Section 02465

DRILLED SHAFT FOUNDATIONS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Construction of foundations consisting of reinforced concrete drilled shafts.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for drilled shaft foundations under this Section. Include cost in lump sum payment for structure requiring drilled shaft foundations.

2. Refer to Section 01270 - Measurement and Payment for unit price procedures

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit work plan for each structure with complete written description, which identifies details of proposed method of construction and sequence of operations for construction relative to drilled shaft activities. Descriptions, with supporting illustrations, shall be sufficiently detailed to demonstrate to City Engineer that procedures meet requirements of Specifications and Drawings.

C. Submit project record documents under provisions of Section 01785 - Project Record Documents. Record locations of drilled shafts, as installed referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.04 REFERENCE STANDARDS

A. ACI 336.1 - Standard Specification for Construction of Drilled Piers

B. TxDOT Standard Specification Item 416 - Drilled Shaft Foundations

PART 2 P R O D U C T S

2.01 EQUIPMENT

A. Perform excavation with equipment suitable for achieving requirements of this Specification.

2.02 MATERIAL

A. For cast-in-place concrete, use Class A concrete. Refer to Section 03310 - Structural Concrete.

B. For reinforcing steel, refer to Section 03211 - Reinforcing Steel

PART 3 E X E C U T I O N

3.01 PREPARATION

A. Conduct an inspection to determine condition and locations of existing structures and other permanent installations, prior to commencing work.

3.02 EXCAVATION

A. Perform excavation required for drilled cylindrical shafts, at locations shown on Drawings through whatever materials encountered, to dimensions and elevations shown or required by site conditions. When satisfactory material is not encountered at plan depth, bottom of shaft will be adjusted or foundation altered, as determined by City Engineer, to satisfactorily comply with design requirements.

B. Do not make shaft excavations within 3 shaft diameters (edge to edge) of shafts, which have been concreted within previous 24 hours.

C. Inspect drilled shaft excavations for verticality and side sloughing. Verticality is specified at one inch in 10 feet of shaft length.. Check to full depth of dry auguring prior to introducing drilling mud. Straighten or add suitable reinforcing steel to shafts not meeting specified tolerance.

D. Slurry is to contain 4 to 8 percent by weight of bentonite additive and satisfy slurry specifications set forth in ACI 336.1, Section 2.3.5.2e. These requirements are more stringent than TxDOT Standard Specification Item 416.3.1. Stricter slurry specifications are required to assure suspension of detritus from drilling operations, and to ensure adequate cleaning of slurry prior to concreting. Cleaning of slurry is important to prevent deposition of detritus on reinforcement cages and ensure that inclusions of detritus will not be formed within concrete mass.

E. At final bearing elevation, clean bottom of each shaft and remove seepage water for examination by City Engineer before reinforcing steel and concrete is placed. Suitable access and lighting for proper inspection of completed excavation is to be provided. Reinforcing steel and concrete is to be placed in drilled shaft without delay after approval of excavation by City Engineer.

3.03 DRILLED SHAFT CONSTRUCTION

A. Drilled shaft construction and installation is to follow TxDOT Standard Specification Item 416 (with exceptions noted below) and ACI 336.1.

B. Before placing concrete, clean out shaft bottom with drilling bucket in order to remove sediments, which may not be displaced by concrete. Clean shaft bottom with Aclean-out@ bucket until rotation on bottom without crowd (i.e., penetration under force) produces little spoil. Probing after cleaning out is essential to verify condition of base of shaft.

C. Concrete is to conform to requirements of ACI 336.1 Section 2.3.5.5.

D. Concrete is to be placed continuously in shaft to construction joint indicated on Drawings or as directed in TxDOT Standard Specification Item 416.3.3. Concrete is to be placed through suitable tube or tremie to prevent segregation of materials. Tremie pipe diameter is to be at least 8 times as large as largest concrete aggregate size.

E. Computation of final concrete volume for each shaft is to be made. Core and check the integrity of shafts taking an unreasonably high or low volume of concrete.

F. If caving soil conditions or excessive groundwater is encountered, use of temporary casing is permitted to prevent caving of material around shaft and to control seepage of groundwater into excavation.

G. Casing material is to be metal of ample strength to withstand handling stresses, pressure of concrete and of surrounding earth or backfill materials and is to be water-tight. Casing shall be smooth, clean and free of accumulations of hardened concrete. Outside diameter of casing is not to be less than specified diameter of drilled shaft.

H. Elapsed time is not to exceed one hour from beginning of concrete placement in cased portion of shaft, until extraction of casing is begun.

I. Withdraw temporary casings as shaft is filled with concrete, or immediately following concreting operation. Bottom of casing is to always remain at least one foot below level of concrete during placement to overcome hydrostatic pressure. Smoothly extract casing with vibratory hammer. Casing extraction is to be at slow, uniform rate with pull in line with vertical axis of shaft. Leave no casing in place.

J. If upward movement of concrete or reinforcing steel occurs inside casing at beginning of pulling operation or at anytime during pulling, stop pulling immediately and leave casing in place.

K. If casing must be left in place, City Engineer is to be informed to determine shaft capacity calculations.

3.04 FIELD QUALITY CONTROL

A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

3.05 DISPOSAL OF EXCESS MATERIAL

A. Dispose of excess materials in accordance with requirements of Section 01504 - Temporary Facilities and Control or Section 01576 - Waste Material Disposal.

END OF SECTION