

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- .2 ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .3 ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- .4 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.
- .5 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .6 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .7 ASTM A269, Specification for Seamless and Welded Austenitic Stainless Steel Sanitary Tubing for General Service.
- .8 ASTM A276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- .9 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
- .10 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .11 ASTM C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- .12 ASTM E488/E488M, Standard Test Methods for Strength of Anchors in Concrete Elements.
- .13 ASTM F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- .14 ASTM F1941/F1941M, Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric.

- .15 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.
- .16 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.
- .17 CAN/CSA S16.1-M, Limit States Design of Steel Structures.
- .18 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.
- .19 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .20 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.
- .21 CSA W59-M, Welded Steel Construction (Metal Arc Welding).
- .22 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.
- .23 CGSB 85-GP-16M, Painting Galvanized Steel.
- .24 NAAMM, The National Association of Architectural Metal Manufacturers.
- .25 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

### 1.3 **DESIGN REQUIREMENTS**

- .1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

### 1.4 **SUBMITTALS**

- .1 Shop drawings:
  - .1 Submit shop drawings for fabrication and erection of miscellaneous and metal items in accordance with Section 01 10 10 indicating:
    - .1 Materials, core thicknesses, class of finish (AMP 555), connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .2 Samples:
  - .1 Submit samples in accordance with Section 01 10 10 of the following:
    - .1 Two 300 x 300 mm samples of perforated metal for the Consultant's approval of material, perforations and finish.
    - .2 Each gate hardware item for Consultant's review.

1.5 **QUALITY ASSURANCE**

- .1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope, to perform the following services as part of the work of this Section:
  - .1 Design steel stairs, handrails and railings and metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.
  - .2 Review, stamp, date and sign shop drawings.
- .2 Workmanship: Fabricate work of this Section to meet the required class of workmanship indicated below in accordance with NAAMM's AMP 555, Section 8.
  - .1 Class 1: for use on direct exposed to view fabricated items:
    - .1 Exposed surfaces are finished smooth without pits, mill marks, nicks, burrs, sharp edges, and scratches filled or ground off. Defects should not show when painted, polished, or finished.
    - .2 Welds should be concealed where possible. Exposed welds are ground to small radius with uniform sized cove unless otherwise noted.
    - .3 Distortions should not be visible to the eye.
    - .4 Exposed joints are fitted to a hairline finish.
- .3 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.
- .4 Perform stainless steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.
- .5 Mock-ups: Refer to Section 01 43 00 for additional information regarding mock-ups pertaining to this Section.

2 Products

2.1 **MATERIALS**

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, primers and paints are to have low VOC content limits.
  - .2 Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.
  - .3 Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of work of this Section.
  - .4 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.

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- .2 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.
  - .3 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.
  - .4 Stainless steel materials:
    - .1 Stainless steel sheet and plate: ASTM A480/A480M, Type 304, finish to AISI No. 4. Size as shown.
    - .2 Stainless steel tubing: ASTM A269, Type 304, to AISI No. 4 finish. Size as shown.
    - .3 Stainless steel shapes: ASTM A276, Type 304, finish to AISI No. 4 or X-L Blend S as indicated. Sizes and shapes as shown.
  - .5 Bollards (protection posts): ASTM A53/A53-M, Schedule 40 standard weight steel pipe in quantity and sizes shown.
  - .6 Perforated metal panels:
    - .1 Minimum 14 ga. perforated metal panels with 5 mm (3/16") diameter x 6 mm (1/4") staggered pattern, having clear powder coat finish as specified herein. Panels sized at 1200 x 2400 mm (4'-0" x 8'-0").
    - .2 Panels as manufactured by Ferrier Wire Goods Company or approved alternatives by Accurate Perforating, McNichols Co. or approved alternative manufacturer.
  - .7 Stainless steel mesh fabric:
    - .1 Type 316 stainless steel hand-woven interlocking mesh fabric, with an opening size of 50 x 50 mm and with a cable diameter of 1.5 mm, complete with accessories and fastenings as required for complete installation. For use at gates and fencing as required.
    - .2 Wire mesh materials, 'Nett'Em' Hand-Woven Stainless Steel Containment Mesh' by A Thru Z Consulting & Distributing, Inc. or approved alternative.
  - .8 Welding materials: CSA W48 and CSA W59-M.
  - .9 Fasteners:
    - .1 Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls and typical applications. Select fasteners for type, grade, and class required.
    - .2 Steel bolts and nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A653/A653M; and, where indicated, flat washers.
    - .3 Anchor bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A653/A653M; and, where indicated, flat washers. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

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- .4 Supply bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.
  
  - .10 Powder coatings:
    - .1 Powder coating (clear): Clear polyester powder coat finish as manufactured by Tiger Drylac or approved alternative in finish as selected by the Consultant. Powder coat finish to suit perforated metal balustrade applications.
    - .2 Powder coating (coloured): Epoxy polyester coating conforming to AAMA 2605 with satin finish and in black colour. 'Interpon D3000 Series' by Akzo Nobel Powder Coatings Ltd. or 'Corafon' by PPG Industries.
  
  - .11 Primer paint:
    - .1 Interior metal fabrications: CPMA 1.73a and in accordance with Section 09 91 00.
    - .2 Exterior metal fabrications: In accordance with Section 09 97 13 for exterior steel coating system.
  
  - .12 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.
  
  - .13 End sleeves: Galvanized steel sleeves for installation within concrete.
  
  - .14 Cast-in safety tread inserts: Nosing base to be type 6063-T5 extruded aluminum; epoxy/abrasive filler to have minimum 60% aluminum oxide content with two abrasive strips; 'Supergrit Type 610' by Wooster Products Inc. or approved alternative. Colour to be black.
  
  - .15 Anchors:
    - .1 Anchors, general: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M.
    - .2 Drilled inserts: "HSL-3" by Hilti Inc. or "Dynabolt Sleeve Anchors" by ITW Construction Products, heavy-duty anchors, sizes as shown.
    - .3 Adhesive anchor system: 'HIT HY 200 Injectable Mortar with Hilti HAS Stainless Steel Anchor Rod System' by Hilti Ltd. or approved alternative by ITW Construction Products, complete with all components required for a complete installation.
  
  - .16 Non-shrink, nonmetallic grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
  
  - .17 Adhesive: Low VOC, heavy duty adhesive, suitable for adhering steel plate to aluminum framing system. Type as recommended by metal fabricator to suit condition.

- .18 Gate hardware: Corrosion resistant, stainless steel, heavy duty gate hardware, including but not limited to gate hinges, padlock hasps, cane bolts, stops, and handles, as required for the complete and secure installation of gates.

## 2.2 FABRICATION

- .1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.
- .2 Fit and assemble work in shop where possible. Execute work in accordance with details and reviewed shop drawings.
- .3 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal work. Use welded connections for exterior metal work unless otherwise found acceptable by the Consultant.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1-M.
- .5 Execute shop welding to requirements specified.
- .6 Carefully make and fit details. Take special care with exposed finished work to produce a neat and correct appearance to the Consultant's acceptance.
- .7 Assemble members without twists or open joints.
- .8 Correctly size holes for connecting work of other trades where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.
- .9 Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.

## 2.3 FABRICATED ITEMS

- .1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.
- .2 Where work is required to be built into work of other Sections supply such members to respective Sections.

- .3 Provide miscellaneous and metal fabrications indicated on the drawings, listed below, and not indicated to be supplied under other Sections. Provide miscellaneous and metal fabrications including but not limited to the following:
- .4 Metal pan stairs:
  - .1 Fabricate steel channel stringer of size, construction and attachment to structure as shown. Close exposed ends of stringers with 3 mm thick steel closure plates welded to edges of exposed flange edges.
  - .2 Furnish treads, risers and landing permanent metal forms of steel sheet formed as shown; treads to be concrete filled in accordance with Division 3, with bare metal riser incorporating 19 mm dust cove. Fabricate landings for concrete fill of same material as stair treads, unless ribbed metal deck form is shown.
  - .3 Support treads, risers and landings as detailed on reviewed shop drawings.
  - .4 Provide specified non-slip tread inserts in metal concrete pan treads.
- .5 Handrails, guardrails, and posts:
  - .1 Provide interior and exterior handrails and guardrails as shown on Contract Drawings.
  - .2 Design railings to withstand minimum horizontal and vertical loads as required to meet requirements of authorities having jurisdiction. In no instance shall load design of railings be less than 3.0 kN/m horizontally and 1.5 kN/m vertically.
  - .3 Close open ends of steel handrails with 1.9 mm thick closure neatly welded. Fabricate railings, handrails, and guardrails as shown on drawings.
  - .4 Handrail bracket: Fabricate as shown. After fabrication, galvanized bracket in accordance with ASTM A123.
  - .5 Finishes:
    - .1 Interior railings: Field painted finish in accordance with Section 09 91 00.
    - .2 Exterior railings: Stainless steel.
6. Perforated metal stair guard:
  - .1 Design guards to withstand minimum horizontal and vertical loads as required to meet requirements of authorities having jurisdiction. In no instance shall load design of guards be less than 3.0 kN/m horizontally and 1.5 kN/m vertically.
  - .2 Fabricate perforated metal guard in accordance with reviewed shop drawings with 13 mm metal angle frame welded to support posts.
  - .3 Install perforated panels in metal frame secured to framing.
  - .4 Ensure panels are installed straight, smooth, plumb and free of wrinkles, buckles and defects in appearance.
- .7 Lintels: Fabricated from CAN/CSA-G40.20/G40.21-M, Grade 350W, size and location as shown, width to be not less than 25 mm less than width of wall and extend 200 mm beyond opening at each end. Unless otherwise shown, fabricate lintels in block walls of steel sections.

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- .8 Masonry lateral support angles:
    - .1 Supply only, to Section 04 22 00 for installation, all horizontal lateral support anchors at top of non-load-bearing masonry walls.
    - .2 Refer to Structural Drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.
    - .3 Galvanized for all exterior wall and unheated and high humidity locations.
  
  - .9 Hoist beams and divider beams: Structural steel sections, sizes indicated on drawings, Finish: Prime painted.
  
  - .10 Steel ladders:
    - .1 Fabricate complete with steel stiffeners, rungs, angle rails, bent plate straps or angle brackets as shown.
    - .2 Ladders in elevator pits shall extend 1220 mm high above finished floor.
    - .3 Provide safety cages around ladders where indicated on Drawings, in accordance with Ministry of Labour requirements.
  
  - .11 Bollards (protection posts):
    - .1 Provide bollards as indicated on drawings. Posts to be 250 mm diameter with a wall thickness of 8 mm. Place posts into a 1500 mm foundation, fill with 20 Mpa concrete and round top. Project pipes 1500 mm above finished grade. Finish prime coat.
    - .2 Finish: Provide paint finish in accordance with Section 09 91 00, colour to be selected by Consultant.
  
  - .12 Millwork and vanity counter supports:
    - .1 Provide supports for millwork and vanity counters. Construct supports of 38 mm x 38 mm x 6 mm steel angles. Where indicated, conceal supports within cavity of drywall partition.
    - .2 Provide all drill holes required for concealed anchorage of counters and for anchoring to building structure.
  
  - .13 Roof screen supports:
    - .1 Provide galvanized steel HSS supports as required for support of roof screens.
    - .2 Design supports as required to support screen assemblies and to withstand live, dead, lateral, wind, seismic, handling, transportation, and erection loads, imposed and other loads.
    - .3 Coordinate with Section 08 44 00 as required for sizing and installation of supports for roof screens.
    - .4 Finish: Galvanized with field painted finish in accordance with Section 09 91 00.

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- .14 Support angles:
    - .1 Provide support angles for acoustic wood wall slat system provided under Section 09 54 26. Coordinate with noted Section as required for sizing and installation of angles with wood wall system.
    - .2 Fabricate support angles true, free of marks, with edges straight and true and without visible distortion. Surfaces to be free from warp, twist, kinks, dents, buckle or other imperfections which may affect appearance or serviceability.
    - .3 Finish and colour: Powder coat finish, in black colour.
  
  - .15 Miscellaneous steel brackets, supports, angles and plates:
    - .1 Supply and install or supply for installation by trades responsible, all loose steel brackets, supports, angles and plates where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.
    - .2 Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior installation.
  
  - .16 Bench supports:
    - .1 Supply only, for installation under work of Section 06 20 00, bench supports constructed of steel plates of sizes noted. Provide supports at maximum 609 mm centres and not less than 152 mm from ends of bench run.
    - .2 Construct supports as detailed. Provide all drill holes required for concealed anchorage of wood bench and for anchoring to building structure.
  
  - .17 Stainless steel mesh gates and fencing:
    - .1 Fabricate stainless steel mesh gates and fencing in accordance with reviewed shop drawings, including complete hardware as required for gate operation.
    - .2 Erect gates and fencing plumb, level, straight, rigidly supported, and securely fastened to abutting surfaces, free from superimposed loads.
    - .3 Ensure mesh panels are installed straight, smooth, plumb and free of wrinkles, buckles and defects in appearance.
    - .4 Adjust gate hardware for smooth and efficient operation.
  
  - .18 Stainless steel corner guards (CG-1, custom for back of house areas):
    - .1 3 mm thick, stainless steel corner with 50 x 50 mm wings, 1200 mm high, complete with adjustable anchors welded to back at maximum 400 mm centres for either casting into concrete or building into masonry work.
    - .2 Ensure anchors align with horizontal joints in masonry walls.
    - .3 Polish smooth all exposed edges and ends.
  
  - .19 Galvanized steel plate:
    - .1 Provide minimum 6 mm thick galvanized steel plate material for adhering to aluminum framing provided under Section 08 44 00, in otter habitat location as shown on Contract Drawings.
    - .2 Fabricate plate material true, free of marks, with edges straight and true and without visible distortion under all design conditions. Surfaces to be free from warp, twist, kinks, dents, buckle or other imperfections which may affect appearance or serviceability.

- .3 Grind smooth and flush without leaving blemishes on exposed surfaces.
- .4 Adhere plates to framing system, ensuring an installation that is secure, straight and free of defects in appearance.
- .5 Powder coat finish: Powder coat finish and colour as specified herein.

#### 2.4 STAINLESS STEEL WORK

- .1 Take all necessary precautions to safeguard against latent surface discolouration due to disturbance of the natural protective oxide coating of the material or to contamination from other sources.
- .2 Workmanship shall be the best standard practice for this type of work. Execute stainless steel work in accordance with the applicable instructions set forth in Atlas Stainless Steels' "Technical Data" handbook on stainless steel.
- .3 Do all stainless steel fabrication in clean shops, located away from areas where carbon steel is burnt, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded into the stainless steel, and as follows:
  - .1 In fabrication of stainless steel do not use tools and dies which have been used on carbon steels.
  - .2 Ensure tools and dies use for forming and cutting stainless steel are free of nicks and other damage.
  - .3 Do not use carbon grits and grinding wheels which will imbed foreign particles into stainless steel surfaces. Use only stainless steel wool when wool polishing is required.
  - .4 Stainless steel items, on which rust stains appear, shall be replaced with new fabricated material.

#### 2.5 ANCHORS AND FASTENING

- .1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.
- .2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete
- .3 Do not secure items to steel deck.
- .4 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

2.6           **WELDING**

- .1       Perform welding by electric arc process.
- .2       Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
  - .1       CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.
  - .2       CSA W59-M and CSA W59S1-M for design of connections and workmanship.
  - .3       CAN/CSA W117.2-M - for safety.
- .3       Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.
- .4       Test welds for conformance and remove work not meeting specified standards and replace to Consultant's acceptance.

2.7           **SHOP PAINTING**

- .1       Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- .2       Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
- .3       Shop prime galvanized steel in accordance with CGSB 85-GP-16M.
- .4       Clean but do not paint surfaces being welded in field.
- .5       Do not paint surfaces embedded in concrete, but clean as if they were to be primed.
- .6       Do not prime steel to be fireproofed or to receive intumescent paint coating.
- .7       Do not prime machine finished surfaces, but apply an effective anti-rust compound.
- .8       Take precautions to avoid damage to adjacent surfaces.

2.8           **POWDER COAT FINISH**

- .1       Prepare intended steel materials as required and as recommended by coating manufacturer.
- .2       Shop apply electrostatic coating in strict accordance with manufacturer's printed instructions.

- .3 Ensure application of each coat into all corners, pinholes and other difficult areas and ensure full coverage to all surfaces.
- .4 Ensure a smooth finish, free of laps, sags, runs, pin holes, crawls and skips. Back lap all edges to achieve full coverage.

### 2.9 HOT DIP GALVANIZING

- .1 After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.
- .2 Hot-dip galvanize members in accordance with requirements of the following ASTM, with minimum coating weights or thicknesses as follows:
  - .1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m<sup>2</sup> for 6 mm and heavier members 640 g/m<sup>2</sup>.
  - .2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153, Table 1 for the various classes of materials used in the Work.

### 3 Execution

#### 3.1 EXAMINATION

- .1 Examine previously installed work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of work of this Section is deemed to signify acceptance of existing, prior conditions.
- .2 Obtain Consultant's written approval prior to field cutting or altering of structural members.

#### 3.2 ERECTION

- .1 Install metal fabrications in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.
- .3 Perform drilling of concrete and steel as required to fasten work of this Section.

- .4 Erect rails and handrails in true vertical and horizontal planes, rigid, and free from whip.
- .5 Continuously weld connections for railings, and anchor directly to steel stringers.

**3.3 TOUCH UPS**

- .1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION