1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 51 00 – Metal Railings.

.2 Section 06 10 00 – Rough Carpentry.

.3 Section 06 17 53 – Prefabricated Wood Trusses.

.4 Section 06 18 00 – Glue Laminated Construction.

.5 Section 07 31 29 – Wood Shingles and Shakes.

.6 Section 07 42 29 – Ceramic Walls Panels.

.7 Section 07 42 43 – Composite Wall Panels.

.8 Section 07 52 00 – Modified Bituminous Membrane Roofing.

.9 Section 07 61 00 – Sheet Metal Roofing.

.10 Section 08 35 16 – Side Folding Grilles.

.11 Section 09 21 16 – Gypsum Board Assemblies.

1.02 REFERENCES

.1 American Association of State and Highway Transportation Officials (AASHTO)
- .1 AASHTO M 300-03(2017), Standard Specification for Inorganic Zinc-Rich Primer.

.2 ASTM International
- .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A123/A123M-15, 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 A269/A269M-15a Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .5 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.6 ASTM F3125/F3125M-15A, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.3 Canada Green Building Council (CaGBC)
.1 LEED® Canada 2009 Rating System, LEED® Canada for New Construction and Major Renovations.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.40-97, Anticorrosive Structural Steel Alkyd Primer.

.5 CSA Group (CSA)
.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).
.2 CSA S16-14, Design of Steel Structures.
.3 CSA W47.1-09 (R2014), Certification of companies for fusion welding of steel.
.4 CSA W48-14, Filler metals and allied materials for metal arc welding.
.5 CSA W55.3-08 (R2013), Certification of companies for resistance welding of steel and aluminum.
.6 CSA W59-13, Welded Steel Construction (Metal Arc Welding), Includes Update No. 1 (2014), Update No. 3 (2015), Update No. 4 (2015).

.6 Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual – September 2012.

.7 National Association of Architectural Metal Manufactures (NAAMM)
.1 NAAMM AMP 555-92, Code of Standard Practice for the Architectural Metal Industry

.8 National Ornamental & Miscellaneous Metals Association (NOMMA)
.1 NOMMA Guideline 1: Joint Finishes, 1994.

1.03 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing and bolts, and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
    .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:
  .1 Submit drawings prepared and stamped by professional engineer licensed to practice in the Province of Prince Edward Island, and indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.4 LEED Submittals: Submit in accordance with Section 01 35 21 - LEED Requirements:
  .1 Submit LEED submittal forms for Credit MR 4 – Recycled Content in accordance with Section 01 35 21 – LEED Requirements. Indicate the following:
    .1 Recycled Content: provide listing of products incorporating recycled content. Include details of percentages of post-consumer and pre-consumer recycled content for materials and products. Indicate material and product costs.
  .2 Submit LEED submittal forms for Credits MR 5 – Regional Materials in accordance with Section 01 35 21 – LEED Requirements. Indicate the following:
    .1 Regional Materials: use building materials or products that have been extracted, harvested, recovered and processed within 800 km, or 2400 km if shipped by rail or water, of the final manufacturing site.

1.04 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

.3 Detail and fabricate metal fabrications in accordance with NAAMM AMP 555.

.4 Fabricator for structural welded steel connections shall be certified in accordance with CSA W47.1

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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, protected from weather, and in accordance with manufacturer's recommendations.
.2 Replace defective or damaged materials with new.

1.05 JOB CONDITIONS AND COORDINATION

.1 Coordinate with other trades and exercise the necessary scheduling to ensure that work is carried out and items incorporated during the appropriate construction phase.

.2 Provide instructions and drawings to other trades for setting bearing plates, anchors blots, and other members that are built into work of other trades.

2 PRODUCTS

2.01 MATERIALS

.1 Steel channels, angles and plates: to CSA G40.20/G40.21, Grade 300W.

.2 Hollow structural sections: to CAN/CSA G40.20/G40.21, Grade 350W, Class C.

.3 Rolled steel sections: to CSA G40.21, 350W.

.4 Steel pipe: to ASTM A53/A53M standard weight (Schedule 40), galvanized finish.

.5 Welding materials: to CSA W59.

.6 Welding electrodes: to CSA W48 Series.

.7 Fasteners: bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws, and machine bolts.

.1 Unfinished fasteners: In areas not exposed to the public, use unfinished bolts conforming to ASTM A307, Grade A, with hexagon heads and nuts. Supply bolts of lengths required to suit the thickness of the material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.2 Finished fasteners:

.1 In areas exposed to public use, bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts to be hot dip galvanized in accordance with ASTM A153/A153M.

.2 For joining stainless steel components use stainless steel fasteners of same type.

.3 Structural bolts: to ASTM F3125.

.8 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.9 Shop coat primer: to CAN/CGSB-1.40.

.10 Galvanized primer: one component, ready-mixed zinc rich, to AASHTO M 300.

.11 Galvanizing: hot-dip method with minimum zinc coating of 705 g/m^2 conforming to ASTM A123 for fabricated assemblies. ASTM A153/A153M for all hardware (average zinc coating of 381 g/m^2). Hot dip galvanize after fabrication.

2.02 FABRICATION

.1 Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

.2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.3 Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and night sky heat loss. Temperature change (Range): 100 deg F (38 deg C).

.4 Shear and punch metals cleanly and accurately. Remove burrs.

.5 Ease exposed edges to a radius of approximately 0.794 mm (1/32 inch), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.6 Remove sharp or rough areas on exposed traffic surfaces.

.7 Weld corners and seams continuously to comply with American Welding Society (AWS) recommendations, and the following:
- .1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- .2 Obtain fusion without undercut or overlap.
- .3 Remove welding flux immediately.
- .4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

.8 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

.9 Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

.10 Shop Assembly: preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

.11 Cut, reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware, screws, and similar items.

.12 Ensure exposed welds are continuous for length of each joint.

.13 Grind or file exposed welds and steel sections smooth and flush with adjacent surfaces. Weld locations not to be visible after application of paint finishes.

.14 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.15 Accurately form connections with exposed faces flush; mitres and joints tight.

.16 Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

.17 All welding is to be performed by CWB Certified Welders.

.18 Welded joints: Finish #1, to NOMMA Guideline 1: Joint Finishes.

2.03 MISCELLANEOUS FABRICATIONS

.1 Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.

.2 Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated that are not a part of structural steel framework, as required to complete work.

.3 Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitred joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

.4 Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

.5 Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.

.6 Fabricate connections to foundation for heavy timber framing as required. Coordinate with Section 06 10 00, and provide connectors to concrete trades for embedment in foundation concrete.

2.04 FINISHES

.1 Primers and paints: to 09 91 00 - Painting.

2.05 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.

2.06 SHOP PAINTING

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.

.2 Apply one coat of shop primer to metal items, with exception of galvanized or concrete encased items.

.3 Apply two coats of primer of different colours to parts inaccessible after final assembly.

.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.5 Do not paint surfaces to be field-welded.

.6 Prime after fabrication and before damage to surface occurs from weather or other exposure.

.7 Protect machine finished or similar surfaces that are not to be coated, but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by the Departmental Representative.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for 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. Commencing with Work means acceptance of conditions.

3.02 ERECTION

.1 Erect and install work in accordance with manufacturer's or fabricator's (as applicable) written instructions and Drawings.

.2 Do welding work in accordance with CSA W59 unless specified otherwise.

.3 Supply finished items to be built in to effected trades, along with instructions for proper installation.

.4 Apply architectural metalwork using hidden mechanical fasteners. Installation shall be by skilled architectural metalworkers experienced in highest quality work.

.5 Fasteners to draw adjoining sections together in proper, true alignment, and are capable of field adjustment.

.6 All fasteners, mountings to be non-loosening and installed so that they will be hidden at completion.

.7 Install all Work to true, straight lines, accurate to profile, all properly aligned.

.8 Isolate dissimilar metals in a manner approved by the Departmental Representative to prevent electrolytic action or corrosion.

.9 Install finish hardware supplied under other Sections required for completion of components of this Section.

.10 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.11 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.12 Make field connections with high tensile bolts to CSA S16 and weld to prevent loosening.

.13 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.14 Touch up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.15 Install miscellaneous metal fabrications and rough hardware as required.

3.08 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.09 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-in-Place Concrete.

.2 Section 05 50 00 - Metal Fabrications.

1.02 REFERENCES

.1 ASTM International
- .1 ASTM A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A123/A123M-12, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM F3125M-15a Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 Canada Green Building Council (CaGBC)
- .1 LEED® Canada 2009 Rating System, LEED® Canada for New Construction and Major Renovations.

.3 CSA Group (CSA)
- .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).
- .2 CSA S16-14, Design of Steel Structures.
- .3 CSA W48-14, Filler metals and allied materials for metal arc welding.
- .4 CSA W59-13, Welded Steel Construction (Metal Arc Welding), Includes Update No. 1 (2014), Update No. 3 (2015), Update No. 4 (2015).

.4 National Association of Architectural Metal Manufactures (NAAMM)
- .1 AMP 510-92, Metal Stair Manual.
- .2 AMP 521-01(R2012), Pipe Railing Systems Manual.

.5 National Research Council Canada (NRC)
.1 National Building Code of Canada (NBC), edition adopted and currently enforced by the Province of Prince Edward Island.

.6 National Ornamental & Miscellaneous Metals Association (NOMMA)
.1 NOMMA Guideline 1: Joint Finishes, 1994.

.7 The Society for Protective Coatings (SSPC)
.1 Systems and Specifications Manual, Volume 2, 2008 Edition.

1.03 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for products incorporated into the Work and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer licensed in Province of Prince Edward Island, Canada.
.2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

.4 LEED Submittals: Submit in accordance with Section 01 35 21 - LEED Requirements:
.1 Submit LEED submittal forms for Credit MR 4 – Recycled Content in accordance with Section 01 35 21 – LEED Requirements. Indicate the following:
.1 Recycled Content: provide listing of products incorporating recycled content. Include details of percentages of post-consumer and pre-consumer recycled content for materials and products. Indicate material and product costs.
.2 Submit LEED submittal forms for Credits MR 5 – Regional Materials in accordance with Section 01 35 21 – LEED Requirements. Indicate the following:

.1 Regional Materials: use building materials or products that have been extracted, harvested, recovered and processed within 800 km, or 2400 km if shipped by rail or water, of the final manufacturing site.

1.04 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.05 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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, protected from the weather, and in accordance with manufacturer's recommendations; store and protect fabrications from nicks, scratches, and blemishes; replace defective or damaged materials with new.

2 PRODUCTS

2.01 SYSTEM DESCRIPTION

.1 Design Requirements:
.1 Design metal railings and connections to National Building Code of Canada (NBC) vertical and horizontal live load requirements.

2.02 MATERIALS

.1 Steel sections: to CSA G40.20/G40.21 Grade 300 W.

.2 Steel plate: to CSA G40.20/G40.21, Grade 260 W.

.3 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless.

.4 Welding materials: to CSA W59.

.5 Welding electrodes: to CSA W48 Series

.6 Bolts: to ASTM A307.

.7 High strength bolts: to ASTM F3125M.

2.03 FABRICATION

.1 Fabricate railings in accordance with NAAMM, Metal Stair Manual.

.2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.3 Accurately form connections with exposed faces flush:
.1 Make mitres and joints tight.
.2 Make risers of equal height.

.4 Grind or file exposed welds and steel sections smooth.

.5 Shop fabricate railings in sections as large and complete as practicable.

2.04 PIPE/TUBING BALUSTRADES

.1 Construct railings from steel pipe; cap and weld exposed ends; terminate at abutting wall with end flange.

2.05 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to ASTM A123. Touch-up galvanized surfaces with zinc rich coating, to ASTM A780: DOD P 21035 zinc rich paint, minimum DFT 8 mils.

.3 Painting: to Section 09 91 00.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for 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. Commencing with Work means acceptance of conditions.

3.02 PREPARATION

.1 Install railings in accordance with NAAMM Metal Stair Manual.

.2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.

.3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.4 Do welding work in accordance with CSA W59 unless specified otherwise.

.5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.03 INSTALLATION OF RAILINGS

.1 Install railings as indicated, including all sleeves, anchors and connections. Prepare steel, touch-up galvanized finish on site as required to maintain cover of exposed steel.

.2 Install railings in accordance with NAAMM Metal Stair Manual.

.3 Install railings to structural support.

.4 Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

.1 Anchor posts in concrete by means of pipe sleeves pre-set and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's directions.

.2 Anchor posts and rail ends to steel with welded connections, unless otherwise indicated.

.3 Anchor posts and rail ends into concrete and masonry with steel round flanges welded to post and rail ends, and anchored into wall construction with expansion shields and bolts.

.4 Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

.5 Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 40 mm clearance from inside face of handrail and finished wall surface. Locate brackets at spacing not less than 1.5 m on centre, unless otherwise indicated. Secure wall brackets and wall return fittings to building construction as follows:

.1 Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

.2 For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

.3 For hollow masonry anchorage, fasten brackets directly on masonry wall using toggle bolts.

.4 For steel framed gypsum board assemblies, fasten brackets to wood blocking using lag bolts or to metal blocking using self-tapping screws, of size and type required to support structural loads.

.6 Hand items over for casting into concrete or building into masonry to appropriate trades, together with setting templates.

.7 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.05 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal stairs and ladders installation.

END OF SECTION

Part 1 General

1.01 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications.

.2 Section 05 51 00 – Metal Railings.

.3 Section 06 10 00 - Rough Carpentry.

.4 Section 08 80 50 – Glazing.

1.02 REFERENCES

.1 American Architectural Manufacturers Association (AAMA)

.1 AAMA CW-12-84, Structural Properties of Glass.

.2 ASTM International (ASTM)

.1 ASTM A240/A240M-15a Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.2 ASTM A269/A269M-14e1 Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A276-16, Standard Specification for Stainless Steel Bars and Shapes.

.4 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.5 ASTM A312/A312M-16, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

.6 ASTM A325M-14, Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric).

.7 ASTM A480/A480M-14b, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

.8 ASTM A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.9 ASTM A747/A747M-12, Standard Specification for Steel Castings, Stainless, Precipitation Hardening.

.10 ASTM D1187/D1187M-97(2011)e1, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

.11 ASTM E488/E488M-10, Standard Test Methods for Strength of Anchors in Concrete Elements.

.12 ASTM E2358-04(2010), Standard Specification for the Performance of Glass in Permanent Glass Railing Systems, Guards, and Balustrades.

.13 ASTM F468-12, Standard Specification for Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws, and Studs for General Use.

.14 ASTM F593-13a, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

.3 American Welding Society (AWS)

.1 AWS A5.9/A5.9M:2012, Specification for Bare Stainless Steel Welding Electrodes and Rods.

.2 AWS D1.6/D1.6M:2007, Structural Welding Code - Stainless Steel.

.3 AWS D18.1/D18.1M:2009, Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications.

.4 Canadian Institute of Steel Construction (CISC)

.1 Code of Standard Practice for Structural Steel, 2010.

.2 Guide for Specifying Architecturally Exposed Steel, 2nd Edition.

.3 Handbook of Steel Construction – 11th Edition.

.4 Limit States Design in Structural Steel, 9th Edition.

.5 Steel Fabrication Quality Systems Guideline, 2nd Edition with Commentary.

.5 Canadian Standards Association (CSA International)

.1 CSA C22.2 NO. 60-M1990 (R2006), Arc Welding Equipment.

.2 CAN/CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.3 CSA S16-14, Design of Steel Structures.

.4 CSA W47.1-09, Certification of companies for fusion welding of steel, Includes Update No. 3 (2011), Update No. 5 (2012).

.5 CSA W48-06 (R2011), Filler metals and allied materials for metal arc welding.

.6 CSA W55.3-08, Certification of companies for resistance welding of steel and aluminum.

.7 CSA W59-13, Welded Steel Construction (Metal Arc Welding), Includes Update No. 1 (2014), Update No. 3 (2015).

.8 CSA W178.2-08 (R2013), Certification of Welding Inspectors.

.6 Canada Green Building Council (CaGBC)

.1 LEED Canada 2009 Rating System, LEED Canada for New Construction and Major Renovations.

.7 Canada Green Building Council (CaGBC)

.1 LEED Canada 2009 Rating System, LEED Canada for New Construction and Major Renovations.

.8 SAE International (The Society of Automotive Engineers)

.1 SAE steel grades.

1.03 SYSTEM DESCRIPTION

.1 Minimum Performance Requirements for Guard Assembly (Balustrade):

.1 Support uniform load of 50 pounds per linear foot (0.73 kN/M) applied in any direction.

.2 Support concentrated load of 200 pounds (0.89 kN) applied at any point in any direction.

.3 These loads need not to be assumed to act concurrently.

.4 Maximum deflection at top of glass is height/24.

1.04 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 Supply following products for installation under other Sections:

.1 Anchor bolts, bearing plates, sleeves and other inserts to be built into other construction and required for anchorage and support of fabricated steel components.

.2 Fabricated steel components to be built into other construction.

.2 Supply instructions and templates as required for accurate setting of inserts and components.

1.05 **PRE-INSTALLATION MEETINGS**

.1 Pre-Installation Meetings: convene pre-installation meeting in accordance with Section 01 31 19 – Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building trades.

1.06 ACTION AND INFORMATION SUBMITTALS

.1 Submit under the provisions of section 01 33 00 - Submittal Procedures.

.2 Submit manufacturer's printed product literature, printed installation instructions, standard details, specifications, and data sheets.

.3 Submit shop drawings: Dimensioned drawings of railing assemblies indicating the following:

.1 Elevations; include joint locations, transitions, and terminations.

.2 Glass light fabrication plans with dimensions, holes and finishes.

.3 Point support layout, details and attachment to support structure.

.4 Manufacturer’s installation and maintenance instructions.

.5 Submit shop drawings bearing stamp of a qualified professional engineer registered in Province of Prince Edward Island.

.4 Submit engineering design report: Calculations showing point support reactions and glass stresses.

.5 Samples of manufacturer’s finishes for initial selection and quality assurance.

.6 LEED Submittals: Submittals that are required to comply with requirements for LEED certification include, but not necessarily limited to, the following:

.1 Recycled Content: Provide product data and certification letter indicating percentages by weight of post consumer and pre consumer recycled content for products having recycled content.

.2 Regional Materials: Provide product data for regional materials indicating location and distance from the Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Distance shall be within 500 miles (805 Km) of the Project Site.

1.07 QUALITY ASSURANCE

.1 Delegated Design:

.1 Retain a Professional Engineer, registered in the Province of Prince Edward Island, to design fabrication and erection of the work of this section in accordance with National Building Code 2010 and amendments, and the requirements of this specification section. Sign and seal shop drawings and design submittals. Review installations.

.2 Premanufactured components and point-support fittings shall be furnished by the same manufacturer.

.3 Glass: tempered glass, to section 08 80 50 – Glazing, minimum 19 mm thick.

.4 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.5 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.

.6 Fabricator Qualifications: A firm experienced in producing stainless steel fabrications similar to those indicated for this Contract and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.7 Welding:

.1 Welders shall be qualified by Canadian Welding Bureau for classification of work being performed.

.2 The fabricator shall be certified to CSA W47.1 or CSA W47.2 as required.

.3 Welding inspection: to CSA W178.

.4 Resistance welding: to CSA W55.3.

.5 Fusion / Metal Arc welding: to CSA W59.

.6 Stainless steel:

.1 Weld stainless steel by the electric arc process, to CSA W59.

.2 Use electrodes compatible with and of the same properties as the stainless steel. Grind smooth and polish to match finish.

.3 Structural stainless steel welding: to AWS D1.6/D1.6M.

.4 Stainless steel tube and pipe: to AWS D18.1/D18.1M.

1.08 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials properly protected against damage to finished surfaces during transit.

.2 Inspect materials upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts shall be removed and replaced.

.3 Store materials in a location and manner to avoid damage; stack materials to prevent bending or applying stress to components; keep handling of materials on site to a minimum.

.4 Store components and materials in clean, dry location, away from uncured concrete or masonry; cover with waterproof paper, tarpaulin or polyethylene sheeting in a manner that permits air circulation inside of covering.

.5 Correct damaged material and where damage is deemed irreparable by the Owner, replace the affected item at no additional expense to the Owner.

.6 Apply protective covering to face of all exposed finished metalwork before it leaves shop, covering to remain until item installed and ready for final finishing.

.7 Fabricate large assemblies so they can be safely and easily transported and handled to their place of installation. Pre-assemble railings prior to shipping to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and for coordination with shop drawings.

1.09 PROJECT CONDITIONS

.1 Coordinate this Work with the remainder of the Work and exercise the necessary scheduling to ensure that all Work is carried out and all items incorporated during the appropriate construction phase.

.2 Provide instructions and drawings to other trades for setting bearing plates, anchors blots, and other members that are built in to work of other trades.

.3 Protect other Sections of the Work from damage by this Section of the Work.

1.10 WARRANTY

.1 For the work of this Section, the 12 month warranty period prescribed in Subsection GC 32.1 of General Conditions "C" is extended to 24 months.

Part 2 Products

2.01 PERFORMANCE AND DESIGN CRITERIA

.1 To the extent practicable, provide building materials with maximum recycled content available, and that are regionally extracted, processed and manufactured.

.2 Provide delegated design as required.

.3 Design balustrades, railings, and connections to National Building Code 2010 and amendments for vertical and horizontal live load requirements.

.4 Design to CSA S16, ASTM E2358, and AAMA CW-12-84.

.5 Comply with CISC Code of Standard Practice for Structural Steel.

.6 Fabricate and finish balustrades and railings in accordance with CISC Guide for Specifying Architecturally Exposed Steel: to AESS 4 *Showcase Elements* (see Table 1 – AESS Category Matrix).

2.02 MATERIALS

.1 Structural bolts: to ASTM F3125/F3125M.

.2 Stainless steel sheet, strip, plate and flat bar: to ASTM A666.

.3 Stainless steel round rod (solid), grade 304, to ASTM A276, annealed, No. 4 finish, threaded at ends as required, and diameter as indicated; if diameter not indicated, then 9.5 mm (0.375”) nominal diameter, maximum tensile strength: 504.7 MPa.

.4 Stainless steel tubing: to ASTM A269.

.5 Stainless steel piping: to ASTM A312/A312M; pipe to NPS Schedule 40S.

.6 Structural steel: to CAN/CSA G40.20/G40.21, grade 350W.

.7 Stainless steel fittings and castings: to ASTM A747/A747M.

.8 Structural stainless steel fasteners: to ASTM A738/A738M.

.9 Stainless steel fasteners, washers and nuts: to ASTM F593, 18-8 austenitic stainless steel (Grade 8 B8/B8A), sized as required for purpose intended, or as otherwise indicated. Cold Finished Materials: Condition B, cold worked, to ASTM A276. Exposed Fasteners: Stainless steel countersunk screws or bolts, consistent with design intent.

.1 Anchors shall be fabricated from stainless steel with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing to ASTM E488.

.10 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours; 40 MPa at 28 days.

.11 Welding materials: to CSA W59.

.12 Welding electrodes: to CSA W48 Series.

.13 Solder and flux: to ASTM B32, alloy composition Tin (Sn) for stainless steel. Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

.14 Self-adhered EPDM flashing tape or emulsified asphalt protective coating for metals to ASTM D1187/D1187M.

.15 Joint Sealants: to Section 07 92 00.

.16 Glass: to Section 08 80 50.

2.03 STAINLESS STEEL TYPES

.1 Provide SAE type 304 stainless steel for non-welded construction, and SAE type 304L for welded construction. No.4 satin finish, grain following direction of hand railing, vertical orientation at posts.

2.04 PREMANUFACTURED FITTINGS AND COMPONENTS

.1 Glazed point-supported stand-off balustrade, Type 304 stainless steel hand railing and support posts mounted directly to safety glass, curved design, anchored to structure with stainless steel round posts and baseplates.

.2 Sole source responsibility: only one manufacturer shall provide premanufactured fittings and components under this section.

.3 Internal handrail connection sleeves: stainless steel tube.

.4 Standoff fittings, stainless steel, with neoprene gasket and grommet to prevent direct contact between metal and glass.

.5 Through-glass handrail brackets:

.1 Material: type 304 stainless steel.

.2 Fabrication: machined.

.3 Finish: match handrail finish.

.6 Handrail tubing:

.1 Profile: round, 40 mm diameter, schedule 40 pipe.

.2 Material: type 304 stainless steel.

.3 Finish: No. 4 satin finish.

.7 Fasteners: Types and sizes indicated in shop drawings and engineering report.

.8 Wall-Mounted Stainless Steel Handrails: type 304 stainless steel to match finish of adjacent point-supported handrails, 38 mm diameter pipe rail with brackets (exposed profile matching appearance of point-supported handrails), mounting flanges as required, matching fasteners, handrails mounted at 900 mm above finished floor, 305 mm handrail extensions at top and bottom, blocking as required within wall (coordinate with other trades to ensure blocking is installed where required), extruded type 304 stainless steel wall bracket

2.05 FABRICATION

.1 Fabricate and finish railings and balustrades in accordance with CISC Guide for Specifying Architecturally Exposed Steel: to AESS 3 *Showcase Elements* (see Table 1 – AESS Category Matrix).

.2 Fabricate in compliance with National Building Code 2010 and amendments.

.3 Fabricate handrail assembly components to lengths and configurations complying with shop drawings.

.4 Machine joint edges smooth and plane to produce hairline seams when site assembled; supply concealed sleeve connectors for joints.

.5 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.6 Isolate dissimilar metals to prevent electrolytic action by applying primer to concealed surfaces of metal components.

2.06 FINISHES

.1 Stainless steel: as indicated; if not indicated, as follows:

.1 Finish shall be No. 4 satin; grain at hand rails to run in direction of railing; grain at posts to have vertical orientation.

Part 3 Execution

3.01 GENERAL

.1 Erect to:

.1 Manufacturer's printed installation instructions, standard details, and data sheets.

.2 National Building Code 2010 and amendments.

.3 CSA S16, ASTM E2358, and AAMA CW-12-84.

.4 CISC Code of Standard Practice for Structural Steel, Architecturally Exposed Steel.

.2 Standoffs shall be located to a tolerance of 0.79 mm. All bushings, spacers, bearing pads and other components shown in the shop drawings shall be properly installed.

3.02 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for work of this Section.

.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. Proceeding with work means acceptance of conditions.

3.03 COMPLIANCE

.1 Comply with system manufacturer's printed assembly and erection instructions, technical datasheets, illustrations, and guide specifications.

3.04 ERECTION

.1 Install glass to Section 08 80 50 – Glazing. Secure to structure using premanufactured stainless steel standoff fittings and structural posts.

.2 Install handrails in accordance with manufacturer's recommended installation instructions and engineered shop drawings.

.3 Install plumb and true in required locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting balustrades and railings to structure.

.4 Do welding work in accordance with CSA W59, and as follows:

.1 Structural stainless steel welding: to AWS D1.6/D1.6M.

.2 Stainless steel tube and pipe: to AWS D18.1/D18.1M.

3.05 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by work of this section.

END OF SECTION