necessary for installing Auger Cast piles in accordance with the Drawings and this Specification. Auger Cast piles will be installed at the pile cap locations shown in plan and to the elevation, minimum length and allowable capacities, as established by the Pile Design Professional, hired by the Pile Contractor, and in conformance with the recommendations included in the Geotechnical Report, prepared by the University's Geotechnical Engineer. Auger Cast piles will be designed to resist the design loads included on the foundation drawings. Pile Design Professional shall be a Professional Engineer, P.E. registered in the State of Ohio.

Furnish all materials and labor as required to perform the pile load tests, as specified herein.

Furnish all engineering and design services for the design and detailing of the reinforced concrete pile caps, at locations shown in plan. Furnish all reinforcing steel, ties, dowels, column anchor bolt embedment, as needed, to ensure that the loads from the super structure building columns are appropriately transferred to the Auger Cast piles below through the pile caps.

B. Pile type and equipment:

1. All piles shall be made of auger-drilled cast-in-place concrete.

2. A continuous flight hollow shaft auger shall be rotated into the foundation material to the specified depth, and then mortar shall be injected through the auger shaft as the auger is being withdrawn.

3. All equipment shall be in good operating condition to do all necessary work as required.

4. The hole through which the mortar is placed shall be located at the bottom of the auger head below the bar containing the cutting teeth.

5. The auger flighting shall be continuous from the auger head to top of auger with no gaps or other breaks. Augers over 50' in length shall contain a middle guide.

6. All piles shall contain reinforcing, as established by the Pile Design Professional, hired by the Pile Contractor.

C. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 2 Section "Site Cleaning" for condition of site at time of pile placement.

2. Division 2 Section "Earthwork" for condition of site at time of pile placement.

1.03 Submittals

A. General: Submit the following items according to conditions of the Contract and Division 1 Specification Sections.

B. List of 10 pile installations comparable to this project which the Contractor performed with reference names, addresses, and telephone numbers.

C. Mix designs of grout with strength substantiating test data prepared by an independent testing laboratory.

D. Pile test method to be used including details such as a loading schedule, types of gauges, types of jacks, method of loading, and who will certify the test.

E. Shop drawings: The Pile Contractor will submit the following information

1. Pile layout, schedule of installation and placing sequence.
2. Type of pile, sizes and details.
3. Load capacity of each pile.
4. Grade and details of reinforcing steel.
5. Type of cement, air content, slump and concrete strength.
6. Elevation of pile bases.
7. Elevation of top of pile.
8. Pile cap sizes and details; including reinforcement layout and sizes.

The Pile Design Professional, hired by the Pile Contractor, shall submit to the Architect/Engineer sealed design calculations for the design and detailing of the Auger Cast piles and the pile caps for review and approval. Work shall not commence until all the submittals have been reviewed and approved by the Architect/Engineer.

1.04 Quality Assurance

A. Perform work with personnel experienced in type of construction required.

B. The piling contractor shall have had a minimum of five years of successful experience in this type of work, with evidence of satisfactory completion of ten pile installations comparable to this one.

C. This contractor shall examine the survey and the soil investigation report and be completely familiar with the contents prior to submitting his bid. The report is available through the Engineer's office.

D. This contractor shall visit the site to familiarize himself as to the conditions under which all work, included in this contract, must be performed.

E. The Pile Contractor and Pile Design Professional shall examine the soils investigation report, prepared by the University's Geotechnical Engineer and shall be completely familiar with the recommendations and contents of the report.

1.05 Tolerances

A. Piles shall be located, and of the diameter, as shown on drawings or as otherwise directed by the Architect. Pile centers shall be located to an accuracy of plus or minus 3". In the event that obstructions are encountered which prevent placing the pile to the depth required, the short pile shall be completed as described in these specifications and an additional adjacent pile placed as directed by the Engineer.

B. Replace or reinforce, at contractor's expense, any pile exceeding these tolerances.

1.06 Testing and Inspection

A. An inspector from an independent laboratory shall be present during placing of all piling. Cost of this inspector shall be paid by the Owner.

B. Compression tests shall be performed on grout used in the piling. A minimum of six test cubes of 3-1/2" x 3-1/2" x 7" height shall be made for each eight-hour shift. Cubes shall be compression-tested according to the requirements of ASTM C1019.

C. Drilling Records: The Pile Contractor and the Testing Laboratory Inspector shall each shall each submit copies of the drilling record of each pile to the Architect/Engineer not later than 48 hours after drilling. The reports shall indicate the name of job, name of pile contractor, and drilling superintendent. For each pile installed, the report shall include the following information: pile location, pile number, pile diameter, actual tip elevation; actual surface elevation (top of grout), pile length, theoretical volume of grout, actual volume of grout placed, reinforcing steel size and depth actually placed, drilling start and finish time, grouting start and finish time, amount of drop in grout level in 24 hours, and a report of any unusual occurrences affecting pile performance. Notify the Architect/Engineer immediately by telephone when the grout level for any pile drops within 24 hours after installation. Reports prepared by the Testing Laboratory Inspector shall be compiled and signed by a registered professional engineer in the state of Ohio. Reports prepared by the Pile Contractor shall be compiled and signed by the drilling superintendent.

1.07 Bid Basis

A. Include in "Base Bid" piling extending to assumed bottom elevations of approximately 55’-0” below the ground surface, as stated in the Geotechnical Report, prepared by the University’s Geotechnical Engineer.

B. Contract price adjustments will be as stated in Article 1.8, PRICE ADJUSTMENT.

1.08 Price and Adjustment

A. This contractor shall state in his bid the cost per lineal foot of piling in place in completed pile including excavation, reinforcing, and grouting.

B. This unit price will be used to determine the amount to be deducted if required depth of pile is less, and the amount to be added if depth is greater, or more piles are found to be necessary.

PART 2 - PRODUCTS

2.01 Grout

A. Grout shall consist of a mixture of Portland cement, "Intrusion-Aid 'C' " or "Intrusion-Aid 'DSC' " mineral filler, sand, and water so proportioned and mixed as to produce a grout capable of maintaining the solids in suspension without difficulty and which will penetrate and fill any

voids in the foundation material. These materials shall be so proportioned as to produce a hardened grout of 4,000 psi at 28 days. Mineral filler and Intrusion-Aid "C" or Intrusion-Aid "DSC" shall impart certain other properties as listed below under "Materials."

B. The proportioning and placing of mortar shall be performed in accordance with the Contractor's standards as reviewed and approved by the Engineer.

C. Materials:

1. Portland Cement: Portland Cement shall conform to Federal Specifications SS-C-192 or current ASTM Standards - Designation C150.

2. Mineral filler shall be a pozzolanic finely powdered siliceous material which possesses the property of combining with lime liberated during the process of hydration of Portland Cement. Mineral filler shall contribute markedly to the later-age strength of the concrete.

3. Intrusion-Aid shall have the effects in the grout of reducing mixing water requirements, retarding the rate of stiffening the time of setting, decreasing the tendency toward bleeding and segregation, eliminating setting shrinkage, improving the qualities of pumpability and penetrability of small voids, and increasing the strength of the piles.

4. Water: Water for intrusion grout shall be fresh, clean, and free from injurious amounts of sewage, oil, acid, alkali, salts, or organic matter.

5. Fine Aggregate: Sand shall meet the requirements of current ASTM Standards, Designation C33, except that the gradation shall be as hereinafter specified.

6. The sand shall consist of hard, dense, durable, uncoated rock particles, and shall be free from injurious amounts of silt, loam, lumps, soft or flaky particles, shale, alkali, organic matter, mica, and other deleterious substances. If the sand is washed, the method for washing shall be one which will not remove desirable fines, and the sand shall subsequently be permitted to drain until the residual-free moisture is reasonably uniform and stable. Grading/Sieve Analysis: Fine aggregate shall be graded within the following limits:

Sieve		Percentage Passing
3/8"	-	100
No. 4	-	95 to 100
No. 8	-	80 to 100
No. 16	-	50 to 85
No. 30	-	25 to 60
No. 50	-	10 to 30
No. 100	-	2 to 10
Fineness Modulus	-	1.8 to 3.2

D. Reinforcing Steel: ASTM A615, Grade 60.

PART 3 - EXECUTION

3.01 Installation

A. Augered cast-in-place piles shall be made as described below:

1. Where foundation material is not sufficiently stable for the hole to retain its shape without support or where consolidation of soft soil strata by grout penetration is required, a continuous flight hollow shaft auger shall be rotated into the ground to such depth as to assure a pile bearing capacity as indicated on the drawings. Grout shall then be injected through the auger shaft as the auger is being withdrawn using earth-filled auger as a packer. Positive or "removing" pressure shall thus be exerted on the withdrawing auger as well as lateral pressure on the soil surrounding the grout-filled pile hole.

2. Where foundation material is sufficiently stable for the hole to retain its shape without support, the earth-filled auger may be removed leaving an open hole of required diameter and depth. In this case, grout may be placed through a pipe insert placed directly into the open hole.

B. Augering shall continue until the design bearing elevation has been reached. Piles encountering an obstruction shall be terminated at the obstruction and additional piles shall be added, and located as directed by the Architect.

C. Grout ingredients shall be accurately measured by volume or weight. This contractor shall have an approved independent testing laboratory test the mix designs and have the results submitted to the Engineer for review.

D. The auger hoisting equipment shall be so designed as to enable the auger to be withdrawn smoothly and steadily at a constant rate. The rate of withdrawal shall be such that the rate of grout filling will tend to consolidate soft or weak soil zones and extend into and fill any fissures or crevices encountered.

E. The pumping of the grout shall proceed only after the augering of the hole has been satisfactorily completed.

F. Pile tops shall be consistent with the information included on the Pile Design Professional design calculations and the shop drawings prepared by the Pile Contractor. Top of Pile caps shall conform with the elevations noted on the foundation drawings prepared by the Structural Engineer of Record. Pile cutoff may be by removing fresh grout or cutting grout after initial set.

G. All work shall conform to the applicable parts of ACI 301 and ACI 318, along with this specification.

3.02 Capacity and Pile Test

A. The pile capacity shall be as established by the Pile Design Professional, hired by the Pile Contractor, and in conformance with the recommendations included in the Geotechnical Report, prepared by the University's Geotechnical Engineer. A load test shall be made on a pile to be designated by the Engineer. The pile shall be tested in accordance with the following:

1. Static Compression Test (ASTM D-1143)
2. Static Tension Test (ASTM D-3689
3. Static Lateral Test (ASTM D-3966)

B. Details, such as a loading schedule, gauges, jacks, method of loading, certification of test, shall be approved by the Engineer.

C. Criteria for acceptance shall be as set forth in Section 1808.2.8 of the Ohio Building Code.

`END OF SECTION 31 63 16