

**Part 1            General**

**1.1                REFERENCES**

- .1    ASTM International
  - .1    ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2    ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2    CSA International
  - .1    CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2    CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3    CSA S16, Design of Steel Structures.
  - .4    CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .5    CSA W59, Welded Steel Construction (Metal Arc Welding).
- .3    The Master Painters Institute (MPI)
  - .1    Architectural Painting Specification Manual.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit the qualifications of the Contractor, qualifications of operators, shop drawings, mill certificates and welding procedures to the Contractor Administrator for acceptance
- .2    Product Data: Submit shop drawings sealed by an engineer registered in the province of Manitoba clearly indicating materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and accessories for the Contract Administrator's approval at least two (2) weeks prior to fabrication. Indicate field measurements on Shop Drawings.

**1.3                QUALIFICATION**

- .1    Fabricator to be fully approved by the Canadian Welding Bureau, in conformance with CSA Standard W.47.1. Welding to be done by currently licensed welders only.
- .2    Fabricator to be fully certified in conformance with CSA Standard W47.2. All welding to be done in a licensed welding shop. Obtain Contract Administrator's approval to do field welding.

**1.4                QUALITY ASSURANCE**

- .1    Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 GENERAL**

- .1 All materials shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contractor Administrator.
- .2 Material intended for use in the various assemblies shall be new, straight and clean, with well defined profiles.

**2.2 MATERIALS**

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
- .2 Steel pipe: to ASTM A53/A53M seamless, standard weight, galvanized finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Stud Anchors: to ASTM A108, Grade 1020.
- .7 Aluminum: to CAN/CSA S157 and the Aluminum Association 'Specifications for Aluminum Structures'. Aluminum for plates shall be Type 6061-T651. Aluminium plate shall have an approved raised oval or multi-grip pattern.
- .8 Isolating Sleeves
  - .1 "Nylite" – headed sleeve as manufactured by SPAE-Nauru of Kitchener, Ontario, or approved equal in accordance with B7.
- .9 Aluminum welding shall be in accordance with the requirements of CSA W59.2.
- .10 Hot Dipped Galvanized Steel Repair Material
  - .1 Galvalloy and Gal-Viz
- .11 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

- .12 Anchor bolts and fasteners: ASTM A276, Type 316 stainless steel, of ample section to safely withstand the forces created by operation of the equipment or the load to which they will be subjected.
- .13 Quantity and size of the fasteners shall be as recommended by the manufacturer or as shown on the Drawings.
- .14 Provide exposed fastenings of same material, and finish as the metal to which applied unless indicated otherwise.
- .15 Supply all items complete with all anchors and fastenings.

### **2.3 FABRICATION**

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Confirm measurements for all fabrications before fabricating.
- .3 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.
- .4 Where possible, fit and shop assemble work, ready for erection.
- .5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .6 Seal exterior steel fabrications to provide corrosion protection in accordance with CSA S16.
- .7 Remove and grind smooth burrs, filings, sharp protrusions, and projections from metal fabrications to prevent possible injury. Correct any dangerous or potentially harmful installations as directed by Contract Administrator.
- .8 All aluminum surfaces in contact with concrete shall be isolated using alkali-resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.
- .9 Aluminum plate shall have an approved raised oval or multi-grip pattern with edges straight and true, and shall be cut as far as practical to maintain continuity of the pattern at abutting edges.
- .10 Pieces shall be of the sizes indicated on the Drawings and shall not be built up from scrap pieces.
- .11 Angle frames shall be of the same material as cover plates, and cover plates shall be hinged and be supplied with lifting handles, as required.
- .12 Exterior covers shall be supplied with a hasp for a padlock.
- .13 Pipe Bollards
  - .1 Steel pipe: double strong, diameter indicated, hot-dip galvanized.

- .2 Concrete: Type HS or HSb sulphate resistant, minimum 20 MPa.
- .3 Fabricate and install pipe bollards to be removable as indicated on the Drawings. Set pipe sleeve level and plumb into reinforced concrete footing. Fabricate bollard of steel pipe to fit over top of pipe sleeve and secure to pipe sleeve with 12 mm diameter hot dipped galvanized thru-bolt with nut and washers. Cap top of pipe with 6 mm thick welded steel plate.
- .4 Final paint colour as shown on the drawings or as directed by the Contract Administrator, to Section 099123 – Painting.

## **2.4 FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m<sup>2</sup> to CAN/CSA-G164.
- .2 Paint for shop primed ferrous metal surfaces: MPI EXT 5.1D Alkyd G5 (semi gloss) finish, premium grade. Colour Schedule will be provided by the Contract Administrator.
- .3 Zinc primer: zinc rich, ready mix.

## **2.5 ISOLATION COATING**

- .1 Isolate aluminum from following components, by means of bituminous paint:
  - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
  - .2 Concrete, mortar and masonry.
  - .3 Wood.

## **2.6 SHOP PAINTING**

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.
- .4 Touch up surfaces after installation.
- .5 Top coat as per Section 099123 – Painting.

## **2.7 ANGLE LINTELS**

- .1 Steel angles: Galvanized, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.

## **2.8 PIPE RAILINGS**

- .1 Steel pipe: 50 mm nominal outside diameter, formed to shapes and sizes as indicated.
- .2 Galvanize pipe railings after fabrication.

**2.9 ACCESS LADDERS**

- .1 Ladders sizes and shapes as indicated, weld 20 mm diameter rungs to stringers, complete with fixing anchors.
- .2 Galvanized after fabrication.

**2.10 CHANNEL AND HSS ACCESSORIES**

- .1 Fabricate accessories from steel, sizes as indicated.
- .2 Weld channels together to form continuous frame, sizes as indicated.
- .3 HSS to be sealed with 6.35 mm steel plate welded completely at each end and ground smooth.
- .4 Finish: Shop painted to Section 099123 - Painting, colour as shown on drawings or as directed by the Contract Administrator. Touch up as required after installation.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform the Contract Administrator in writing of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Contract Administrator.

**3.2 ERECTION**

- .1 Do steel welding work in accordance with CSA W59 unless specified otherwise.
- .2 Do aluminum welding work in accordance with CSA W59.2 unless specified otherwise.
- .3 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .4 Provide suitable means of anchorage acceptable to the Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .5 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .6 Supply components for work by other trades in accordance with shop drawings and schedule.
- .7 Make field connections with bolts to CSA S16 or weld field connection.

- .8 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .9 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion.
- .10 Repair damaged galvanized surfaces and field welds with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780, Repair of Damaged Hot Dip Galvanizing Coatings. The general procedure shall be to allow a small amount of the repair alloy to flow then spread by brushing briskly with a wire brush. Brushing shall be sufficient to obtain a bright finish. Repeat process three times to ensure a proper thickness is achieved. Temperatures shall be kept below 177°C (350°F) at all times. All heating of structural steelwork shall be done in the presence of the Contract Administrator.
- .11 Install access hatch frames square and level at the locations show on the Drawings. Embed anchors in concrete as shown on the Drawings. Install covers and adjust hardware to proper function.
- .12 Isolate aluminum surfaces in contact with concrete using alkali-resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.
- .13 Install electrochemical isolation gaskets and sleeves to electrically isolate dissimilar metals.

### **3.3 PIPE RAILINGS**

- .1 Install pipe railings as indicated.

### **3.4 ACCESS LADDERS**

- .1 Install access ladders in locations as indicated.
- .2 Erect ladders 450 mm clear of wall on bracket supports or as indicated.

### **3.5 CHANNEL AND HSS ACCESSORIES**

- .1 Install steel channel frames to openings as indicated.

### **3.6 CLEANING**

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### **3.7 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

City of Winnipeg  
Route 90 Underpass Pumping Station  
2016 Upgrades  
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METAL FABRICATIONS  
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**END OF SECTION**