1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 21 00 – STEEL JOIST

.2 Section 05 31 00 – METAL DECK

1.02 REFERENCES

.1 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.2 ASTM F3125, Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 830/1040 MPa Minimum Tensile Strength.

.3 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.

.4 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.

.5 CSA-G40.20, General Requirements for Rolled or Welded Structural Quality Steel.

.6 CSA-G40.21, Structural Quality Steel.

.7 ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.8 CSA-S16, Consolidation: Limit States Design of Steel Structures.

.9 CSA-S136, Design of Cold Formed Steel Structural Members.

.10 .CSA-W47.1, Certification of Companies for Fusion Welding of Steel.

.11 CSA-W48, Filler Metals and Allied Materials for Metal Arc Welding.

.12 CSA-W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.13 CSA-W59, Welded Steel Construction (Metal Arc Welding).

1.03 SHOP DRAWINGS

.1 Submit erection drawings in accordance with Section 013300. Shop Detail Drawings for individual pieces and for standard connections are not to be submitted.

.2 Submit shop details of non-standard connections to be used in the connection of structural steel members. Identify on erection drawings the location of all non-standard connections.

.3 On erection drawings, indicate member size, base plate elevations, anchor bolt size, all details and information necessary for assembly and erection purposes.

.4 Ensure fabricator designed assemblies, components and connections, and drawings are stamped and signed by qualified professional engineer licensed in the Province of Construction.

1.04 DESIGN OF DETAILS AND CONNECTIONS

.1 Design details and connections in accordance with requirements of CSA-S16 and CSA-S136 to resist forces, moments, shears and allow for movements indicated.

.2 If connection for shear only (standard connection) is required:

.1 Select framed beam shear connections from an industry-accepted publication such as “Handbook of the Canadian Institute of Steel Construction”.

.2 If shears are not indicated, select or design connections to support reaction resulting from maximum uniformly distributed load that can be safely supported by beam in bending, provided no concentrated loads act on beam. If concentrated

loads act on beam, calculate loads or contact Departmental Representative for loads.

.3 For non-standard connections submit sketches stamped and signed by qualified professional engineer licensed in Province of construction.

2 PRODUCTS

2.01 MATERIALS

.1 Structural steel: to CSA-G40.21 Grade 350W.

.2 Hollow structural sections: to ASTM A500 Grade C.

.3 Channels, angles, plates and rod: Type 300W

.4 Anchor bolts: to CSA-G40.21, Grade 300W

.5 Bolts, nuts and washers: to ASTM F3125

.6 Shear Studs to CSA W59

.7 Welding materials: to CSA-W48 and CSA-W59 and certified by Canadian Welding Bureau.

.8 Shop paint: to CISC/CPMA 1-73a and 2-75 as applicable.

.9 Hot dip galvanizing: Galvanize all structural steel exposed to weather and other steel as indicated on drawings to CSA-G164. Minimum zinc coating shall be 450 grams/square meter.

.10 "Hump rods" for attachment of masonry walls to steel columns as detailed on structural drawings. Hump rods shall be 6mm diameter rods welded to columns and shall be compatible with masonry connectors supplied by masonry contractor.

.11 Anchor bolts through bottom flanges of steel beams and bottom chords of steel joists where steel beam/joist provides lateral support to masonry walls as detailed on structural drawings.

.12 Angle framing welded to steel beams and joists to provide lateral restraint to top of masonry walls as detailed on structural drawings.

2.02 FABRICATION

.1 Fabricate structural steel in accordance with CSA-S16, S136 and in accordance with reviewed shop drawings.

.2 Camber steel beams where indicated on structural drawings.

.3 Continuously seal members by continuous welds where indicated. Grind smooth.

.4 Provide holes for attachment of other work where required.

.5 Where finished surfaces of steel are to be left exposed to view, fabricate to AISC specifications for architecturally exposed steel including straightness. Remove mill marks, identification and surface imperfections.

.6 Exposed welds to be continuous for length of each joint. Grind exposed welds smooth and flush.

2.03 SHOP PAINTING

.1 For steel not to receive finish painting on site:

.1 Clean all members of loose mill scale, rust, oil, dirt and other foreign matter, prepare and paint to CISC/CPMA 1-73.

.2 Apply one coat of paint in shop to all steel surfaces except:

.1 Surfaces to be encased in concrete.

.2 Surfaces and edges to be field welded.

.2 For steel to receive finish painting on site:

.1 Clean all members of loose mill scale, rust, oil, dirt and other foreign matter, prepare and prime to CISC/CPMA 2-75. Grey primer to be used

.2 Apply one coat of primer in shop to all steel surfaces.

.3 Hot dip galvanizing: Galvanize all structural steel exposed to weather and other steel as indicated on drawings to CSA-G164. Minimum zinc coating shall be 450 grams/square meter.

3 EXECUTION

3.01 GENERAL

.1 Structural steel work: in accordance with CSA-S16 and CSA-S136.

.2 Welding: in accordance with CSA-W59.

.3 Companies to be certified under Division 1 or 2 of CSA-W47.1 for fusion welding of steel structures and/or CSA-W55.3 for resistance welding of structural components.

.4 Installation of “hump rods” on steel columns and angle framing to provide lateral support to masonry walls as detailed on structural drawings. Loose anchor bolts for masonry support will be supplied by this section but installed by the masonry contractor.

3.02 MARKING

.1 Mark materials in accordance with CSA-G40.20. Do not use die stamping.

3.03 ERECTION

.1 Erect structural steel, as indicated and in accordance with CSA-S16, CSA-S136 and in accordance with reviewed erection drawings.

.2 Field cutting or altering structural members: to approval of Departmental Representative.

.3 Clean with mechanical brush and touch up shop primer to bolts, welds and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

.5 Assume full responsibility for the integrity of structure during erection. Make necessary provision for all erection loads and for sufficient temporary bracing to maintain safe structure, plumb and in true alignment until completion of erection and installation of necessary permanent bracing.

.6 Prepare galvanized structural steel surfaces for field welding by removing zinc before welding. After welding, chip away flux and prime with protective zinc rich paint.

.7 Set column base plates and loose bearing plates with steel shims to proper elevation, true and level, ready for grouting-in.

3.04 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Owner.

.2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.

.3 Owner will pay costs of testing.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 12 23 - Structural Steel

.2 Section 05 31 00 - Metal Deck

1.02 REFERENCES

.1 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.

.2 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.

.3 CSA-G40.20, General Requirements for Rolled or Welded Structural Quality Steel.

.4 CSA-G40.21, Structural Quality Steel.

.5 ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.6 CSA-S16, Consolidation: Limit States Design of Steel Structures.

.7 CSA-S136, Design of Cold Formed Steel Structural Members.

.8 CSA-W47.1, Certification of Companies for Fusion Welding of Steel.

.9 CSA-W48 Filler Metals and Allied Materials for Metal Arc Welding.

.10 CSA-W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.11 CSA-W59, Welded Steel Construction (Metal Arc Welding).

1.03 SHOP DRAWINGS

.1 Submit drawings stamped and signed by qualified professional engineer registered or licensed in province of construction.

.2 On erection drawings, indicate relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and other details.

.3 In shop details, provide particulars relative to joist geometry, framed openings, splicing details, bearing and anchorage. Include member size, properties, specified and factored member loads, and stresses under various loadings, deflection and camber.

1.04 DESIGN OF STEEL JOISTS AND BRIDGING

.1 Design steel joists and bridging to carry loads indicated on drawings in accordance with CSA-S16 and CSA-S136.

.2 Design joists and anchorages for uplift forces as indicated.

.3 Ensure joists are manufactured to consider load effects due to fabrication, erection and handling.

.4 Limit roof joist deflection due to specified Live Load to 1/240 of span and deflection due to specified Total Load to 1/180 of span unless noted on drawings.

.5 Limit roof joist deflection due to specified Live Load to 1/360 of span and deflection due to specified Total Load to 1/240 of span where ceilings susceptible to cracking are suspended from the roof structure unless noted on drawings.

.6 Limit floor joist deflection due to specified Live Load to 1/360 of span and deflection due to specified Total Load to 1/240 of span unless noted on drawings.

2 PRODUCTS

2.01 MATERIALS

.1 Structural steel: to CSA-G40.21.

.2 Welding materials: to CSA-W48 and CSA-W59.

.3 Shop paint primer: to CISC/CPMA 1-73a and 2-75

.4 Hot dip galvanizing: Galvanize all structural steel exposed to weather and other steel as indicated on drawings to CSA-G164. Minimum zinc coating shall be 450 grams per square meter.

2.02 FABRICATION

.1 Fabricate steel joists and accessories as indicated in accordance with CSA-S16 and CSA-S136 and in accordance with reviewed shop drawings.

.2 Weld in accordance with CSA-W59.

.3 Provide top and bottom chord extensions where indicated and/or required.

.4 Provide diagonal and/or horizontal bridging and anchorages as per CSA-S16 and CSA-S136.

.5 Mark joists to indicate erection orientation and with identification corresponding to shop drawings.

.6 Incorporate shoes of proper depths to suit elevations of bearings in each location.

.7 Fabricate joists of uniform appearance in areas exposed to view.

.8 Fabricate joists such that the intersection of the axes of the chord and end diagonals is located within the middle third of the supporting beam flange width.

2.03 SHOP PAINTING

.1 For joists not to receive finish painting on site:

.1 Clean all members of loose mill scale, rust, oil, dirt and other foreign matter, prepare and paint to CISC/CPMA 1-73.

.2 Apply one coat of paint in shop to all steel surfaces except:

.1 Surfaces to be encased in concrete.

.2 Surfaces and edges to be field welded.

.2 For joists to receive finish painting on site:

.1 Clean all members of loose mill scale, rust, oil, dirt and other foreign matter, prepare and prime to CISC/CPMA 2-75.

.2 Apply one coat of primer in shop to all steel surfaces.

.3 Hot dip galvanizing: Galvanize all structural steel exposed to weather and other steel as indicated on drawings to CSA-G164. Minimum zinc coating shall be 450 grams per square meter.

3 EXECUTION

3.01 GENERAL

.1 Structural steel work: in accordance with CSA-S16 and CAN/CSA-S136.

.2 Welding: in accordance with CSA-W59.

.3 Companies to be certified under Division 1 or 2 of CSA-W47.1 for fusion welding and/or CSAW55.3 for resistance welding.

.4 Provide certification that all welded joints are qualified by Canadian Welding Bureau.

3.02 ERECTION

.1 Erect steel joists and bridging in accordance with CSA-S16 and in accordance with reviewed erection drawings.

.2 Complete installation of all bridging and anchorages before placing construction loads on joists.

.3 Field cutting or altering joists or bridging that is not shown on shop drawings: to approval of Engineer.

.4 Clean and touch up shop primer/paint to bolts, welds, burned or scratched surfaces at completion of erection.

.5 Weld or bolt all joists to supporting structure.

.6 Attachment of mechanical, electrical and other services to joists shall be by using approved clamp connectors. No drilling or cutting of the joist material is permitted.

.7 Include the necessary equipment as required for erection and to comply with safety regulations.

3.03 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Owner.

.2 Testing laboratory may inspect representative joists for integrity, accuracy of fabrication and soundness of welds. Departmental Representative will determine extent of and identify all inspections.

.3 Owner will pay costs of testing.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 12 23 - Structural Steel

.2 Section 05 21 00 - Steel Joists

1.02 REFERENCES

.1 CSA-S136, Design of Cold Formed Steel Structural Members.

.2 CSA-W47.1, Certification of Companies for Fusion Welding of Steel.

.3 CSA-W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.4 CSA-W59, Welded Steel Construction (Metal Arc Welding).

.5 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.

.6 ASTM A 653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.7 CSSBI 10M, Standard for Steel Roof Deck.

.8 SSBI 12M, Standard for Composite Steel Deck.

.9 CAN/CGSB-1.181, Ready Mixed Organic Zinc-Rich Coating

1.03 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in province of construction.

.3 Indicate details of temporary shoring of steel deck, such as location, time and duration of placement and removal of shoring for concrete fill decks.

.4 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.

1.04 DESIGN REQUIREMENTS

.1 Design steel deck using limit states design in accordance with CSA S136 and, CSSBI 10M and CSSBI 12M.

.2 Steel deck and connections to steel framing to carry Dead, Live and other Loads including Lateral Loads, diaphragm action, composite deck action, and uplift as indicated.

.3 Deflection under specified Live Load not to exceed 1/240 of span, except that when plaster gypsum board ceilings are hung directly from deck, Live Load deflection not to exceed 1/360 of span.

2 PRODUCTS

2.01 MATERIALS

.1 Zinc-iron Alloy (ZF) coated steel sheet: to ASTM-A653 structural quality with ZF75 coating, for interior surfaces not exposed to weather and where no finish painting is to occur. Where deck is to be painted on site, supply deck which has had the passivation treatment removed by either mechanical or chemical means. Refer to drawings for minimum base steel thickness.

.2 Zinc (Z) coated steel sheet: to ASTM-A653 structural quality, passivated, for exterior surfaces exposed to weather or at other locations as noted on drawings. Where deck is to be painted on site, supply deck which has had the passivation treatment removed by either mechanical or chemical means. Refer to drawings for

minimum base steel thickness. Minimum zinc coating shall be Z275.

.3 Closures: in accordance with manufacturer's recommendations.

.4 Cover plates, cell closures and flashings: In accordance with manufactures recommendations; Steel sheet with minimum base steel thickness to match deck material. Metallic coating same as deck material.

.5 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

.6 Acoustic insulation: fibrous glass 16 kilograms per cubic meter density profiled to suit deck flutes.

.7 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

.8 Shear studs: to CSA W59.

.9 Types of Decking

.1 Steel roof deck: Refer to drawings for minimum base steel thickness and depth of profile. Deck shall be non-cellular with interlocking side laps.

.2 Acoustic steel roof deck: Refer to drawings for minimum base steel thickness and depth of profile. Deck shall be perforated on vertical face of flutes and be non-cellular with interlocking side laps.

.3 Composite steel floor deck: Refer to drawings for minimum base steel thickness and depth of profile. Deck shall be non-cellular with interlocking side laps.

2.02 FABRICATION

.1 Include in work of this section cover plates, cell closures, fasteners, stiffeners and accessories as required. Fabricate sheet metal accessories of same material and finish as deck.

.2 Fabricate to meet specified requirements of CSA-S136 and to support superimposed loading as shown on Structural Drawings.

.3 Form deck units to provide male and female interlocking side lap joints.

.4 Fabricate units to provide for joints between abutting panel ends with 50 mm overlap, sized to provide smooth joint. End laps to occur over supports only.

.5 Span deck units over at least three or more supports wherever possible. Increase thickness of metal to compensate for continuity wherever fewer than three supports may occur.

.6 Incorporate reinforcing stiffeners for unsupported edges of metal deck.

3 EXECUTION

3.01 GENERAL

.1 Structural steel work: in accordance with CSA-S136 and CSSBI 10M and CSSBI 12M.

.2 Welding: in accordance with CSA-W59, except where specified otherwise.

.3 Companies to be certified under Division 1 or 2.1 of CSA-W47.1 for fusion welding of steel and/or CSA-W55.3 for resistance welding.

3.02 ERECTION

.1 Erect steel deck as indicated and in accordance with CSA-S136, CSSBI 10M and CSSBI 12M and in accordance with reviewed erection drawings.

.2 Butt ends: to 3 mm gap. Install steel cover plates over gaps wider than 3 mm.

.3 Lap ends: to 50 mm minimum.

.4 Weld and test stud shear connectors through steel deck to steel joists/beams below in accordance with CSA W59.

.5 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.

.6 Prior to concrete placement, steel deck to be free of soil, debris, standing water, loose mil scale and other foreign matter.

.7 Temporary shoring, if required, to be designed to support construction loads, wet concrete and other construction equipment. Do not remove temporary shoring until concrete attains 75% of its specified 28 day compression strength.

.8 Place and support reinforcing steel as indicated.

.9 Install interior cell closures in flutes intersecting vertical surfaces exposed to view, at tops of interior walls and partitions extended to deck.

.10 Fasten deck to structural steel as indicated on structural drawings. Fasten sheets of deck to adjacent sheets of deck as indicated on structural drawings and as per deck manufacturer’s specifications.

3.03 OPENINGS AND AREAS OF CONCENTRATED LOADS

.1 No reinforcement is required for openings cut in deck which are smaller than 150 mm square.

.2 For deck openings with any one dimension greater than 150 mm and for areas of concentrated load, reinforce in accordance with structural framing details indicated on structural drawings.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 05 51 00 – Metal Railings.

.2 Section 06 10 00 – Rough Carpentry.

.3 Section 07 61 00 – Sheet Metal Roofing.

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

.4 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 nova Scotia, and indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

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.
.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 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).

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

.4 National Research Council Canada (NRC)
- .1 National Building Code of Canada (NBC), edition adopted and currently enforced by the Province of Nova Scotia.

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

.6 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 Nova Scotia.
.2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

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. 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