

Part 1 General

1.1 RELATED WORK

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 ACI 355.4-19, Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary.
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A53/A53M-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - .2 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .4 ASTM A500/A500M-20, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - .5 ASTM A572/A572M-18, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - .6 ASTM A780/A780M-20, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - .7 ASTM A992/A992M-20, Standard Specification for Structural Steel Shapes.
 - .8 ASTM F3125/F3125M-19e2, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
- .3 Canadian Standards Association (CSA)
 - .1 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA S16:19, Design of Steel Structures.
 - .3 CSA W47.1:19, Certification of Companies for Fusion Welding of Steel.
 - .4 CSA W48-18, Filler Metals and Allied Metals for Metal Arc Welding.
 - .5 CSA W55.3-08 (R2018), Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .6 CSA W59-18, Welded Steel Construction.

- .4 International Code Council (ICC)
 - .1 ICC-ES AC308 (June 2019), Post-Installed Adhesive Anchors in Concrete Elements.
- .5 National Association of Architectural Metal Manufacturers (NAAMM)
 - .1 AMP 510-92, Metal Stair Manual, Fifth Edition.
- .6 NB Occupational Health and Safety Act.

1.3 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design metal stairs, landing and handrail construction and connections to NBC vertical and horizontal live load requirements, and NB Health and Safety Regulation 91-191.
 - .2 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

1.4 SOURCE QUALITY CONTROL

- .1 If requested by the Departmental Representative, submit copies of mill test reports showing chemical and physical properties and other details of steel to be incorporated into work at least 4 weeks prior to fabrication. Such mill test reports shall be certified by qualified metallurgists confirming that tests conform to requirements of CSA G40.20 and CSA G40.21.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .3 The Contractor is to provide written documentation from the Canadian Welding Bureau certifying that the steel subcontractor is qualified to requirements of CSA W47.1, Division 1 or 2.1.

1.5 DESIGN OF CONNECTIONS

- .1 Except where shown differently on the drawings, or as otherwise indicated, design details and connections in accordance with the requirements of CSA S16 to resist forces, moments, shears and allow for movements indicated.
- .2 Shop connections shall be 19 mm diameter high tensile bolts conforming to ASTM F3125 or welds.
- .3 Field connections shall be 19 mm diameter high tensile bolts conforming to ASTM F3125 unless otherwise shown on the drawings. Field welded connections can be used only when approved by the Departmental Representative for each case.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 On shop fabrication drawings, indicate materials, core thicknesses, finishes, member lengths, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and accessories.
- .3 On erection drawings, indicate all details and information necessary for assembly and erection purposes such as, description of methods, sequence of erection, type of equipment proposed for use in erection, and temporary bracings.

- .4 It is the responsibility of the contractor to field confirm the exact locations and construction of the work to which work under this section connects to, or is supported on, or is required to reinforce. This is to include all areas of existing structure where reinforcing of structural members is required.
- .5 Each drawing submission shall bear signature and stamp of qualified Professional Engineer registered or licensed to practice in the Province of Nova Scotia, for all assemblies, components, details and connections not shown on the drawings.
- .6 Review of shop details and erection diagrams will extend to general design concept only. This review does not relieve the Contractor of the responsibility for accuracy of the detail dimensions, general fit-up of parts to be assembled, adequacy of connection details, or for errors or defects contained in the details.

1.7 ALTERNATIVE MATERIALS

- .1 Acceptable Materials: where materials are specified by trade name refer to the Instruction to Tenderers for procedure to be followed in applying for approval of alternatives.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

Part 2 Products

2.1 MATERIALS

- .1 Structural steel: to CSA G40.20/G40.21 Grade 350W, Class C or ASTM A500, Grade C for HSS, to CSA G40.20/G40.21, Grade 350W, ASTM A992 or ASTM A572 Grade 50 for W sections and CSA G40.20/G40.21 Grade 350W for angles, plates and channels.
- .2 Pipe: Pipe for rails of stair and landing guards to be to ASTM A53, Grade 240, standard weight, (SCH. 40).
- .3 Stainless Steel Sections and Plates: CAN/CSA-G40.20, Grade 350W, stainless steel AISI No. 4 finish.
- .4 Stainless steel tubing: to ASTM A269, Type 304 commercial grade seamless welded with AISI No. 4 finish.
- .5 Grating for stair landing to be welded steel grating to NAAMM Standards with 32 mm by 4.8 mm thick bearing bars at 30 mm centres. To be serrated for stair landing only. Hot-dipped galvanized.
 - .1 Bearing bars to span short direction of landing and trench and as indicated.
 - .2 Grating on landing to be fastened to edge support framing with saddle clips and c-clamps with 8 mm diameter bolts.
 - .3 Grating over trenches shall be 915 mm nominal width and removable.
- .6 Stair treads to be of size indicated, consisting of welded steel serrated grating with checker plate nosing. Construct to NAAMM Standards with 32 mm deep x 4.8 mm thick bearing bars. Treads to be complete with standard end plates. Treads to be fastened to channel stringers by bolting.

- .7 Anchor rods: to CSA G40.20/G40.21, Grade 300W.
- .8 Bolts, nuts and washers: to ASTM F3125, Grade A325, Type 1. Galvanized where indicated.
- .9 Anchorage adhesive:
 - .1 In concrete: to be injectable, two-component, fast-cure hybrid adhesive that has been tested in accordance with ACI 355.4 and ICC-ES AC308 for use in cracked and uncracked concrete.
- .10 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
- .11 Electrodes shall conform to the requirements of CSA W48.
- .12 Hot-dip galvanizing:
 - .1 Where indicated, galvanize steel after fabrication by the hot-dip process in accordance with ASTM A123/A123M, minimum zinc coating of 610 g/m².
 - .2 Where indicated, galvanize bolts, nuts, washers and threaded rods in accordance with ASTM A153/A153M.
- .13 Substitutions for steel sections or materials shown on the drawings are not to be made unless specifically approved in writing by the Departmental Representative.
- .14 Field Galvanizing Touch-up/Repair:
 - .1 Repair welds and areas damaged by one of the approved methods in accordance with ASTM A780/A780M and ASTM A123/A123M.
- .15 Monorail crane system:
 - .1 System to consist of two hoists and trolleys.
 - .2 1500 kg capacity each.
 - .3 CMAA Crane Service Class 'C'.
 - .4 Trolley to be of a push-pull type.
 - .5 Hoist to be equipped with mechanical overload device to prevent lifting over capacity.
 - .6 Hoist to be equipped with 4.30 m of available lift.
 - .7 Chain to be stainless steel.
 - .8 Crane supplier responsible for commissioning, testing, and certification as per New Brunswick safety regulations.

2.2 FABRICATION - GENERAL

- .1 Fabricate steel fabricated items, as indicated, in accordance with CSA S16 and in accordance with reviewed shop drawings.
- .2 Minimum fillet weld size shall be 5 mm.
- .3 Fit and shop assemble items in largest practical sections, for delivery to site.
- .4 Fabricate items with joints tightly fitted and secured.
- .5 Continuously seal joined members by continuous welds.

- .6 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- .7 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- .8 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATION TOLERANCES

- .1 Squareness: 3 mm maximum different in diagonal measurements.
- .2 Maximum Offset Between Faces: 1.5 mm.
- .3 Maximum Misalignment of Adjacent Members: 1.5 mm.
- .4 Maximum Bow: 3 mm in 1.2 m.
- .5 Maximum Deviation From Plane: 1.5 mm in 1.2 m.

2.4 FINISHES - STEEL

- .1 Shop Prime: Prepare surfaces to be primed in accordance with SPCC SP 2. Do not prime surfaces in direct contact with concrete or where field welding is required. Prime paint items with one coat.
- .2 Galvanized Finish: Galvanize after fabrication to ASTM A123/A123M. Provide minimum 610 g/m² galvanized coating.
- .3 Stainless Steel Finish:
 - .1 Stainless steel No. 4 brush finish.
 - .2 Smooth all welds and corners. Rub finish to product match to AISI No. 4 finish.
- .4 Perform finish painting in accordance with Section 09 91 23.

2.5 METAL STAIR ASSEMBLY AND LANDINGS

- .1 Detail and fabricate stairs to the National Association of Architectural Metal Manufacturers, (NAAMM), Metal Stair Manual, Fifth Edition (1992).
- .2 Materials, connection design, fabrication, erection and workmanship shall be to CSA S16.
- .3 Fabricate stairs with open riser, steel grating tread construction.
- .4 Grind or file exposed welds and steel sections smooth.
- .5 Shop fabricate stairs in sections as large and complete as practicable.
- .6 Close ends of stringers where exposed.
- .7 Finished product to be square. Maximum allowable difference on diagonal grating panel dimensions to be 3 mm.
- .8 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.

- .9 All stair and landing steel components and fasteners to be hot-dip galvanized after fabrication, (minimum zinc protection to be 610 g/m²).

2.6 HANDRAIL

- .1 Construct handrails from steel pipe and HSS sections as indicated.
- .2 Steel pipe: diameter as shown, formed to shapes and sized as indicated.
- .3 Fabricate pipe handrail for stairs and landing using pipe to ASTM A53. Size and weight to be as indicated on drawings. Fabricate handrail to NAAMM Standards. Joint quality to be to NOMMA – Type 2. Galvanize assembly to ASTM A123/A123M (minimum 610 g/m²). Touch up all scratched and damaged galvanized steel.
- .4 Provide adequate drainage at low points of all rails. Indicate drain hole locations on shop drawings for review by Departmental Representative.

Part 3 EXECUTION

3.1 GENERAL

- .1 Do structural steel work in accordance with CSA S16.
- .2 Do welding in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrication installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative 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 Departmental Representative.

3.3 ERECTION

- .1 Erect steel components as indicated and in accordance with CAN/CSA-S16 and reviewed erection drawings.
- .2 The steel erector shall design and provide temporary bracing wherever necessary to withstand all loads which the structure may be subject to during construction. Temporary bracing shall remain in place as long as required for safety.
- .3 Do welding work in accordance with CSA W59 unless specified otherwise.

- .4 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .5 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .6 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .7 Supply components for work by other trades in accordance with shop drawings and schedule.
- .8 Make field connections with bolts to CSA S16 or weld field connection.
- .9 Deliver items over for casting into concrete and building into masonry together with settling templates to appropriate location and construction personnel.
- .10 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of.
- .11 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.4 ERECTION TOLERANCES

- .1 Maximum Variation From Plumb: 6 mm per storey, non-cumulative.
- .2 Maximum Offset From True Alignment: 6 mm.
- .3 Maximum Out-of-Position: 6 mm.

3.5 INSPECTION

- .1 Examine the work of other sections upon which the work of this section depends and report any discrepancies to the Departmental Representative.
- .2 Verify that surfaces and conditions are ready to accept the work of this section.
- .3 Beginning of installation means acceptance of existing conditions.

3.6 PRODUCT DELIVERY STORAGE AND HANDLING

- .1 Exercise care in storing, handling, and erecting material and support materials properly at all times so that no piece will be bent, twisted, or otherwise damaged structurally or visually.

3.7 ANCHOR RODS

- .1 Drilled-in adhesive anchors to be supplied and installed under this section.

3.8 ERECTION

3.9 INSTALLATION OF STAIRS AND LANDINGS

- .1 Install in accordance with NAAMM, Metal Stair Manual.
- .2 Install plumb and true in exact locations. Provide anchor bolt, bolts and shim plates as required for connecting stair assembly to foundation supports.

3.10 FIELD TOUCH-UP

- .1 Repair areas damaged by one of the approved methods in accordance with ASTM A780/A780M and ASTM A123/A123M.

3.11 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

3.12 PROTECTION

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

END OF SECTION