Section 02800 - PIERS

1. SCOPE. This section covers steel and concrete piers and all associated work.

2. GENERAL. Pier locations are shown on the drawings. Pier spacing, center to center, will be as shown on the drawings, but all pier locations may be adjusted by the Engineer due to field conditions.

3. STEEL PIERS. Steel pile piers shall consist of structural steel shapes of the section required on the plans and details. The steel shall conform to "Specifications For Steel For Bridges And Buildings", ASTM A-36. All bolts and nuts shall conform to ASTM A325 for 7/8 inch and to ASTM A-490 for 1 inch and larger.

All specified surfaces shall be coated with Koppers' No. 300M, Amercoat No. 78, Carboline-Carbomastic No. 14 or equal coal tar epoxy. Welding electrodes shall conform to the following:

Shielded Metal-Arc: AWS A5.1 or AWS 5.5, E70X4
Submerged-Arc: AWS A5.17, F70X-EXXX
Gas Metal-Arc: AWS A5.18, E70S-X or E70U-1
Flux Cored-Arc: AWS A5.20, E70T-X (except 2 and 3)

Piers shall be placed parallel to the flow of the creek unless otherwise directed by the Engineer.

3.01. Steel Pile Piers. The work covered by this section consists of furnishing and driving piles, as indicated on the plans, the standard details, and as approved by the Engineer, in conformity with the specifications and to the bearing and penetration required.

3.01.01. Installation. General - The HP8x36 or W8x35 pilings shall be driven to obtain a bearing capacity of 20 tons based on the following formula (the Engineering New Record Pile Driving Equation) and to a minimum depth of 10 feet in undisturbed earth below the bottom of the creek channel or existing ground when not adjacent to the creek.

ENR Formula: $S = (2E/R) - C$

S = penetration per blow (inches)
R = specified bearing capacity (pounds)
E = energy per blow (ft-lbs)
C = 1.0 for drop hammer; 0.1 for air, steam, or diesel hammer

3.01.02. Pile Lengths. Full-length piles shall be used where practicable and not more than 2 pieces (1 splice) of steel pile will be permitted in making up one full-length pile unless approved by the Engineer. Splices, where necessary and approved by the Engineer, shall be made as to maintain the true alignment and position of the pile sections. Both pieces of a spliced pile shall be the same shape (HP8x36 or W8x35).

Splices should develop not less than 100 percent of the bending strength of the pile and not less than 100 percent of the axial load strength of the pile. All welded splices will be of butt weld type with back-up plates welded to the flanges and web of the steel piles. All welding of structural steel in the shop or in the field shall meet the requirements of the AWS Code and be done by qualified welders. Certification of welders and welds will be required by the Engineer in accordance with the AWS Code.

3.01.03. Driving. Steel piles shall be driven with a diesel, steam, drop, or air hammer with a rated energy of not less than 15,000 ft-lbs, fixed leads and a ram weight of one (1) to one and a half (1-1/2) times the pile weight. In case the required penetration is not obtained by the use of a hammer complying with the above minimum requirements, the Contractor shall provide a heavier hammer, at his own expense. The piles shall be driven on a batter of 15 degrees to the vertical or as shown on the plans, and shall not be out of position at the top of the pile by more than three inches in any direction after driving.

3.01.04. Cross Bracing. Cross bracing will be required only when the undisturbed ground level is below the intersection of the cross bracing.

3.01.05. Painting Steel Piers. Unless otherwise directed, all steel in the piers shall have a coal tar epoxy coating consisting of two coats of coal tar epoxy as specified. All surfaces of the steel to one foot below the disturbed ground or to one foot below the cross bracing, whichever is greater, shall receive the coating system and shall be thoroughly sand blasted prior to application to remove rust, dirt, grease, and other foreign material and to provide a clean surface to receive the coating. Each coat of paint shall be approved by the Engineer prior to application of the next coat. The total dry film thickness shall be at least 16 mils. Areas with coatings less than 16 mils shall be recoated as required to provide the specified film thickness.

3.01.06. Testing and Inspection. The Owner will provide inspection and will determine bearing capacity of the driven piles. The Contractor shall submit certification of rated hammer energy acceptable to the Engineer.

The Inspector will be present during all pile driving operations and the Contractor will provide him evidence that the average penetration for the last 10 blows is less than the S calculated by use of the above formula.

Test piles furnished and driven by the Contractor for his use in determining the lengths of piles to be furnished may be so located that they may be cut off and become a part of the completed structure, provided that such test piles conform to the specifications and are approved by the Engineer.

Test piles shall be driven with equipment of the same type and capacity as that used for driving piles for the structure.

Test piles which are not to be incorporated in the completed structure shall be removed to at least 2 feet below the surface of the ground or the stream bed, and the remaining hole backfilled with earth or other suitable material.

The Contractor shall give written notice before beginning construction on the steel piles in order to coordinate this work with the Owner.

4. CONCRETE PIERS. If the required penetration for a pile is not obtained, as determined solely by the Engineer, the Contractor may be directed to construct a reinforced concrete pier. The Contractor will not attempt to drive a second pile at a pier location at which the first pile did not achieve the required penetration unless the Engineer has determined that the first pile will be used.

A pile which will not be incorporated in the completed structure will be removed or cut off so that the top of the pile is below the concrete footing.

End of Section