

SECTION 02458 STEEL H PILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes steel H piles.
- B. Related Sections:
 - 1. Division 1 Section "Unit Prices" for a schedule of unit prices.
 - 2. Division 1 Section "Construction Facilities and Temporary Controls."

1.3 UNIT PRICES

- A. Basis for Bids: Base bids on number and dimensions of piles indicated from point to cutoff, plus not less than 12 inches of overlength for cutting piles at required cutoff elevations.
- B. Basis for Payment: From data obtained as a result of driving piles, calculate actual total net length of piles used. Contract price per linear foot includes labor, materials, tools, equipment, and incidentals and for performing work for furnishing, driving, cutting off and capping piles. This includes disposal of cutoffs.
 - 1. Measurements will be based on effective length of piles in place, with lengths measured to nearest 12 inches. Additional payment for lengths in excess of that indicated, and credit for lengths less than that indicated, will be calculated at unit prices stated in the Contract, based on net addition or deduction to total length of piling.
 - 2. Test piles that become part of completed foundation system will be considered as an integral part of the Work.
 - 3. No payment will be made for rejected piles, including piles driven out of place, defective piles, or piles damaged during handling or driving.

1.4 SUBMITTALS

- A. Product Data: For each type of pile product and accessory.
- B. Shop Drawings: Show fabrication and installation details for piles, including driving points, splices, field-cut holes, and pile caps.
 - 1. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 2. Include arrangement of static pile reaction frame, test and anchor piles, equipment, and instrumentation. Submit structural analysis data signed and sealed by the qualified Professional Engineer licensed in the State of Tennessee responsible for their preparation.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- E. Mill test reports signed by manufacturer certifying that steel H piles comply with requirements:
- F. Pile-Driving Equipment: Include type, make, maximum rated energy, and rated energy per blow of hammer; weight of striking part of hammer; weight of drive cap; details, type, and structural properties of hammer cushion; and details of follower and jetting equipment.
- G. Static Pile Test Reports: Submit within two days of completing test.
- H. Driving Records: Submit within two days of driving.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing piling similar in material, design, and extent to that indicated for this Project.
- B. Survey Work: Provide pile-driving records, including surveys, layouts, and measurements, prepared by a surveyor or professional engineer who is legally qualified in Tennessee.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Tennessee and who is experienced in providing engineering services for piles that are similar to those indicated for this Project in material, design, and extent.
- D. Contractor's Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- E. Comply with requirements of the following publications:
 - 1. ASIC's "Specification for Structural Steel Buildings--Allowable Stress Design."
- F. Welding Standards: Qualify welding procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- G. Preinstallation Conference: Conduct conference at Project site.
- H. Site Subsurface Exploration Report:
 - 1. Subcontractor shall examine the site and conditions under which the piles are to be installed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.
 - 2. A copy of boring logs and geotechnical report prepared by LAW Engineering and Environmental Services, Inc., dated June 30 2000, is available for review at the office of the Construction Manager. The data on indicated subsurface conditions are not intended as representations or warranties of the accuracy or continuity of such conditions. It is expressly understood that the Contractor is responsible for interpretations or conclusions drawn from the data. The data is made available for the information of the Contractor

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent physical damage. Support piles with webs in vertical position.

PART 2 - PRODUCTS

2.1 STEEL H PILES

- A. Carbon Steel: ASTM A 36.

2.2 PILE ACCESSORIES

- A. Driving Points: Manufacturer's standard one-piece driving point, fabricated from steel castings as follows to provide full bearing of web and flange of pile tip. Cast driving point with integral tapered cutting wedges and with top alignment curbs to encase web and flanges of pile.
 - 1. Carbon-Steel Castings: ASTM A 27/ Grade 65-35, heat treated.

2.3 FABRICATION

- A. Pile Lengths: Pile lengths will be verified by Construction Manager after submitting static pile test reports.
- B. Fabricate and assemble piles in shop to greatest extent possible.
- C. Fabricate full-length piles to eliminate splicing during driving, with ends square.
- D. Fit and weld driving points to tip of pile according to manufacturer's written instructions and AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
- E. Pile-Length Markings: Mark each pile length with horizontal line at 12-inch intervals, and the distance from pile tip at 60-inch intervals.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Conditions: Do not start pile-driving operations until earthwork fills have been completed.

3.2 DRIVING EQUIPMENT

- A. Pile Hammer: Air-, steam-, or diesel-powered type capable of consistently delivering driving energy to pile within range recommended by hammer manufacturer for length and weight of pile and character of subsurface material anticipated.
- B. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap recommended by hammer manufacturer for type of pile.
- C. Leads: Use fixed or rigid-type pile-driver leads that will hold full length of pile firmly in position and in axial alignment with hammer. Extend leads to within 24 inches of elevation at which pile enters ground.

3.3 STATIC PILE TESTS

- A. General: Static pile tests will be used to verify design pile lengths and to confirm design load capacity of piles.
 - 1. Furnish test piles 60 inches longer than production piles.
 - 2. Actual length of piles will be based on results of static pile tests.
- B. Pile Tests: Arrange and perform the following pile tests:
 - 1. Axial Compressive Static Load Test: ASTM D 1143. Test load of 200 kips.

- C. Drive test piles at locations indicated to a tip elevation below final cutoff elevation equal to pile length specified as basis of bid or, to refusal, whichever occurs first. Piles will be considered as driven to refusal when the pile is driven to 60 blows per foot for two consecutive feet using a driving hammer delivering 15,000 ft-lbs of energy per blow.
 - 1. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.
- D. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify Construction Manager at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.
 - 1. Number of Test Piles: One single pile.
- E. Driving Test Piles: Use test piles identical to those required for Project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.
 - 1. Pile Design Load: 100 Kips.
- F. Approval Criteria: Allowable design capacity of test piles shall be one-half of the load that results in the lesser of the following two values:
 - 1. Net settlement, after deducting rebound, of not more than 0.01 inch/ton of test load.
 - 2. Gross settlement of not more than 1 inch, provided that load-settlement curve shows no sign of failure.
- G. Driving Records: Prepare driving records for each test pile, compiled and attested to by a Professional Engineer licensed in the State of Tennessee. Include same data as required for driving records of permanent piles.
- H. Test piles that comply with requirements, including location tolerances, may be used on Project.

3.4 DRIVING PILES

- A. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles. Establish and maintain axial alignment of leads and pile before and during driving.
- B. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.
- C. Driving Tolerances: Drive piles without pile heads exceeding the following tolerances:
 - 1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
 - 2. Plumb: Maintain 1 inch in 10 feet from vertical, or a maximum of 4 inches, measured when pile is above ground in leads.
 - 3. Batter Angle: Maximum 1 inch in 10 feet from required angle, measured when pile is above ground in leads.
- D. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances. Fill holes left by withdrawn piles as directed by Construction Manager.
 - 1. Rejected piles may be abandoned and cut off as directed by Construction Manager.
 - 2. Leave rejected piles in place and install new piles in locations as directed by Construction Manager.

3. Fill holes left by withdrawn piles that will not be filled by new piles using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact in lifts not exceeding 72 inches.
- E. Cutting off: Cut off tops of driven piles square with pile axis and at elevations indicated.
1. Pile Caps: Weld steel plates, of same material as H pile, to top of steel pile square and level.
- F. Driving Record: Maintain accurate driving records for each pile, compiled and attested to by a Professional Engineer licensed in the State of Tennessee. Include the following data:
1. Project name and number.
 2. Name of Contractor.
 3. Pile location in pile group and designation of pile group.
 4. Sequence of driving in pile group.
 5. Pile dimensions.
 6. Ground elevation.
 7. Elevation of tip after driving.
 8. Final tip and cutoff elevations of pile after driving pile group.
 9. Records of redriving.
 10. Type, make, model, and rated energy of hammer.
 11. Weight and stroke of hammer.
 12. Type of pile-driving cap used.
 13. Cushion material and thickness.
 14. Actual stroke and blow rate of hammer.
 15. Pile-driving start and finish time; and total driving time.
 16. Time, pile-tip elevation, and reason for interruptions.
 17. Record of number of blows for each 12 inches of penetration, and number of blows per 1 inch for the last 6 inches of driving.
 18. Pile deviations from location and plumb.
 19. Record of unusual occurrences during pile driving.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing agency to perform field quality-control testing.

3.6 DISPOSAL

- A. Remove withdrawn piles and cutoff sections of piles from site and legally dispose of them off Owner's property.

END OF SECTION 02458