

230 STEEL SHEET PILE

230.1 The Work

The works in this section shall consist of furnishing all material, labor, tools, equipment, services and incidentals necessary to construct the steel sheet piles including concrete capping, in accordance with the contract documents and this specification.

230.2 Submittals and Approvals

230.2.1 Experience and Personnel

At least two weeks prior to the start of steel sheet pile construction, the Contractor shall submit four copies of a list identifying the on-site supervisors and pile driving equipment operators assigned to the project to the Engineer for approval. The list shall contain a detailed summary of each individual's experience in steel sheet pile operations.

- 1) On-site supervisors shall have a minimum two years' experience in supervising construction of steel sheet piles and difficulty to those shown in the Drawings, and similar geotechnical conditions to those described in the geotechnical report. The work experience shall be direct supervisory responsibility for the on-site steel sheet pile construction operations. Project management level positions indirectly supervising on-site steel sheet pile construction operations shall not be considered to be acceptable for this experience requirement.
- 2) Pile driving equipment operators shall have a minimum one-year experience in construction of steel sheet piles.

The Engineer shall approve or reject the Contractor's qualifications and field personnel within ten working days after receipt of the submission. Work shall not be started on any steel sheet pile until the Contractor's qualifications and field personnel are approved by the Engineer. The Engineer may suspend the steel sheet pile construction if the Contractor substitutes unapproved field personnel without prior approval by the Engineer. The Contractor shall be fully liable for the additional costs resulting from the suspension of work and no adjustments in contract time resulting from such suspension of work shall be allowed.

230.2.2 Sheet Pile Installation Plan

At least four weeks prior to the start of steel sheet pile construction, the Contractor shall submit four copies of a steel sheet pile installation plan narrative for acceptance by the Engineer. This narrative shall provide at a minimum the following information:

- 1) Description of the construction operation sequence of steel sheet pile construction when in groups or lines.
- 2) A list, description and capacities if proposed equipment to be used.

- 3) Details of steel sheet pile driving methods.
- 4) Shop drawings including details of the concrete capping.

230.2.3 Approvals

Work shall not begin until all the required submittals have been accepted in writing by the Engineer. All procedural acceptances given by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work.

230.3 Materials

230.3.1 Steel Sheet Piles

Steel sheet piles shall be ARBED Z sheet pile AZ34 or approved equivalent.

230.3.2 Concrete

Concrete used for capping shall conform to Section 206.2 – Classes of Concrete. Concrete strength shall be 28 MPa with slump of 50mm – 100mm.

230.3.3 Reinforcing Steel

Reinforcing steel for concrete capping shall be Grade 40 and should conform to Section 207 – Steel Reinforcement.

230.4 Construction Requirements

230.4.1 Location and Site Preparation

Piles shall be driven where indicated on the drawings or as directed by the Engineer.

All excavations on which the piles are to be driven shall be completed before the pile driving, unless otherwise specified or approved by the Engineer. After driving is completed. All loose and displaced materials shall be removed from around the piles by hand excavation.

230.4.2 Pile Driving

All piles shall be driven as shown on the drawings or as ordered by the Engineer. They shall be driven within an allowed variation of 20mm per meter of pile length from the vertical or batter as shown on the drawings. The maximum variation at the butt end of the pile shall be 75mm in any direction from the location shown on the drawings or as directed by the Engineer.

All pile driving equipment is subject to the Engineer's approval. The Contractor is responsible for sufficient capacity and efficiency of the driving equipment.

Piles shall be supported in line and position with leads while being driven. Pile driving leads shall be held in position by guys or steel braces to insure rigid lateral support to the pile during driving. Manipulation of piles to force them

into proper position if considered by the Engineer too excessive shall not be permitted.

230.4.3 Splicing

Splicing when permitted shall be made as shown on the drawings and in accordance with this Subsection.

If the length of the steel sheet pile is insufficient, an extension of the same cross-section shall be spliced to it. Unless otherwise shown on the drawings, splices shall be made by butt-welding the entire cross-sections to form an integral pile using the electric arc method. The sections connected shall be properly aligned so that the axis of the pile shall be straight. Bent and/or damaged piles shall be rejected.

230.4.4 Cutting Off and Capping Piles

The top of the steel sheet piles shall be embedded in concrete capping as shown on the drawings.

Cut-offs of steel sheet piles shall be made at right angles to the axis of the pile. The cut shall be made in clear, straight lines and any irregularity due to cutting or burning shall be beveled-off with deposits of weld metal prior to placing of concrete capping.

230.4.5 Defective Piles

Any pile delivered with defects or damaged in driving due to internal defects or improper driving or driven out of location or driven below the elevation fixed by the drawings or by the Engineer, shall be corrected at the Contractor's expense by one of the following methods approved by the Engineer for the pile in question:

1. Any pile delivered with defects shall be replaced by a new pile.
2. Additional pile shall be driven at the location as directed by the Engineer.
3. The pile shall be spliced as provided herein on the underside of the capping to properly embed the pile.

230.5 Measurement and Payment

230.5.1 Measurement

The quantity of steel sheet piles to be paid for shall be the sum of the lengths in linear meters of the sheet piles driven in the completed, approved and accepted work measured from the tip elevation to the bottom of the concrete capping. Measurement will not include additional piles driven that may be necessary to suit the Contractor's method of construction and were driven at his option.

Unless otherwise provided for, pre-boring, jetting or other methods used for facilitating pile driving operations will not be measured directly but will be considered subsidiary to Pay Items.

Concrete and reinforcing steel for capping will not be measured for payment but will be considered subsidiary to Pay Items.

230.5.2 Payment

Steel sheet pile shall be paid by the contract unit price per linear meter. Such payment shall be full compensation for all costs in connection with furnishing, driving, cutting and splicing of steel sheet pile, mixing and placing of concrete, cutting, bending and placing of reinforcing steel, collecting and disposing all excavated and waste materials, and all incidentals necessary to complete the item in accordance with the drawings, the specifications and as directed by the Engineer

Payment shall be made under:

| Pay Item Number | Description | Unit of Measurement |
|-----------------|------------------|---------------------|
| 230 | Steel Sheet Pile | Linear Meter |

- END OF SECTION -