NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICTION
North Dakota

METAL FABRICATION AND INSTALLATION
(Code 105)

1. SCOPE

The work shall consist of furnishing, fabricating, and erecting metalwork, including the metal parts and fasteners of composite structures. Any materials or construction details contained within the design package supersede those of this construction specification.

2. LOCATION

Metal structures shall be installed at the locations, and in the configurations, as shown on the drawings and staked in the field. Any deviation from the drawings requires approval from NRCS prior to installation.

3. QUALITY CONTROL

Quality Control of all materials and construction procedures is the responsibility of the producer and installer. NRCS will make periodic review(s) of work for the benefit of the agency which will include final construction inspection.

4. MATERIALS

Steel shall be of structural quality unless otherwise specified. Castings shall be thoroughly cleaned and subjected to careful inspection before installation. Finished surfaces shall be smooth and true to assure proper fit.

Structural Steel

Structural steel shall conform to the requirements of ASTM A36.
High-strength low-alloy structural steel shall conform to ASTM A242 or A588.
Carbon steel plates of structural quality to be bent or formed cold shall conform to ASTM A283, Grade C.
Carbon steel sheets of structural quality shall conform to ASTM A1011, Grade 40 or A1008, Grade 40.
Carbon steel strips of structural quality shall conform to ASTM A1011, Grade 36.

Commercial or Merchant Quality Steel

Commercial or merchant quality steel shall conform to the requirements of the applicable ASTM Standards listed below:

ASTM A526 or A 924 Zinc-Coated Carbon Steel Sheets
ASTM A1011 Carbon Steel Sheets
ASTM A1011 Carbon Steel Strips
ASTM A575 Carbon Steel Bars Grade M1015 to Grade M1031

Aluminum Alloy

Aluminum alloy products shall conform to the requirements of the applicable ASTM Specifications listed below. Unless otherwise specified, alloy 6061-T6 shall be used.

ASTM B209 Sheet and Plate
ASTM B210 Drawn Seamless Tubes
ASTM B211 Rolled or Cold-Finished Bars, Rods and Wire
ASTM B221 Extruded Bars, Rods, Shapes and Tube
ASTM B308 Standard Structural Shape
ASTM B429 Extruded Structural Pipe and Tube

Bolts

Steel bolts shall conform to the requirements of ASTM A307. If high-strength bolts are specified they shall conform to the requirements of ASTM A325.

When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of ASTM Specification A153; except that bolts 1/2-inch or less in diameter may be coated with electro-deposited zinc or cadmium coating conforming to the requirements of ASTM B633, Service Condition SC 3, or ASTM B766, unless otherwise specified.

Rivets

Unless otherwise specified, steel rivets shall conform to the requirements of ASTM A31, Grade B. Unless otherwise specified, aluminum alloy rivets shall be Alloy 6061 conforming to the requirements of ASTM B3l6.

Welding Electrodes

Steel welding electrodes shall conform to the requirements of American Welding Society Specification AWS A5.1. "Specification for Mild Steel Covered Arc-Welding Electrodes," except that they shall be uniformly and heavily coated (not washed) and shall be of such a nature that the coating will not chip or peel while being used with the maximum amperage specified by the manufacturer.

Aluminum welding electrodes shall conform to the requirements of American Welding Society Specification AWS A5.10, "Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes."

5. FABRICATION

Fabrication of structural steel shall conform to the requirements of Section l.23 of the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (Riveted, Bolted and Arc-Welded Construction)," American Institute of Steel Construction.

Fabrication of structural aluminum shall conform to the requirements in the Aluminum Design Manual available from the Aluminum Association.

6. ERECTION

The frame of metal structures shall be carried up true and plumb. Temporary bracing shall be placed wherever necessary to resist all loads to which the structure may be subjected, including those applied by the installation and operation of equipment. Such bracing shall be left in place as long as may be necessary for safety.

As erection progresses the work shall be securely bolted up, or welded, to resist all dead loads, wind and erection stresses. The Installer shall furnish such fitting-up bolts, nuts and washers as required.

No riveting or welding shall be done until as much of the structure as will be stiffened thereby has been properly aligned.

Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

All field welding shall be done in conformance to the requirements for shop fabrication, except those that expressly apply to shop conditions only.

7. PROTECTIVE COATINGS

Items specified to be galvanized shall be completely fabricated for field assembly before the application of the zinc coatings. Galvanized items shall not be cut, welded or drilled after the zinc coating is applied.

Unless otherwise specified, items designated to be painted shall be painted with one of the following systems:

Paint System E

All surfaces that will not be submersed or subject to saturated soil conditions shall be treated as follows:

- Brush-Off Blast Cleaning – Surfaces to be coated shall be prepared by removing all visible oil, dirt, dust, loose mill scale, loose rust and loose paint by sand or grit air blasting. Tightly adherent mill scale, rust and paint may remain on the surface. Mill scale, rust and paint are considered highly adherent if they cannot be removed by lifting with a dull putty knife. Oils, grease or other soluble contaminants shall first be removed by solvent cleaning.
- Primer Coat – One coat of primer consisting of a single package moisture cured urethane primer shall be applied. Urethane primer shall have a minimum of 50 percent solids by volume. Primer shall be able to be applied at 2.0 to 3.0 mils DFT in one coat. Color shall be metallic aluminum.
- Final Coat – A minimum of one coat of Acrylic Polyurethane (semi-gloss or gloss) shall be applied. The color shall be as specified on the drawings or Items of Construction Detail. Acrylic Polyurethane shall be lead free. Acrylic Polyurethane shall have a minimum of 58 percent solids by volume for semi-gloss or 74 percent solids for gloss. Acrylic Polyurethane shall be able to be applied at 3.0 to 5.0 mils dry-film-thickness in one coat.

Paint System F

All surfaces that will be immersed or subjected to saturated soil conditions shall be treated as follows:

- All surfaces to be coated shall be prepared by removing all grease and oil using steam cleaning or solvent methods. After degreasing is completed, sand or grit blasting shall be performed to remove all dirt, rust, mill scale or other foreign material or residue. The cleaned, finished surface shall be at least 95 percent free of all visible foreign material or residue.
- Paint – Paint type shall be Coal Tar Epoxy. Coal tar epoxy shall have a minimum of 75 percent solids by volume and conform to the requirements of SSPC Paint Specification No. 16; Type I. Coal tar epoxy shall be able to be applied at 8.0 mils dry film thickness in one coat.
- Paint Application – This system requires the application of two coats at a dry film thickness of 8.0 mils per coat. Total system shall provide a minimum dry film thickness of 16.0 mils.

8. ITEMS OF CONSTRUCTION DETAIL

Items of work to be performed in accordance with this specification and construction details are:

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