DIVISION 5 - METALS

The following section specifies all items fabricated from metal shapes, plates, sheets, rods, bars, or castings, and all other wrought or cast metal items. Fabricated metal items that are detailed in the contract documents but not mentioned specifically herein shall be fabricated in accordance with the applicable requirements of this section.

05010 – METAL MATERIALS

All materials shall be new and undamaged and shall conform to pertinent ASTM or other industry standard specifications including the following:

STEEL

Shapes, Plates, and Bars (including concrete imbedded items other than reinforcing steel)	ASTM A588 or ASTM A242 (weathering)
Structural Tubing	ASTM A847 or ASTM A606, Type 4 (weathering)
Grating	A606, Type 4 (weathering) or AISI 304/316 (stainless steel)
Bolts and Nuts	ASTM F593 and F594, (stainless steel grade 18.8 or 316) or ASTM A325, Type 3 (weathering) and A563, grade C3 or DH3 (weathering)
Flat Washers	ANSI B27.2, of the same material as bolts and nuts
Hinges	Weld-on barrel hinges, steel base metal, “zerk” type grease fittings, hinge pin pivots on ball bearing, 1000 lb/pair capacity (6.75” hinge length, 1.5” dia. barrel) and 3000 lb/pair capacity (7” hinge length, 2.5” dia. barrel)

Bat closures shall be fabricated from high strength (F_y=50,000 psi), self-weathering, low alloy, atmospheric corrosion resistant steel as specified above.

05030 - METAL FINISHES

Specified hereunder are shop-applied coatings. It is the intent of these specifications to use atmospheric corrosion resistant structural steel, grating and appurtenances to the fullest

extent practicable. This section specifies the required shop coatings for metal services where it is not practicable to use a corrosion resistant material.

05031- SHOP COATING

I. Materials

Unless otherwise authorized, shop applied prime coatings shall be:

Zinc-rich Urethane Primer Tnemec "90-97 Tneme-Zinc" or DuPont "Imron 62 ZF", or approved equal[1]

For repair of hot-dip galvanized surfaces and to rustproof welds, field applied coatings shall be:

Cold Galvanizing Compound Z.R.C. Cold Galvanizing Compound, or approved equal.[2]

II. Cleaning

Surfaces shall be dry and of a proper temperature when coated, and free of grease, oil, dirt, dust, grit, rust, loose mill scale, weld flux, slag, weld spatter, or other objectionable substances. Articles to be galvanized shall be pickled before galvanizing. All other ferrous metal surfaces shall be cleaned by high power wire brushing or blasting. Welds shall be scraped, chipped, and brushed as necessary to remove all weld spatter.

III. Galvanizing

All galvanizing shall be done after fabrication by the hot-dip process in conformity with requirements of ASTM A123, A153 and A385.

IV. Steel

Unless otherwise specified, all ungalvanized structural and miscellaneous steel shall be given an anticorrosion prime coat in the shop after fabrication. Steel surfaces shall be prime coated as soon as practicable after cleaning. All painting shall be done in a heated structure if the outside air temperature is below 50 degrees Fahrenheit. Steel shall not be moved or handled until the shop coat is dry and hard.

1 Use of brand names is for the purpose of describing the standard of quality, performance and characteristics desired and is not intended to limit or restrict competition.
2 Use of brand names is for the purpose of describing the standard of quality, performance and characteristics desired and is not intended to limit or restrict competition.

Plates, shapes, and bars of weathering steel shall not be shop or field primed or painted, except as noted.

V. Aluminum

All surfaces of aluminum that will be in contact with concrete, mortar, or dissimilar metals shall be given a heavy coat of coal tar paint.

VI. Other Surfaces

No shop coating will be required for zinc-coated steel, stainless steel, or bronze surfaces.

VII. Film Thickness

The dry film thickness of the shop coating shall be at least 2.5 mils for the zinc-rich urethane primer.

05500 – METAL FABRICATIONS

Structural steel members shall be fabricated in accordance with drawings that are a part of the contract documents. The Contractor shall verify all dimensions prior to fabrication. All bolt holes shall be drilled.

Non-corrosion resistant structural steel members shall be cleaned, prepared, and shop primed, unless otherwise specified. Surfaces to be field welded or in contact with concrete shall not be primed.

05501 - FIELD ERECTION

Structural steel and miscellaneous metals shall be erected in accordance with drawings that are a part of the contract documents.

Structural steel and miscellaneous metal shall be stored on blocking so that no metal touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads. Care shall be taken in handling steel and miscellaneous metals to avoid unsightly gouges and scrapes.

The Contractor shall make adequate provisions for all erection loads and for sufficient temporary bracing to maintain the structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing.

Before assembly, surfaces to be in contact with each other shall be thoroughly cleaned. All parts shall be assembled accurately as shown on the drawings. Light drifting will be

permitted to draw parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills. Enlarging holes by burning is absolutely prohibited.

After erection, all welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete, shall be primed, unless the steel is weathering steel. The primer shall be consistent with the shop prime coat.

Weathering steel shall be kept as clean and free as possible from mud, grease, oil, paint, concrete or mortar splatter, and other foreign substances to minimize on-the-job cleaning. Paint or crayon identification marks shall be made in locations not visible on the finished structure; otherwise, these marks must be removed from the visible surfaces during the final cleaning operation. Objectionable substances on weathering steel, especially on highly visible exterior surfaces and including mill scale on the surfaces visible from the mine opening, shall be removed by solvents, high-speed power brushing, scraping, sand or grit blast cleaning, or other suitable methods. Surfaces of welds shall be given special treatment by scraping and wire brushing as necessary to remove all slag and weld spatter. Tools that produce excessive roughness shall not be used.

Welders certified in accordance with AWS specifications for the intended work shall do all field welding. A copy of certifications shall be furnished to the Project Manager. All welding shall be consistent with the requirements of AWS D1.1, "Structural Welding Code," including adequate edge preparation and preheating and the selection of proper flux (when applicable).

For weathering steel, the use of properly dried, low-hydrogen electrodes and fluxes are specified by the AWS and shall be used. The capping runs of multi-run fillet and butt welds shall have strength, corrosion resistance, and weathered appearance similar to that of the base metal by use of appropriate alloy electrodes for the final two exposed top layers with the weld composition for weathering steel matching the base metal. Conventional electrodes may be used for the body of such welds. Conventional electrodes may also be used for butt welds with a single run each side and for single run fillet welds of up to 5/16-inch leg length.

All joints shall be welded unless otherwise indicated. Weathering steel fabrications shall be welded to eliminate surfaces on which moisture accumulation can occur and joints shall be tight to so that moisture cannot enter between plies of material. All joints in weathering steel, including fillet welds, shall be continuously welded to avoid moisture and corrosion traps such as crevices.

An oxygen meter shall be used to test air before and during field erection and welding of metal fabrications or any other work inside mine openings. The oxygen meter shall be a National Mine Service (NMS) OX231 oxygen meter or equivalent. The oxygen meter shall continuously monitor oxygen levels and have an audible warning. If the oxygen level falls

below 19 percent, all personnel shall withdraw from the working area in the mine until the oxygen content increases to safe levels.

Any remedy for increasing oxygen content of the working area or providing ventilation from the surface shall be determined in consultation with the Project Manager.

05990 – SUBMITTALS

Complete data, detailed drawings, and setting or erection drawings covering all structural and miscellaneous metal items, including bolts and nuts, shall be submitted in accordance with the procedure set forth in Section 01340.

END OF DIVISION 5

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