PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 032000: Reinforcement
Section 033000: Cast-in-place concrete

B. Unless specified differently herein, all work shall be done in compliance with the construction methods and tests and inspections sections of the pier foundations portion of the ACI Manual of Concrete Practice (ACI 336.1), Latest Edition.

1.2 SUMMARY

A. Provide cast-in-place reinforced concrete piles complete in place as shown on the Drawings and specified herein.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 013300.

B. Concrete Mix Designs shall be submitted to the University Representative for review and approval. Concrete strength of piles shall be noted on General Notes of drawings.

C. Reinforcing Shop Drawings shall be submitted to the University's Representative for review and approval. Refer to Section 032000 for detailed requirements.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

B. The contractor shall demonstrate successful experience in performing work of a similar nature for a period of five years.

C. In addition to complying with Applicable Code Requirements, comply with recommendations of the University's soil engineer, and obtain approvals from the University's Representative. The University's soil engineer's log will be used as the official log on which final payment quantities will be based for the work of this section.

D. Comply with the provisions of Section 014500.

E. Pre-Installation Meeting: Conduct meeting at project site to comply with requirements in Division 1 Section "Project Management and Coordination".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 016100.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcement:
1. Bars: Comply with ASTM A706 and, unless otherwise shown on the Drawings, use grade 60, with deformed bars for number 3 and larger.
2. Welded wire fabric: Comply with ASTM A185.
3. Bending: Comply with pertinent provisions of ACI 318.
4. Unless otherwise shown on drawings, provide reinforcement complying with pertinent provisions of Section 032000 of the specifications.

B. Concrete:
1. Unless otherwise shown on the Drawings, provide concrete complying with pertinent provisions of Section 033000 of these Specifications.
2. Provide a concrete mix with a slump of 4", with a tolerance of ± 1 inch.

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the University's Representative.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 SITE/FIELD CONDITIONS

A. Length of cast-in-place piles indicated in the construction documents are minimum lengths based on the Soils Report. Pile lengths may be increased due to actual field conditions as determined by the University's Geotechnical Engineer and approved by the University's Representative.

B. Existing Utilities: Locate existing underground utilities before excavating drilled piers. If utilities are to remain in place, provide protection from damage during drilled-pier operations.
1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with the University and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.

C. The University's Geotechnical Engineer's log will be used as the official log on which final payment quantities will be based for the work of the section.

3.3 DRILLING

A. General:
1. Machine drill the pile shafts to the diameters and lengths shown on the Drawings.

2. Locate shafts within 2" of the position shown on the Drawings, and make excavations plumb within a tolerance of 1" in 10'-0".
3. Maintain clear excavations, using necessary equipment to prevent fouling of concrete due to inclusion of dirt from the shaft sides while depositing concrete.
4. Where piles occur in groups, or are spaced closer than four diameters on center, drill and fill alternate piles and allow to cure at least eight hours before drilling adjacent pile.
5. Take care not to overdrill piles.
6. Contractor is responsible to provide shaft liners, as required, in case water is encountered during drilling and/or placement of concrete.

B. Inspections:
1. Secure inspection of shafts by the University's Geotechnical Engineer and approval of shafts by University's Representative prior to installing the reinforcing and placing concrete.
2. Provide necessary facilities, including shaft liners and droplights when so required, to accommodate required inspections.

3.4 REINFORCING

A. Assemble the required reinforcement, securely wiring together, and install in the shaft with concrete block spacers.

B. Unless otherwise shown on drawings, install reinforcement complying with pertinent provisions of Section 032000 of the specifications.

3.5 PLACING CONCRETE

A. Prior to placing concrete, remove water from the shafts by pumping or other means approved by the University's Representative. Remove all loose dirt and debris from the bottom of the shaft.

B. Scheduling:
1. Drill and fill piles with concrete in one continuous operation.
2. Do not leave pile shafts unfilled except as approved by the University's Representative.

C. Placing:
1. Place concrete in piles by the pump method, taking care to ensure that concrete does not strike sides of the shaft causing segregation of materials and inclusion of dirt.
2. Support the pump hose with suitable means to allow the hose to hang straight down into the shaft.
3. Limit the concrete to a 5'-0" maximum free fall, with no ricochet off the reinforcing steel.
4. Concrete may be required to be placed with a tremie if water enters the shaft too rapidly. Provide procedure to Structural Engineer Of Record (SEOR) for review, and obtain approval from the University's Representative.
5. When hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to ACI 301 to maintain delivered temperature of concrete at no greater than 90 deg. F. Place concrete immediately on delivery.

D. Caving precautions:
   1. If sides of shaft excavations tend to cave or ravel, provide shaft liners during placement of concrete.
   2. Keep the bottom of the liner below the level of fresh concrete and slowly withdraw the liner as the shaft is filled.

E. Vibration:
   1. Have suitable vibration equipment immediately available as approved by the University's Representative.
   2. Vibrate the freshly placed concrete as approved by the University's Representative.
   3. Vibrate as required to assure adequate consolidation along the entire depth of the pile.

F. Protection: Provide suitable protection around protruding reinforcement steel.

G. Unless otherwise shown on drawings place concrete complying with pertinent provisions of Section 03300 of the specifications.

3.6 FIELD INSPECTION

A. Comply with all pertinent provisions of Section 014550.

B. All excavation and pile drilling operations shall be performed under the observation of a representative of the University's geotechnical engineering firm.

C. The University's geotechnical firm shall issue periodic field reports regarding the progress of the excavation and pile drilling operations and observations. Copies shall be distributed to the University's Representative and SEOR.

D. The University's geotechnical firm shall issue a final as-built geotechnical report which shall include the following:
   1. Observations and tests performed during grading, excavation and installing the piles.
   2. Verification of pile lengths and pile locations.

E. Testing Agency: The University will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit reports during excavation and concrete placement for drilled piers.

END OF SECTION