

SECTION 31 62 16
HYDRAULICALLY JACKED MICROPILES

PART 1 GENERAL

1.1 DESCRIPTION

This section specifies materials and installation required for the construction of hydraulically jacked piles.

1.2 RELATED WORK

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- C. Subsurface investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article, PHYSICAL DATA.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer: A firm with a minimum of 5 years' experience in the Installation of micropiles, and a person in charge of installation with a minimum of 2 years' experience in the driving of piles.
 - 2. Welder: Qualify welding procedures and personnel according to AWS D1.1.
 - 3. Install pile foundations under the direct supervision of a registered professional engineer knowledgeable in the field of soil mechanics and pile foundations, who shall certify that the piles as installed satisfy the design criteria.
- B. Contractor will select and pay a Testing Laboratory to provide full time inspection during installation of piling work.
- C. Testing Agency Qualifications: An independent testing agency qualified for testing indicated, as documented according to ASTM E548 shall be approved by the COTR.
- D. Pre-installation Conference: Contractor shall conduct conference at Project site prior to pile installation.

1.4 PROJECT CONDITIONS

- A. Subsurface Information: A Geotechnical Investigation prepared by Terracon, dated April 30, 2012 is available to bidders for review.

- A. Contractor is responsible for evaluating and implementing the information provided in the geotechnical report prepared for the Project.
- B. Existing Utilities: Locate existing underground utilities in areas of pile installation. Utilities are to remain in service, provide adequate support and protection.
- C. Protection: Protect structures and other construction from damage caused by pile operations.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store piles to prevent damage. Store piles above ground. Piles exhibiting variations beyond tolerance limits will be considered distorted and may not be used in the work. Keep piles free from rust.

1.6 SUBMITTALS

- A. Contractor's written certifications that installer has the required experience.
- B. Welder certifications.
- C. Certified copies of mill reports covering the chemical and physical properties of the steel piles.
- D. Shop drawings showing:
 - 1. Pile locations.
 - 2. Bracket details
 - 3. Weld locations and details.
- E. Installation Records: Four (4) copies of the installation records of each pile to the COTR no later than two (2) days after installation. Include the Project name and number, name of Contractor, pile location and number, computed pile capacity, pile dimensions, pile deviation, and any unusual occurrences during pile driving.
- F. Submit detailed plan of pile installation and jacking procedures to COTR prior to pile installation.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A36/A36M-08 Standard Specification for Carbon Structural Steel
 - A513 Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
 - E329-11c Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
 - E548-94e1 Standard Guide for General Criteria Used for Evaluating Laboratory Competence
- C. American Welding Society (AWS):

D1.1/D1.1M-2010 Structural Welding Code - Steel

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Piles:

- ASTM A 513 1015/1020 ERW Steel Tube.
- 3"Ø O.D. with 1/4" wall thickness (minimum).
- Ultimate compressive and tensile stress: 70,000 psi.

B. Steel Plates: ASTM A36.

C. Bracket Tube:

- ASTM A513 1026/1030 DOM or ASTM A519 1026/1030 Seamless Steel Tube.
- 3 7/8"Ø O.D. with 3/8" wall thickness (minimum).

D. Bolts: 3/4"Ø ASTM A490.

E. Expansion Bolts:

1. Hilti Kwik-Bolt III, 1/2"Ø, 3 1/2" minimum embedment, ultimate shear capacity greater than 3500#.

2.2 MICROPILE INSTALLATION EQUIPMENT

- A. Hydraulic Ram: Advance micro-piles into the ground using hydraulic ram(s) pressing directly against the micro-pile. Provide equipment with a direct means of determining load applied to micro-pile, and a means for testing attachment bracket capacity and the connection to the structure.

If the equipment cannot provide direct testing of the bracket and connection, Contractor to submit detailed drawings of the anchoring system and calculations indicating the allowable load capacity of the system. Drawings and calculations must be stamped by a Professional Engineer registered in the State where the project is located.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which micro-piles are installed. Notify COTR in writing of conditions detrimental to the proper and timely completion of the work. Starting of work constitutes acceptance of existing conditions.

3.2 PROTECTION

- A. Protect structures, underground utilities and other construction from damage caused by micro-pile installation operations. Pre-excavate for piles if required.
- B. Contractor is responsible for any and all damage to existing structures and utilities as a result of pile installation operations.
- C. Contractor must monitor the existing structures in a manner approved by the COTR before, during, and after micro-pile installation to detect damage that may result from installation, and to identify damage, cracks, etc., that existed prior to work on this Project.
- D. Contractor shall coordinate with the appropriate local authorities to locate existing utilities in the work area and shall report conflicts to the COTR.
- E. Repairs of damage to existing structures and utilities resulting from the work of this Section shall be performed at the expense of the Contractor, at no cost to the Government.

3.3 INSTALLATION

- A. A minimum factor of safety of 1.5 is required to determine the proof load of the micro-pile. Loads shown on the drawings are design allowable loads.
- B. Test all micro-piles to proof load.
- C. Tolerances:
 - 1. Maximum out of plumb – 2.5% of the final installation length, measured on the inside of the micro-pile.
 - 2. Bracket placement - $\pm 2"$ parallel to the face of the bracket, $\pm \frac{1}{2}"$ perpendicular to the face of the bracket.
 - 3. Install micro-piles to a final length appropriate to achieve the required installation force.
- D. Axial Load Test
 - 1. Perform axial load test at each micro-pile location
 - 2. Apply proof load and monitor micro-pile advancement rate for 30 minutes. The load test is successful if the advancement of the micro-pile under the applied load is less than 1/16 inch

per hour. Continue forward advancement of the micro-pile until a successful load capacity test is achieved.

E. Field Modifications

1. Field welding in accordance with "Code for Welding in Building Construction" of the American Welding Society.
2. Modification of manufactured products; micro-piles, brackets or connectors is prohibited.

F. Utilities

1. Locate all underground structures and utilities adjacent to micro-pile installation prior to the start of the installation work. Provide a horizontal pile spacing equal to or greater than one half the depth of the utility.

3.4 FIELD QUALITY CONTROL

- A. Testing agency work shall be under the direct supervision of a registered professional engineer knowledgeable in the field of soil mechanics and pile foundations.
- B. Testing agency will inspect the pile installation equipment. Do not permit pile installation equipment which does not conform to these Specifications to remain on site.
- C. Testing agency will monitor the installation of micro-piles.

3.5 DISPOSAL

- A. Remove cutoff sections of piles from site and legally dispose of them off Government property.

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