

## SECTION 02451 - PILE LOAD TESTS

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. The work included in this section of the specifications includes all labor, materials, equipment, and services necessary to furnish and install all piling specified here.

#### 1.2 RELATED DOCUMENTS

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

#### 1.3 SECTION INCLUDES

- A. Furnishing and driving treated timber piles, conducting pile load testing, and documenting results.
- B. Investigating the existing adjacent and nearby buildings, sewers, and utilities. Take proper and necessary precautions to protect those things from damage due to the execution of the Pile Load Testing Work. Should damage occur due to the Contractor's negligence, responsibility and cost for repairing or replacing the work in its original condition shall be borne by the Contractor, without additional compensation.

#### 1.4 RELATED REQUIREMENTS

- A. Section 02463 - Timber and Steel Pipe Piles.

#### 1.5 REFERENCE STANDARDS

- A. ASTM D 1143/D 1143M - Standard Test Method for Deep Foundations Under Static Axial Compressive Load; 2007.
- B. Building Code of the City of New Orleans, Louisiana.

#### 1.6 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Pile installation equipment.

#### 1.7 PROJECT CONDITIONS

- A. Refer to geotechnical report of additional information.

#### 1.8 QUALITY ASSUARANCE

- A. The Owner shall engage an independent testing laboratory to perform inspections and tests as specified here.
- B. Inspect timber piles at source of of supply and hammer mark in the butt to indicate conformance with the requirements of these project specifications. Check piles immediately prior to driving for the previously made hammer mark.
- C. Prepare a numbered pile plan, log the driving of all piling (including indicator and reaction piles), and record the information required in Section 02463.
- D. Submit driving records daily, no later than the morning after driving.

## PART 2 PRODUCTS

### 2.1 EQUIPMENT

- A. Provide equipment, load carrying devices, loads, and instrumentation as required by test methods specified in PART 3.

## PART 3 EXECUTION

### 3.1 EXPLORATORY / INDICATOR PILES

- A. Carefully handle piles in a manner that will not cause damage to the piles.
- B. The Contractor shall furnish and drive three (3) exploratory/indicator piles at locations selected in collaboration with the Owner's Representative and the Contractor. These piles may be driven in permanent pile locations.
- C. The exploratory/indicator piles shall be the same size and type as specified for the project's piles. These piles shall be installed to the design tip penetration without using any other supplemental installation techniques and using the same methods, equipment, and techniques as proposed for the production (job) piles. The exploratory/indicator piles shall have tip diameters no more than 1/2 inch larger than the minimum diameter indicated on the plans and butt diameters no more than 1 inch larger than the minimum diameter indicated on the plans.

### 3.2 EQUIPMENT

- A. Driving equipment is subject to the approval of the Owner's Representative and the proposed equipment shall be submitted to the Owner's Representative for approval before mobilizing equipment to the site. Owner's Representative has the right to reject equipment if in its opinion, at any time, the equipment does not perform its intended task adequately.

### 3.3 DRIVING PROCEDURE

- A. Before pile-driving operations begin, the testing laboratory's personnel shall clearly mark each pile, measure and record each pile's tip and butt diameters, as well as each pile's length.

- B. Use fixed leads to hold pile firmly in position and in alignment with hammer. Prior to driving, the butt of the pile shall be cut smooth and square with the longitudinal axis of the pile.
- C. Drive continuously until proper penetration as determined by Owner's Representative is obtained.
- D. During the driving of exploratory piles and reaction piles, the laboratory shall monitor and record the vibrations to adjacent and surrounding areas. The laboratory shall employ the services of a vibration specialist engineer who in conjunction with the laboratory shall render complete reports and interpretations of the data obtained, including the possible effects of the measured vibrations on adjacent and surrounding structures. The vibrations shall be measured by means of a portable seismograph, which directly measures particle velocity (rate of ground movement) in three mutually perpendicular directions (longitudinal, transverse, and vertical). Probes shall be located at various locations as directed by Owner's Representative. A complete report of the vibration study, including seismograms, shall be furnished after the conclusion of the driving of these piles.

#### 3.4 STATIC LOAD TEST

- A. After all three (3) exploratory piles are driven, the Owner's Representative, with input from the geotechnical and structural engineers, will select one pile to be load tested in compression.
- B. Contractor shall provide reaction piles, test beams, plates, etc., to allow Owner's independent testing laboratory to load test the pile. Reaction piles shall be located in accordance with ASTM D 1143 and at least 7 feet from the test pile and, if left in place, shall not interfere with the location of future permanent piles. The calibrated hydraulic ram and load cell shall be furnished by the testing laboratory.
- C. The reaction system shall have the capacity to resist a compression load of at least 150% of the predicted ultimate pile capacity shown in the project's geotechnical report, and the loading system shall have the capability of applying a compression load to the test pile of at least 150% of the predicted ultimate pile capacity shown in the project's geotechnical report. The device used to apply load to the top of the pile shall be capable of controlling the applied load to within 5 percent of the total applied load.
- D. Vertical movements of the pile butt during loading shall be measured using two independent measurement systems capable of yielding an accuracy of 0.01 inches.
- E. Provisions shall be made to protect the instrumentation, measuring system, and reference system from disturbance, vibrations, and adverse temperature variations. In addition, there shall be a system for measuring vertical movements of the reaction system.

- F. After driving the pile to be tested and the reaction piles around the test pile, there shall be a waiting period of at least 14 days between the driving of these piles and the start of the load test. The load test shall meet the requirements of the Building Code of the City of New Orleans, Louisiana (Orleans Parish Building Code) and ASTM D 1143, "Quick Load" method.
1. Load shall be applied to the top of the test pile in equal increments that correspond to about 10 to 15 percent of the expected failure load.
  2. As failure approaches, reduce the test load increment to one-half that used during the earlier stages of the load test.
  3. Maintain each load increment for 1 hour, regardless of the loading increment.
  4. Apply load to the pile until the lesser of the following occurs: the pile plunges, constant jacking is required to maintain the load increment, or 150% of the predicted (computed) ultimate pile capacity has been applied.
  5. Measure and record movement of the pile butt under each increment of load after various elapsed intervals of time; also measure vertical movements of the reaction system
  6. At the completion of the loading program, remove the load in four (4) equal decrements with 30 minutes between decrements.
  7. Observe the rebound of the pile during the unloading period for each decrement after various elapsed intervals of time.
  8. Obtain the final rebound reading after the load has been removed for 1 hour.

END OF SECTION