

## SECTION 02457 - STEEL SHEET PILES

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SECTION INCLUDES

- A. Driven steel sheet piling for retaining walls.

#### 1.3 REFERENCE STANDARDS

- A. ASTM A 328/A 328M - Standard Specification for Steel Sheet Piling; 2007.
- B. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2008.

#### 1.4 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Submit drawings for approval of steel sheet piles prior to start of the work or ordering materials. Include details of top protection, special reinforcing tips, tip protection, lagging, splices, fabricated additions to plain piles and driving, cut-off method, and corrosion protection.
  - 1. Show complete dimensions on drawings, including minimum section properties and details of piling and the driving sequence and location of piling.
  - 2. Include details and dimensions of templates and other temporary guide structures for installing the piling.
  - 3. Provide details of the method of handling piling to prevent permanent deflection, distortion or damage to piling interlocks.
- C. Test Reports:
  - 1. Conform to the piling manufacturer's standard test, including the testing of at least two 3 inch long coupons taken randomly from different as-produced pilings of each heat and approved by the Architect/Structural Engineer of Record .
- D. Project Record Documents: Accurately record the following:
  - 1. Sizes, lengths, and locations of piles.
  - 2. Sequence of driving.
  - 3. Number of blows per foot for entire length of piles and measured set for last 10 blows.
  - 4. Identify piles requiring drilling, and hole diameters.
  - 5. Final base and top elevations.
  - 6. Driving force of each hammer blow.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle piling using handling holes or lifting devices.
- B. Support on level blocks or racks spaced not more than 10 feet apart and not more than 2 feet from the ends. Provide supports between multiple lifts in a vertical plane.

## 1.6 QUALITY ASSURANCE

- A. Material Certificates: For each shipment, submit certificates identified with specific lots prior to installing piling. Identification data should include piling type, dimensions, chemical composition, mechanical properties, section properties, heat number, and mill identification mark.
- B. Interlock Tension Test Procedure: Submit the procedure for testing the tension strength of piling interlocks as required herein for approval prior to testing sheet piling.
- C. Pile Driving Equipment: Submit descriptions of pile driving equipment to be employed in the work. Descriptive information includes manufacturer's name, model numbers, capacity, rated energy, hammer details, cushion material, helmet, templates, and jetting equipment.

## PART 2 PRODUCTS

### 2.1 STEEL SHEET PILES

- A. Heavy gage hot-rolled sheet piling conforming to ASTM A 328/A 328M.
- B. Interlocking: Free-sliding interlocks, allowing a swing angle of at least 5 degrees when threaded and maintaining continuous interlocking when installed.
- C. Sheet piling, including special fabricated sections: Provide full-length sections of the dimensions shown.
  - 1. Fabricated sections: Conform to the requirements herein and the piling manufacturer's recommendations for fabricated sections.
  - 2. Provide sheet piling with standard pulling holes.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Pile Hammer: Use a pile hammer having a delivered force or energy suitable for the total weight of the pile and the character of subsurface material to be encountered. Operate hammer at the rates recommended by the manufacturer throughout the entire driving period. Repair damage to piling caused by use of a pile hammer with excess delivered force or energy.
- B. Pile Driving:
  - 1. Maintain piling vertical during driving. Drive piles in such a manner as to prevent damage to the piles and to provide a continuous closure. Where possible, drive Z-pile with the ball end leading. If an open socket is leading, a bolt or similar object placed in the bottom of the interlock will minimize packing material into it and ease driving for the next sheet.

2. Incrementally sequence driving of individual piles such that the tip of any sheet pile is not more than 4 feet below that of any adjacent sheet pile.
- C. Cutting and Splicing:
1. Cut off to the required elevation any piles driven to refusal or to the point where additional penetration cannot be attained and the piles are extending above the required top elevation in excess of the specified tolerance.
  2. Extend by splicing any piles driven below the required top elevation and piles damaged by driving and cut off to permit further driving. Splice as required to reach the top elevation when directed by the Architect/Structural Engineer of Record .
  3. If directed by the Architect/Structural Engineer of Record , splice piles as required to drive them to depths greater than shown on the drawings and extend them up to the required top elevation. Piles adjoining spliced piles shall be full length unless otherwise approved.
    - a. Remove from the site pile cut-offs, which are the property of Contractor.
    - b. Use a straightedge in cutting by burning to avoid abrupt nicks.
    - c. Drill bolt holes or burn and ream by approved methods that will not damage the surrounding metal. Make holes other than bolt holes reasonably smooth and the proper size for rods or other items to be inserted.
    - d. Make holes in piles on the wet side of cofferdams watertight by welding steel plates over the holes after the piling installation is completed.
    - e. Do not use explosives for cutting.
- D. Welding: Comply with requirements of AWS D1.1 for shop and field welding, qualification of welding procedures, welders, and welding operators.
- E. Tolerances in Driving:
1. Drive all piles with a variation from vertical of not more than 1/4 inch per foot.
  2. Place piles so the face will not be more than 6 inches from vertical alignment at any point.
  3. Top of pile at elevation of cut-off shall be within 1/2 inch horizontally and 2 inches vertically of the location indicated.
  4. Manipulation of piles to force them into position will not be permitted. Check all piles for heave. Redrive all heaved piles to the required tip elevation.

### 3.2 FIELD QUALITY CONTROL

- A. Maintain a pile driving record for each sheet pile. Indicate on the installation record installation dates and times, type and size of hammer, rate of operation, total driving time, dimensions of driving helmet and cap used, blows required per foot for each foot of penetration, final driving resistance in blows for final 6 inches, pile locations, tip elevations, ground elevations, cut-off elevations, and any reheading or cutting of piles. Record any unusual pile driving problems during driving. Submit complete records to Architect/Structural Engineer of Record .

- B. Perform continuous inspection during pile driving. Inspect all piles for compliance with tolerance requirements. Bring any unusual problems that may occur to the attention of Architect/Structural Engineer of Record .
- C. Inspection of Driven Piling:
  - 1. Inspect the interlocks of the portion of driven piles that extend above ground. Remove and replace piles found to be out of interlock.
  - 2. Pulling and Redriving: Contractor may be required to pull selected piles after driving to determine the condition of the underground portions of piles. The pile pulling method must be approved by Architect/Structural Engineer of Record . Remove and replace at Contractor's expense any pile pulled and found to be damaged to the extent that its usefulness in the structure is impaired. Redrive piles pulled and found to be in satisfactory condition.

END OF SECTION