

## **SECTION 31 62 16 STEEL SHEET PILES**

### **PART 1 GENERAL**

#### **1.01 REFERENCE STANDARDS**

- A. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

#### **1.02 SECTION INCLUDES**

- A. This section covers all members to be used in the construction of steel sheet piles. This specification also covers the installation of steel sheet piling and trimming of the sheet pile to the lines and grades shown on the drawings or as required. This work also includes pre-drilling to facilitate driving sheet pile to the designated elevations.

#### **1.03 RELATED REQUIREMENTS**

- A. Section 31 20 00 - Site Preparation, Excavation and Grading
- B. Section 31 22 00 - Earth Moving Excavation, Filling and Grading
- C. Section 31 23 16 - Trenching
- D. Section 31 30 00 - Earthwork

#### **1.04 REFERENCE STANDARDS**

- A. ACI 318, Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute.
- B. ASTM A36, Standard Specification for Carbon Structural Steel.
- C. ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. ASTM A139, Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4 and Over).
- E. ASTM A252, Standard Specification for Welded and Seamless Steel Pipe Piles.
- F. ASTM A328, Standard Specification for Steel Sheet Piling.
- G. ASTM A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- H. ASTM A1011/A1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- I. AWS D1.1, Structural Welding Code—Steel.

#### **1.05 SUBMITTALS**

- A. Provide qualifications of proposed sheet pile installer.
- B. Contractor shall provide information from the manufacturer that indicates the sheet piling meets or exceeds the Specifications listed in this section.
- C. Contractor shall submit verification from the manufacturer that the hammer can deliver the required energy.
- D. Splice locations, if necessary, shall be reviewed and accepted by Engineer prior to installation.

#### **1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: Sheet piling installer shall have, as a minimum, three (3) successful past installations of sheet piling of comparable overall heights and sections and comparable penetration into soils similar to those found on the project.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. All steel sheet piling shall be new and unspliced material throughout, unless otherwise reviewed and accepted by Engineer.
- B. Steel sheet piles and special fabricated shapes shall be of a design that ensures continuous interlock throughout the entire length when in place.

### **2.02 MATERIALS**

- A. Steel sheet piling shall meet the requirements of ASTM A328, (Grade 50).
- B. Steel corners, tees, wyes, and crosses shall meet the requirements of ASTM A328 or ASTM A690.
- C. Steel sheet piles required for the project shall be the type and weight shown on the drawings. Sheet piling shall be constructed with a weathering finish. Additional length beyond those indicated on the drawings may be required to provide for trimming of tops of sheet piling.
- D. The interlocks between steel sheet pile sections shall be configured such that the average width of the annular space between all contact points of the interlocks shall be a maximum of one-eighth (1/8) inch, as determined by Engineer.
- E. Steel sheet piles and interlocks shall not have excessive kinks, camber or twist that would prevent the pile from reasonably free sliding to grade.
- F. All fabricated connections shall be made with the use of angles or bent plates, as necessary, and shall be adequately welded or connected with high strength bolts as accepted by Engineer.
- G. Handling Holes:
  - 1. If handling holes are provided, they shall be two (2) standard two and nine-sixteenth (2-9/16) inch diameter handling holes located six (6) inches from one end.
  - 2. The holes shall be plugged by welding a piece of steel over the hole prior to installing any riprap, backfill or drop structure cap.
  - 3. The plated hole shall be watertight.

### **2.03 STORAGE AND HANDLING**

- A. Do not subject piles to damage by impact bending stresses in transporting to and storing piles onsite.
- B. Store and handle piles such that corrosion protection coating will not be damaged.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin sheet pile installation until the earthwork in the area where the piles are to be driven has been completed to the extent that the grade elevation is at no more than twelve (12) inches above or below the top of the piling elevation as indicated on the drawings.

### **3.02 PREPARATION**

- A. Any fill along the alignment of the sheet pile must be in place to sub-grade elevations and compacted prior to driving the sheet pile.
- B. Fill material (except riprap, boulders, bedding and grout) is not to be placed around the sheet pile after the sheet pile is in place.

### **3.03 INSTALLATION**

- A. General:
  - 1. All welding or gas cutting shall be in accordance with the current standards of the American Welding Society.
  - 2. Virtual Refusal:
    - a. Steel sheet piling shall be driven to the depths shown on the drawings or to virtual refusal.

- b. Virtual refusal is defined as ten (10) blows per inch with an approved pile hammer.
  - c. A pile hammer shall be used to determine virtual refusal.
  - d. The hammer shall be operating at the manufacturer's recommended stroke and speed when virtual refusal is measured.
- B. Sheet Piling Driving:
- 1. Steel sheet piling shall be assembled before driving and then driven as a continuous wall, progressively in stages to keep the piles aligned correctly and minimize the danger of breaking the interlock between the sheets.
  - 2. Steel sheet piling shall be driven to form a tight bulkhead.
  - 3. A driving head shall be used and any piling which is damaged in driving or which has broken interlocks between sections shall be pulled and replaced at Contractor's expense.
  - 4. The piling shall be driven within the following tolerances:
    - a. Alignment:
      - 1) Sheet pile shall be driven to form a relatively straight line between the termini points shown on the drawings.
      - 2) Horizontal deviation of any point from a straight line connecting the two ends of the wall section shall be a maximum of six (6) inches.
    - b. Plumbness: Each individual sheet pile section shall be driven vertical, within a horizontal tolerance of two percent (2%) of any vertical length measured along the pile.
    - c. Elevation:
      - 1) Tops of sheet pile sections shall be within a tolerance of one (1) inch from plan elevations.
      - 2) Contractor shall not be paid for excess sheet pile trimmed off the end of the pile to meet final grade.
- C. Contractor shall brace and/or provide soil grading as necessary during construction operations in order to provide lateral stability for the sheet pile wall. The sheet pile wall has been designed for the soil grades of the final configuration denoted on the drawings only. Other temporary configurations during the construction period shall not be allowed.
- D. Care shall be taken during driving to keep from causing deformations of the top of the piles, splitting of section, or breaking of the interlock between sections. Care shall also be taken during driving to prevent and correct any tendency of steel sheet piles to twist or get out of plumb.
- E. Steel Z piling shall be driven with the ball-end leading. Proper care and planning shall be used to allow for this construction procedure in both immediate and possible future walls.
- F. Alternate Z piles shall be reversed end for end for proper interlocking in the "normal" position. Piles shall also be aligned properly to maintain a "normal" driving width.
- G. For sheet piles driven into the native soils, pre-drilled soils, or excavated soils a vibratory driver may be used as long as the required depth is obtained.
- H. For sheet piles being driven into bedrock, an approved hammer utilizing a minimum hammer energy of 19,000 foot-pounds per square inch of steel section shall be used to obtain the required depth or virtual refusal. The hammer shall be clearly marked so that it can be identified at the job site.
- I. Steel sheet pile that is full length as shown on the drawings and is required to be driven below the specified cutoff elevation shall be spliced with additional steel sheet piling with a full penetration butt weld.

**END OF SECTION 31 62 16**