# 1 General

## 1.1 RELATED SECTIONS

.1 Section 07 42 13 - Metal Wall Panels.

.2 Section 07 42 43 - Composite Aluminum Panels.

.3 Section 08 11 16 - Aluminum Doors and Frames.

.4 Section 08 50 00 - Aluminum Windows and Curtain Wall.

## 1.2 SYSTEM DESCRIPTION

.1 This section specifies work required for fluoropolymer coating, and applies to each section listed in 1.1 - Related Requirements.

.2 Responsibility of coating lies with manufacturer of product being coated.

## 1.3 REFERENCES

.1 American Architectural Manufacturers Association (AAMA).

.1 AAMA 2605-13, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

.2 ASTM International (ASTM).

.1 ASTM B117-11, Standard Practice for Operating Salt Spray (Fog) Apparatus.

.2 ASTM D523-14, Test Method for Specular Gloss.

.3 ASTM D1308-02(2013), Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

.4 ASTM D2244-14, Standard Practice for Calculation of Color Tolerances and Color Differences From Instrumentally Measured Color Coordinates.

.5 ASTM D2247-11, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

.6 ASTM D2794-93(2010), Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

.7 ASTM D3359-09e2, Standard Test Methods for Measuring Adhesion by Tape Test.

.8 ASTM D3363-05(2011)e2, Standard Test Method for Film Hardness by Pencil Test.

.9 ASTM D714-02(2009), Standard Test Method for Evaluating Degree of Blistering of Paints.

.10 ASTM D4145-10, Standard Test Method for Coating Flexibility of Prepainted Sheet.

.11 ASTM D4214-07(2015), Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

## 1.4 QUALITY ASSURANCE

.1 Applicator shall be experienced in handling and application of coating, and be approved by coating manufacturer.

.2 Provide letter from coating manufacturer indicating conformance with above requirements.

1.5 ACTION AND INFORMATIONAL

.1 Submit in accordance with Section 01 10 01 - General Requirements.

.2 Samples:
.1 Submit duplicate 150 mm x 75 mm samples of actual finish on aluminum sheet, to indicate colour.

.3 Maintenance Data
.1 Provide maintenance data for cleaning and maintenance of finishes for incorporation into manual specified in Section 01 10 01 - General Requirements.

1.6 MAINTENANCE MATERIAL

.1 Provide one (1) 28 ml bottle of touch up paint, of same colour as coating.

1.7 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
.3 For products not identified on list, source products with highest recycled content available when practical.
.4 Include following information with product data submission.
.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.
.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
.1 Interior and Exterior Paints: GS-11
.2 Anti-Corrosive Paint: GS-11

.3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.

.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.8 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

2 Products

2.1 FLUOROPOLYMER COATING

.1 Coating: to AAMA 2605.

.1 Resin: polyvinylidene fluoride ($PVF_2$), accounting for 70% of coating.

.2 Three-coat system consisting of primer, colour coat and clear top coat.

.3 Colour coat: custom metallic colour as selected by Departmental Representative.

.2 Coating properties

.1 Specular Gloss: to ASTM D523.

.1 30 ± 5 units at 60° angle.

.2 Pencil Hardness: to ASTM D3363.

.1 F to 2H.

.3 Formability: to ASTM D4145.

.1 0-2 T-bendwith no loss of adhesion.

.4 Cross Hatch Adhesion: to ASTM D3359.

.1 No loss of adhesion.

.5 Reverse Impact: to ASTM D2794.

.1 No cracking or loss of adhesion.

.6 Acid Resistance: to ASTM D1308.

.1 10% muriatic acid - 24 hours: no effect.

.2 20% sulfuric acid - 18 hours: no effect.

.7 Alkali Resistance: to ASTM D1308.

.1 10%, 25% NaOH - 1 hour: no effect.

.8 Salt spray Resistance: to ASTM B117.

.1 5% salt fog @ 95°F: Passes 4000 hours, Less than 1.5 mm average ceeepage from scribe; none of few #8 blisters.

.9 Humidity Resistance: to ASTM D2247 and ASTM D714 .

.1 No #8 blisters @ 100% RH 4,000 Hours.

.10 Exterior exposure (10 years @ 45°, south Florida.

.1 Fade: to ASTM D2244; maximum 5.

.2 Chalk: to ASTM D4214; maximum 8.

.3 Use only one brand of coating for entire project, unless exact colour match between different brands can be proven.

3 Execution

3.1 APPLICATION

.1 Application of coating may only be factory applied. Field application of coating is not acceptable, except for minor touch-ups.

.2 Pretreat surfaces using multi-stage cleaning process to remove organic and inorganic surface soils and residual oxides. Apply chemical conversion coating to promote coating adhesion.

.3 Prime surface in accordance with methods approved by coating manufacturer.

.4 Apply coating to extrusions to obtain following dry film thickness.
- .1 Primer: 0.005 mm to 0.007 mm.
- .2 Colour coat: 0.018 mm to 0.020 mm.
- .3 Clear coat: 0.007 mm to 0.010 mm.

.5 Oven bake coating in accordance with manufacturer's written instructions.

END OF SECTION

# 1 General

## 1.1 RELATED REQUIREMENTS

.1 05 50 00 - Metal Fabrications.

.2 10 95 00 - Miscellaneous Specialties.

## 1.2 SYSTEM DESCRIPTION

.1 This section specifies work required for powder coating, and applies to each section listed in 1.1 - Related Requirements.

.2 Refer to products within each section for items requiring powder coat finish.

## 1.3 QUALITY ASSURANCE

.1 Applicator shall be experienced in handling and application of coating, and be approved by coating manufacturer.

.2 Provide letter from coating manufacturer indicating conformance with above requirements.

## 1.4 SAMPLES

.1 Submit duplicate 150 mm x 75 mm samples of actual finish on sheet steel or sheet aluminum, to indicate colour.

## 1.5 MAINTENANCE DATA

.1 Provide maintenance data for cleaning and maintenance of finishes for incorporation into manual specified in Section 01 10 01 - General Requirements.

## 1.6 MAINTENANCE MATERIAL

.1 Provide one (1) 28 ml bottle of touch up paint, of same colour as coating.

# 2 Products

## 2.1 POWDER COATING

.1 Powder coating:
- .1 Coating: exterior grade, smooth matte finish, polyester based.
  - .1 Metallic: metallic finish with clear coat.
    - .1 Colour: as selected by Departmental Representative.
  - .2 Reflective: reflective finish with clear coat.
- .2 Pretreatment: of type as recommended by coating manufacturer for use over substrate.

.2 Use only one brand of coating for entire project, unless exact colour match between different brands can be proven.

## 3 Execution

### 3.1 PREPARATION

.1 Clean surfaces prior to pretreatment coating.

.2 Ensure surfaces to receive finish are dry and free of debris, oils, dust, or other deleterious materials.

.3 Clean surfaces to be coated as follows:

- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping dry with clean cloth or compressed air.
- .2 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .3 Allow surfaces to drain completely and to thoroughly dry.
- .4 If above procedures do not clean substrate surfaces, clean surfaces with high pressure water washing.

### 3.2 APPLICATION

.1 Apply pretreatment as soon as possible after cleaning and before surface deterioration occurs.

.2 Apply coating in accordance with manufacturer's written instructions to obtain minimum dry film thickness of 2.5 mil to 3.5 mil (0.064 mm to 0.089 mm).

### 3.3 SCHEDULE

.1 Use reflective finish where specified; metallic finish elsewhere.

END OF SECTION

# 1 General

## 1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A36/A36M-12, Specification for Structural Steel.
- .2 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .3 ASTM A325-10, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .4 ASTM A123/A123M-12 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

.2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
- .1 CISC/CPMA 2 - 75, Quick-Drying, Primer for use on Structural Steel.

.3 Canadian Standards Association (CSA International)
- .1 CAN/CSA G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-S16-09, Limit States Design of Steel Structures.
- .3 CAN/CSA-S136-07 (R2012), Cold Formed Steel Structural Members.
- .4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA W48-06 (R2011), Filler Metals and Allied Materials for Metal Arc Welding.
- .6 CSA W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .7 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
- .8 CAN/CSA-W117.2-12 - Safety in welding, cutting, and allied processes.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.5 The Society for Protective Coatings (SSPC)
- .1 SSPC SP-6/NACE No. 3-00, Commercial Blast Cleaning.

.6 National Building Code of Canada 2010.

## 1.2 QUALIFICATIONS

.1 Do welding in accordance with CSA-W59, by companies certified by, and welders qualified in accordance with CSA-W47.1, Division 1 or 2.

.2 Submit written documentation within two weeks after award of contract from the Canadian Welding Bureau certifying that the steel subcontractor is qualified to requirements of CSA-W47.1, Division 1 or 2.

.3 The Fabricator shall have established and audited engineering capability, provided by a registered professional engineer or engineers, employed on a full time basis or retained on a contractual basis, to provide the engineering necessary for the preparation of shop details and erection diagrams, and to establish engineering practices in order to maintain standards as set forth, and also to be responsible for any structural design when undertaken.

.4 Submit letter stating the fabricator's engineering capability within two weeks after award of contract.

.5 Quality Assurance program:
- .1 The Fabricator shall have a Quality Assurance program in place at the time of bidding, audited by a qualified (certified) independent 3rd party.
- .2 The steel fabricator shall be certified with the Canadian Institute of Steel Construction (CISC) Quality Certification Program (Steel Structures), or be certified under one of the following Quality System Programs.
  - .1 ISO 9001-2008.
  - .2 CAN/CSA Z299 (1, 2, 3).
  - .3 AISC Certification - Steel Building Structures.
- .3 Submit certification documentation within 2 weeks following award of contract.

1.3 DESIGN REQUIREMENTS

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

.2 The Fabricator is responsible for design and detailing of all steel connections.

.3 Shop connections shall be with 19 mm diameter high tensile bolts conforming to ASTM A325 or by welding.

.4 Field connections shall be with 19 mm diameter high tensile bolts conforming to ASTM A325. Field welded connections are not permitted unless indicated on drawings, or prior approval of specific welding procedure is obtained in writing from the Departmental Representative.

.5 Splicing of members is not permitted unless detailed on drawings.

.6 The Departmental Representative reserves the right to review the detail drawings to ensure compliance with tender documents. This review does not relieve the Fabricator from their responsibility for the connections.

.7 Beam to column connections shall be notched at the upper right corner of the plate, bracket or clip angle in order to clear the first supporting bolt of the previously installed beam.

.8 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 Non-composite beams: select or design connections for the maximum of either:
  - .1 If shears are not indicated, select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam.
  - .2 Design Shear as indicated on drawings.
- .3 Composite beams: select or design connections for the maximum of either:
  - .1 1.5 times the support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, as calculated for a non-composite beam.
  - .2 Design shear as indicated on drawings.

.9 Submit design calculations stamped and signed by qualified professional engineer licensed in Province of New Brunswick, Canada for non-standard connections and moment connections.

.10 Unless indicated otherwise, provide minimum 8 mm thick cap plate at tops of columns.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 10 01 General Requirements.

.2 Shop drawings shall be as defined by the CISC Code of Standard Practice for Structural Steel by the Canadian Institute of Steel Construction and will include:
- .1 Erection Diagrams,
- .2 Connection Design Details,
- .3 Shop Details,
- .4 Erection Procedures and Field Work Details.

.3 Submit the following for review:
- .1 Anchor rod plan.
- .2 Erection Diagrams and procedures.
- .3 Connection Design Details:
  - .1 Axial loaded beams.
  - .2 Bracing.
  - .3 Moment connections.
  - .4 Splice details.
  - .5 Indicate connection design loads on drawings.

.4 Erection drawings: indicate details and information necessary for assembly and erection purposes including:
- .1 Description of methods.
- .2 Sequence of erection.
- .3 Type of equipment used in erection.
- .4 Temporary bracings.

.5 Shop Details and Field work details to be made available on site to the Departmental Representative when requested, but are not to be submitted for review.

.6 Reproduction of contract drawings for use as shop drawings is not permitted.

.7 Connection design details, erection diagrams, shop details and field work details shall bear the seal of the fabricator's engineer, who shall be either registered or licensed to practice within the Province of New Brunswick. It shall be understood that in so stamping the diagrams and drawings, the fabricator's engineer is not accepting responsibility for design other than their own.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor’s waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Requiring Recycled Content”.

.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
.3 For products not identified on list, source products with highest recycled content available when practical.
.4 Include following information with product data submission.
.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.
.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
.1 Interior and Exterior Paints: GS-11
.2 Anti-Corrosive Paint: GS-11
.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
.1 General maximum VOC 25g/L.
.2 Electrical apparatus components and electronic components.
.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
.2 Refer to SCAQMD for additional information and clarification and complete list of applications.
.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.7 QUALITY ASSURANCE

.1 Submit one copy of mill test reports.
  .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.
  .2 Provide mill test reports certified by metallurgists qualified to practice in province of New Brunswick, Canada.

.2 Submit structural steel Fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

.3 Submit certification that all structural steel used in the work has a minimum recycled content of 85%.

.4 Submit, if requested, welding procedures prepared and sealed by the steel fabricator's engineer.

.5 Submissions shall be to Departmental Representative and shall be submitted at least 2 weeks prior to fabrication of structural steel.

.6 The Specialty Engineer responsible for the shop drawings, or the Specialty Engineer's representative, shall visit the site to review in place the connections and components designed by that Specialty Engineer. The Specialty Engineer shall be satisfied or take steps to ensure that these connections and components comply with the design. The Specialty Engineer shall provide a sealed and signed letter stating that the connections and components comply with the design.

1.8 PRECONSTRUCTION MEETING

.1 A site meeting shall be called two (2) weeks prior to start of work to review construction documents, proposed construction methodology and schedule. Representatives of the General Contractor, steel sub-contractor, steel sub-contractor's engineer, erection sub-contractor and the Departmental Representative shall attend.

.2 The General Contractor shall be responsible for recording and distributing the minutes of the meeting.

1.9 ARCHITECTURAL DRAWINGS

.1 Structural steel subcontractor shall review all architectural drawings, as well as structural drawings, to determine all structural materials and structural requirements as shown on these drawings.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate metal, plastic, paper packaging and corrugated cardboard and deposit in appropriate on-site recycling bins.

2 Products

2.1 MATERIALS

.1 Rolled structural steel W shape section material: to CSA-G40.21-M Grade 350W, ASTM A572 Grade 50 or ASTM A992 Grade 50.

.2 Hollow structural steel (HSS) section material: to CSA-G40.21-M Grade 350W, Class C or ASTM A500, Grade C.

.3 Channels, angles, rods and plate: CSA-G40.21-M Grade 300W.

.4 Anchor rods: to CSA G40.21 Grade 300W, complete with ASTM A563 nuts and ASTM F436 circular washers unless detailed otherwise.

.5 Bolts, nuts and washers: to ASTM A325.

.6 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
- .1 Electrodes: E49XX.

.7 Shop primer for structural steel exposed to view: to CISC/CPMA 2-75.

.8 Galvanizing touch up paint: zinc-rich, ready mixed to CAN/CGSB-1.183.

.9 Shear studs: to CSA W59, Appendix H.

.10 Below Grade Protective Coating:
- .1 Protective coating for structural steel columns encased below grade.
- .2 Single component, coal tar mastic.
- .3 Acceptable Products:
  - .1 Bitumastic 50 by Carboline.
  - .2 Amercoat 78 HB by PPG Protective & Marine Coatings.
  - .3 Bakor 810-14 by Henry Corporation Canada.

.11 Substitution for steel sections or materials shown on drawings and as specified are not permitted unless approved in writing by the Departmental Representative.

## 3 Execution

### 3.1 GENERAL

.1 Verify dimensions and condition of existing work, report any discrepancy and potential problem areas to Departmental Representative for direction before commencing fabrication.

.2 Structural steel work: in accordance with CAN/CSA-S16.

.3 Welding: in accordance with CSA W59.

.4 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.

### 3.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

.2 Install shear studs in accordance with CSA W59.

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

.4 Minimum fillet weld size - 6 mm.

### 3.3 SHOP PRIMING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16.1 and as indicated below.

.2 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter in accordance with SSPC SP1 (Solvent Cleaning).

.3 Clean steel to receive primer and to be left exposed in the finished work in accordance with SSPC SP6 (Commercial Blast Cleaning). Blast profile shall be at least 50 microns and not more than 75 microns.

.4 Steel members to be primed:
.1 All steel members.

.5 For members to be primed, as indicated above**,** apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 37 to 50 micrometers (1.5 to 2 mils), except:
.1 Surfaces to be encased in concrete.
.2 Surfaces to receive field installed stud shear connections.
.3 Surfaces and edges to be field welded.
.4 Faying surfaces of friction-type connections.
.5 Below grade surfaces in contact with soil.

.6 Apply primer under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.7 Maintain dry condition and 5 degrees C minimum temperature until primer is thoroughly dry.

.8 Strip primer from bolts, nuts, sharp edges and corners before prime coat is dry.

3.4 INORGANIC ZINC COATING

.1 Apply inorganic zinc coating to brick veneer support steel where indicated on drawings.

.2 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter in accordance with SSPC SP1 (Solvent Cleaning).

.3 Clean steel to receive inorganic zinc coating in accordance with SSPC SP6 (Commercial Blast Cleaning). Blast profile shall be at least 25 microns and not more than 75 microns.

.4 Apply coating in shop in accordance with coating manufacturer’s written instructions to achieve 50-75 microns dry film thickness minimum.

.5 After coating, cure in accordance with coating manufacturer’s written instructions.

3.5 BELOW GRADE PROTECTIVE COATING

.1 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter in accordance with SSPC SP1 (Solvent Cleaning).

.2 Clean steel to receive inorganic zinc coating in accordance with SSPC SP6 (Commercial Blast Cleaning). Blast profile shall be at least 25 microns and not more than 75 microns.

.3 Apply coating to base of columns located below slab in accordance with coating manufacturer’s written instructions to achieve 50-75 microns dry film thickness minimum.

.4 After coating, cure in accordance with coating manufacturer’s written instructions.

3.6 MARKING

.1 Mark materials in accordance with CAN/CSA G40.20/G40.21. Do not use die stamping. If steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.7 ERECTION

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

.2 Prior to erection, the steel contractor shall review and survey site conditions, dimensions and elevations for foundations, and locations/plumbness of anchor rods. Any discrepancies shall be immediately reported to the Departmental Representative.

.3 Make adequate provision for erection stresses and for sufficient temporary bracing to keep the structure plumb and in true alignment until completion of bracing connections, permanent bracing and installation of metal deck. This shall be the sole responsibility of the Contractor.

.4 Plumb, level and align steel work in accordance with CSA-S16. Set column bases true and level at proper elevation on steel shims or screeds ready for grouting.

.5 Support metal deck around columns using angles.

.6 Provide framing around all openings in accordance with typical details on drawings.

.7 Field welding of connections is not permitted unless approved in writing.

.8 Assemble structural joints using ASTM A325M high-strength bolts.

.9 When assembling beams to columns, the beam shall not be supported by a bar or connecting spanner.

.10 Field cutting or altering structural members is not permitted unless written approval of Departmental Representative is obtained.

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

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

3.8 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship.
- .1 Inspection and testing of materials and workmanship will be carried out by independent Testing Agency designated by Departmental Representative.
- .2 Contractor will pay costs of inspection and testing.
- .3 Copies of inspection reports are to be submitted to the Departmental Representative.
- .4 Provide safe access and working areas for testing on site, as required by Testing Agency.
- .5 Steel surface preparation, equipment, primer and top coat dry film thicknesses shall be verified by a qualified protective coatings inspection firm.
- .6 Fabrication shop inspection:
  - .1 Shop welding procedures - visual; x-ray of splices.

.2 Steel preparation for priming and painting.
.3 Inspection of steel materials.

.7 The following, at a minimum, are to be inspected at approximately 20% completion and at 60% completion of steel erection:
.1 Field erection procedures.
.2 Methods of temporary bracing.
.3 Procedures for aligning and securing bolted connections.
.4 Baseplate templates and anchor rod installation.
.5 Qualifications and welding certification of erector.
.6 Erector's welding procedures and equipment.
.7 Quality of site welding and conformance to shop drawings and contract drawings.
.8 Storage and handling procedures.
.9 Compare steel fabrication/mill reports with material on site.
.10 Quality of surface coating.

.8 When steel erection is approximately 98% complete, provide a final inspection of all work as follows:
.1 Plumb alignment of columns and other vertical building elements.
.2 Slope and camber of beams.
.3 Connections - on minimum representative sample of 25%.
.4 Quality of surface coating.

.9 Visual welding review will be carried out on all welding as outlined in CSA W59 by a Testing Agency certified to CSA W178.1 and inspectors certified to CSA W178.2.

.10 Inspection of connections shall be carried out during steel erection. Notify Departmental Representative and Testing Agency minimum 5 days prior to commencement of steel erection. The Contractor shall cooperate with and assist the Testing Agency by providing access to all parts of the work as required.

.11 Review of connections shall be carried out in accordance with CAN/CSA-S16.

.12 Review of erection tolerances shall be carried out in accordance with CAN/CSA-S16, including but not limited to: elevation of base plates, plumbness of columns, horizontal alignment of members and elevation of members.

.13 Cranked beam splices shall be tested by radiographic means in accordance with CSA W59. If a beam splice is found unacceptable, it shall be repaired by the steel fabricator at no additional cost to the Owner. Submit proposed repair details, stamped by fabricator's engineer, to Departmental Representative for review prior to carrying out repairs.

.14 Submit reports to Departmental Representative within 5 days of completion of review/testing.

.15 When defects or non-conforming work is revealed, the Departmental Representative may request, at the Contractor's expense, additional review or testing to ascertain the full extent of the defect or non-conforming work.

.16 Pay cost of Departmental Representative services incurred by the Owner resulting from un-conforming work identified by Departmental Representative and requiring remedial Departmental Representative services to correct the work.

3.9 DEPARTMENTAL REPRESENTATIVE'S GENERAL REVIEW.

.1 Departmental Representative will identify non-conforming work during general reviews of the Work and will submit written reports to Owner and Contractor.

.2 Pay cost of Departmental Representative services incurred by the Owner resulting from un-conforming work identified by Departmental Representative and requiring remedial Departmental Representative services to correct the work.

.3 The Departmental Representative's general review during construction is undertaken to inform the Owner of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of contractual responsibility.

3.10 FIELD TOUCH UP

.1 Touch up damaged primed surfaces with primer specified. Ensure surfaces are clean and prepared in accordance with these specifications.

.2 Spot-paint field welds, bolts, scratches, burns and abrasions with primer.

.3 Touch up damaged, scratched and burned surfaces of brick support steel with inorganic zinc coating specified.

END OF SECTION

# 1 General

## 1.1 REFERENCES

.1 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
- .1 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.

.2 Canadian Standards Association (CSA International)
- .1 CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA-S16-09, Limit States Design of Steel Structures.
- .3 CSA-S136-07 (R2012), Cold Formed Steel Structural Members.
- .4 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA-W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 CSA-W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).

.3 National Building Code of Canada 2010.

## 1.2 QUALITY ASSURANCE

.1 Submit 1 copy of mill test reports at least 4 weeks prior to fabrication of steel joists and accessories. Reports to show:
- .1 Chemical and physical properties.
- .2 Other details of steel to be incorporated into work.
- .3 Certification by qualified metallurgists confirming that tests conform to requirements of CSA G40.20/G40.21

.2 Supply affidavit prepared by fabricator of structural steel joists stating that materials and products used in fabrication conform to this specification.

.3 Submit certification of recycled content for all structural steel used in work.

## 1.3 DESIGN OF STEEL JOISTS AND BRIDGING

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

.2 Design joists and anchorages for uplift forces as indicated on drawings. In addition to the loads indicated, design joists for an unfactored concentrated load of 1.2 kN applied to any one panel point.

.3 Joist bearing shall be centered on supporting steel beam centerline unless noted otherwise.

.4 Bridging to be horizontal type unless indicated otherwise on drawings.

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

.6 Roof joists shall have cranked top chords as detailed on drawings to suit roof slope.

.7 Limit floor and 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 unless specified otherwise on drawings

.8 Submit one (1) copy of calculations and joist design drawings for typical joists for Departmental Representative's records at least 4 weeks prior to fabrication and/or delivery.

1.4 SHOP DRAWINGS

.1 Submit shop details and erection drawings in accordance with Section 01 10 01 General Requirements**.**

.2 Submit drawings stamped and signed by qualified professional engineer licensed in province of New Brunswick.

.3 Indicate on erection drawings, relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and details.

.4 Provide particulars, on shop drawings, 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.

.5 Reproduction of contract drawings is not permitted.

1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
- .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
- .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
- .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
- .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
- .1 Include following information with Product Data submission for materials specified under this section:
  - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.
.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
.1 Interior and Exterior Paints: GS-11
.2 Anti-Corrosive Paint: GS-11
.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
.1 General maximum VOC 25g/L.
.2 Electrical apparatus components and electronic components.
.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
.2 Refer to SCAQMD for additional information and clarification and complete list of applications.
.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate metal, plastic, paper packaging and corrugated cardboard and deposit in appropriate on-site recycling bins.

2 Products

2.1 MATERIALS

.1 Structural steel: to CSA-G40.20/G40.21 and CSA-S136.

.2 Welding materials: to CSA-W59.

.3 Shop paint primer: to CISC/CPMA-2.

2.2 FABRICATION

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

.2 Weld in accordance with CSA-W59.1.

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

.4 Provide diagonal and horizontal bridging and anchorages as indicated and as required for joist design. For spans greater than 12 m, connections shall be bolted.

.5 Coordinate bridging locations with Departmental Representative.

.6 Joist shoe height shall be as indicated on drawings.

2.3 SHOP PAINTING

.1 Clean, prepare and shop prime surfaces of steel joists to CAN/CSA-S16.1 and as indicated below.

.2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces in accordance with SSPC SP1 (Solvent Cleaning).

.3 Clean steel for painting in accordance with SSPC SP7 (Brush Off Blast Cleaning)

.4 Apply one coat of CISC/CPMA 2 primer to steel surfaces to achieve maximum dry film thickness of 37 to 50 micrometres (1.5 to 2.0 mils) except:
- .1 Surfaces to be encased in concrete.
- .2 Surfaces to receive field installed stud shear connectors and steel decks.
- .3 Surfaces and edges to be field welded.
- .4 Faying surfaces of friction-type connections.
- .5 Below grade surfaces in contact with soil.

.5 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.6 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.7 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

3 Execution

3.1 GENERAL

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

.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 CSA-W55.3 for resistance welding.

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

3.2 FIELD QUALITY CONTROL

.1 Review and testing of materials and workmanship.
- .1 Review and testing of materials and workmanship will be carried out by testing laboratory approved by Departmental Representative.
- .2 Testing laboratory will inspect representative joists for:
  - .1 Integrity, accuracy of fabrication and soundness of welds.
  - .2 Plumb alignment and spacing.
  - .3 Slope and camber.
  - .4 Connections.
- .3 Departmental Representative will pay costs of review and testing.
- .4 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .5 Visual welding review will be carried out on welding as outlined in CSA W59 by an inspector certified to CSA W178.2.

.6 Review of connections shall be carried out during steel erection. Notify Departmental Representative and Testing Company minimum 5 days prior to commencement of steel erection. The Contractor shall cooperate with and assist the Testing Company by providing access to all parts of the work as required.

.7 Review of connections shall be carried out in accordance with CAN/CSA-S16.

.8 Review of erection tolerances, including but not limited to: horizontal and vertical alignment of members and elevation of members, shall be carried out in accordance with CAN/CSA-S16.

.9 Submit test report to Departmental Representative within 5 days after completion of inspection.

.10 When defects or non-conforming work is revealed, the Departmental Representative may request, at the Contractor's expense, additional review or testing to ascertain the full extent of the defect or non-conforming work.

.11 Pay cost of Departmental Representative services incurred to correct work performed under this contract that does not conform to contract documents.

3.3 DEPARTMENTAL REPRESENTATIVE'S GENERAL REVIEW.

.1 Departmental Representative will identify non-conforming work during general reviews of the Work and will submit written reports to the Contractor.

.2 Pay cost of Departmental Representative services incurred resulting from un-conforming work identified by Departmental Representative and requiring remedial Departmental Representative services to correct the work.

.3 The Departmental Representative's general review during construction is undertaken to inform of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of contractual responsibility.

3.4 ERECTION

.1 Erect steel joists and bridging as indicated in accordance with CAN/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: to approval of Departmental Representative. Do not commence work until written approval be Departmental Representative is received.

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

3.5 FIELD TOUCH-UP

.1 Touch up all damaged surfaces with CISC/CPMA-2 in accordance with manufacturers' recommendations to CAN/CGSB-85.10.

END OF SECTION

# 1 General

## 1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A653/A653M-09, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)
- .1 CAN/CSA-S16-09, Limit States Design of Steel Structures.
- .2 CSA-S136-07 (R2012), Cold Formed Steel Structural Members.
- .3 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
- .4 CSA W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .5 CSA W59-03 (R2008), Welded Steel Construction, (Metal Arc Welding).

.4 Canadian Sheet Steel Building Institute (CSSBI)
- .1 CSSBI 10M-08, Standard for Steel Roof Deck.
- .2 CSSBI 12M-08, Standard for Composite Steel Deck.

## 1.2 QUALITY ASSURANCE

.1 Erection companies: certified by the Canadian Welding Bureau (CWB) under CSA W47.1.

.2 Welding operators: qualified by the Canadian Welding Bureau for light gauge metal deck welding.

.3 Submit copies of certifications minimum two (2) weeks prior to erection.

.4 Submit certification of recycled content for all structural steel used in work.

## 1.3 DESIGN REQUIREMENTS

.1 Deck units shall span continuously over at least three spans unless single span is required in order to accommodate roof slope.

.2 Steel deck is not to be used to support or attach suspended ceiling hangers, equipment or materials from other trades.

## 1.4 POWDER ACTUATED FASTENER SYSTEM (OPTIONAL)

.1 Contractor is permitted, as specified below, to utilize powder actuated fastener system in lieu of welding deck to supporting steel.

.2 Additional cost for use of power actuated fastener system, if any, shall be borne by Contractor and shall not result in increase in contract price.

.3 Submit manufacturer’s proposed powder actuated fastener to the Departmental Representative for review and approval minimum of 4 weeks prior to erection of deck. Include size, spacing and other relevant data.

.4 Fasteners shall be equal to or exceed the strength and stiffness of the welded deck. Documentation shall indicate that proposed fasteners meet or exceed strength of weld patterns indicated on drawings.

.5 Documentation shall be stamped by an engineer licensed to practice in the Province of New Brunswick.

.6 Maintain manufacturer's recommended head standoff.

.7 Have manufacturer's technical representative on site prior to start of deck fastening to provide training on proper use of fastening system. Inform Departmental Representative in writing minimum 5 days prior to technical representative being on site.

.8 Manufacturer's representative shall:

.1 Observe the fastening of the deck (minimum 10% of deck area) to ensure fasteners are installed in accordance with manufacturer's requirements.

.2 Provide written documentation stating proper training of workers has been conducted and fastening of deck for this project has been carried out in accordance with manufacturer's recommendations. Submit copy to Departmental Representative within 5 days thereafter.

## 1.5 SUBMITTALS

.1 Shop Drawings

.1 Submit shop drawings erection and shoring drawings in accordance with Section 01 10 01 General Requirements.

.2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of New Brunswick.

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

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

.5 Reproduction of contract drawings is not permitted.

## 1.6 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.

.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor’s waste management final report.

.2 Recycled Content.

.1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Requiring Recycled Content”.

.2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.

.3 For products not identified on list, source products with highest recycled content available when practical.

.4 Include following information with product data submission.

.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.
.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
.1 Interior and Exterior Paints: GS-11
.2 Anti-Corrosive Paint: GS-11
.3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.
.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
.1 General maximum VOC 25g/L.
.2 Electrical apparatus components and electronic components.
.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
.2 Refer to SCAQMD for additional information and clarification and complete list of applications.
.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

2 Products

2.1 MATERIALS

.1 Zinc (Z) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with Z275 coating, regular spangle surface, minimum base steel thickness as indicated on drawings.

.2 Closures: in accordance with manufacturer's recommendations unless specified otherwise.

.3 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness to match deck. Metallic coating same as deck material.

.4 Stitch screws: Hilti #10 screw or an approved equal.

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

2.2 TYPES OF DECKING

.1 Metal deck to be as manufactured by Canam, Vic-West or Acceptable Material.

.2 Steel roof deck: minimum base steel thickness, depth and profile as indicated on drawings, non-cellular, overlapping side laps.

.3 Composite steel floor deck: minimum base steel thickness, depth and profile as indicated on drawings, non-cellular, embossed fluted profile, overlapping side laps.

3 Execution

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S136 , CSSBI 10M and CSSBI 12M unless specifications and drawings indicate more stringent requirements.

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

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

.4 Store and protect decking on site on wood blocking and clear of ground to prevent damage and to keep foreign material from accumulating. Ensure bundles are sloped slightly to prevent water accumulation.

3.2 ERECTION

.1 Erect steel deck as indicated on drawings and in accordance with reviewed erection drawings.

.2 Welding of deck shall not commence until a valid welding certificate for the deck welder is submitted and approved by Departmental Representative.

.3 Do not permit overloading of, or damage to, placed deck due to storage of material or other construction work.

.4 Unless noted otherwise on drawings, weld decking to supporting steel perpendicular to deck span with 20 mm diameter fusion welds through the low rib of the deck at a maximum of 300 mm on centre at intermediate supports and 150 mm on centre at ends of deck sheets and deck sheet overlaps.

.5 Where deck is bearing on steel parallel to deck span, weld through low rib of deck with 20 mm diameter fusion welds at maximum of 300 mm centres.

.6 Replace all decking that has been stained from water damage, has been damaged or bent.

.7 Steel decking shall not be installed until all steel has been bolted, welded and plumbed.

.8 Ensure deck is properly positioned before attaching. Mark joist/beam locations onto metal deck during erection in order to correctly position arc-spot welds or pins.

.9 Ensure deck is in full contact with beam flange/joist chord at point of welding or fastening with no gap greater than 1.5 mm, and no deleterious material interposed between deck and joist chord (with the exception of primer).

.10 Fasten deck units through low rib to supporting steel. Arc spot welds shall have a 20 mm nominal top diameter.

.11 Secure deck with arc spot welds or pin fasteners, and stitch screw overlaps as detailed on drawings.

.12 Install sheet metal closure strips at edges of concrete slabs unless detailed otherwise.

.13 Immediately after deck is permanently secured in place, touch up metallic coated top surface of deck with zinc-rich paint where burned by welding. Touch up steel where burned by welding of deck with touch-up primer as specified in Section 05 12 23.

.14 Repair of deck burned through by welding are to be repaired to the satisfaction of Departmental Representative.

.15 At deck end joint overlaps, weld each side of lap joint to structural support. Minimum end lap - 100 mm.

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

.17 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.

## 3.3 CLOSURES

.1 Install closures in accordance with approved details.

## 3.4 OPENINGS AND AREAS OF CONCENTRATED LOADS

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

.2 All openings indicated on drawings shall be cut by deck erection subcontractor.

.3 Frame deck openings with any one dimension between 150 to 300 mm as recommended by manufacturer, except as otherwise indicated.

.4 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

## 3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship.

- .1 Inspection and testing of materials and workmanship will be carried out by an independent Testing Agency designated by Owner and approved by Departmental Representative.
- .2 Departmental Representative will pay costs of inspection and testing.
- .3 Provide safe access and working areas for testing on site, as required by Testing Agency and as authorized by Departmental Representative.

.4 The following, at a minimum, are to be inspected at approximately 20% completion and at 60% completion of steel deck erection:
  .1 Field erection procedures.
  .2 Welding procedures, weld types and locations.
  .3 Lap joints at side and ends of panels.
  .4 Deck cover plates.
  .5 Adequate reinforcing of openings.
  .6 Condition of deck surface coating and touch up primer.

.5 Visual welding review will be carried out on all welding as outlined in CSA W59 by an inspector certified to CSA W178.2.

.6 Notify Departmental Representative and Testing Agency minimum 5 days prior to commencement of steel erection. The Contractor shall cooperate with and assist the Testing Agency by providing access to all parts of the work as required.

.7 Submit reports to Departmental Representative within 5 days of completion of review/testing.

.8 When defects or non-conforming work is revealed, the Departmental Representative may request, at the Contractor's expense, additional review or testing to ascertain the full extent of the defect or non-conforming work.

.9 Pay cost of Departmental Representative services incurred by the Owner resulting from un-conforming work identified by Departmental Representative and requiring remedial Departmental Representative services to correct the work.

3.6 DEPARTMENTAL REPRESENTATIVE'S GENERAL REVIEW.

.1 Departmental Representative will identify non-conforming work during general reviews of the Work and will submit written reports to Owner and Contractor.

.2 Pay cost of Departmental Representative services incurred by the Owner resulting from un-conforming work identified by Departmental Representative and requiring remedial Departmental Representative services to correct the work.

.3 The Departmental Representative's general review during construction is undertaken to inform the Owner of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve the Contractor of contractual responsibility.

END OF SECTION

# 1 General

## 1.1 RELATED REQUIREMENTS

.1 Section 06 16 43 - Gypsum Sheathing.

.2 Section 09 22 16 - Non-structural Metal Framing.

## 1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM A653/A653M-05a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A879/A879M-12, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.

.2 American Welding Society (AWS)
- .1 AWS D1.3/D1.3M:2008, Structural Welding Code - Sheet Steel; Fifth Edition.

.3 Canadian Standards Association (CSA)
- .1 CSA S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
- .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
- .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready Mixed Organic Zinc-Rich Coating.

## 1.3 DESCRIPTION OF SYSTEM

.1 Structural stud systems includes:
- .1 Wall studs subjected to lateral loads. No axial load other than self-weight and weight of applied finishes.
- .2 Steel bridging.
- .3 Top and bottom track.
- .4 Head and sill members and jamb studs for wall openings.
- .5 Stud, bridging and track connections.
- .6 Top and bottom track connections to main structure including detailing to accommodate floor deflections.

## 1.4 DEFINITIONS

.1 Camber: the deviation from straightness of a member or any portion of a member with respect to its major axis.

.2 Sweep: the deviation from straightness of a member or any portion of a member with respect to its minor axis.

## 1.5 DESIGN CRITERIA

.1 Design shall be based on Limit States Design principles using factored loads and resistances.

.2 Loads and load factors: in accordance with National Building Code of Canada 2010.

.3 Resistances and resistance factors: determine in accordance with National Building Code of Canada 2010 and CSA S136.

.4 Allow for loading and provide blocking for antenna and other wall mounted items.

.5 Conform to requirements of specified fire rated assemblies.

.6 Design bridging to prevent member rotation and member translation perpendicular to minor axis. Provide for secondary stress effects due to torsion between lines of bridging.

.7 Maximum deflections under specified loads shall conform to the following:
- .1 Wall studs supporting materials susceptible to cracking (ie. masonry veneer, portland cement plaster, ceramic tile) L/720.
- .2 Wall studs supporting materials not susceptible to cracking (ie. metal cladding, synthetic veneers) L/360.

.8 Design components and assemblies to accommodate specified erection tolerances of the structure.

.9 Maximum spacing of wall studs: 400 mm o.c.

.10 Allow for movement of structure. Design stud end connections to accommodate floor/roof deflections such that studs are not loaded axially.

.11 Make connections between lightweight steel framing members using bolts, sheet metal screws or by welding.

.12 Base the resistance for sheet metal screws on manufacturer's lower bound test values multiplied by appropriate resistance factor φc, given in CSA S136.

.13 Double (nested) track system required at top of stud walls.

.14 Design steel stud framing system for exterior walls. Design shall allow for openings such as doors, window, louvres, etc.

## 1.6 STORAGE OF MATERIALS

.1 Protect products from conditions that may cause physical damage or corrosion.

## 1.7 SOURCE QUALITY CONTROL

.1 Prior to commencement of work, submit two (2) certified copies of mill reports covering chemical and mechanical properties, and coating designation of steel used in this work.

## 1.8 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit two (2) copies of the following in accordance with Section 01 10 01 - General Requirements.

.3 Samples: representative pieces of framing component parts including mechanical fasteners if used. Length of pieces submitted need not exceed 300 mm. Tag pieces with the name of part, metal thickness exclusive of coating and manufacturer.

.4 Calculations: engineering calculations or data verifying capacity of members and ability of assemblies to meet design requirements.

.5 Shop drawings:
- .1 Each shop drawing submitted shall bear the stamp and signature of a qualified professional engineer registered in the Province of New Brunswick.

.2 Include necessary shop details and erection diagrams. Indicate member sizes, locations, thicknesses exclusive of coating, coatings and materials. Include connection details for attaching framing to itself and for attachment to structure. Show splice details where permitted. Indicate dimensions, openings, requirements of related work and critical installation procedures. Show temporary bracing required for erection purposes.

.3 Indicate design loads.

.4 No splices allowed in studs.

.5 Drawings indicate limitations on braces. Show bracing detail to reduce vertical span.

.6 Field review reports: as required in Article 3.8.

1.9 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.

.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.

.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".

.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.

.3 For products not identified on list, source products with highest recycled content available when practical.

.4 Include following information with product data submission.

.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.

.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".

.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:

.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.

.1 Include following information with Product Data submission for materials specified under this section:

.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.

.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.

.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:

.1 Interior and Exterior Paints: GS-11

.2 Anti-Corrosive Paint: GS-11

.3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.

.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.10 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):

.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:

.1 General maximum VOC 25g/L.

.2 Electrical apparatus components and electronic components.

.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.

.2 Refer to SCAQMD for additional information and clarification and complete list of applications.

.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements and 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, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect structural metal studs from nicks, scratches, and blemishes.

.3 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.

.4 Handle and protect galvanized materials from damage to zinc coating.

.5 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Steel: to CSA S136 and identified as to specification, type, grade and mechanical properties.

.1 Minimum steel thickness, exclusive of coating: 1.52 mm for wall studs.

.2 Zinc coating: to ASTM A653/A653M.

.3 Members forming part of exterior building envelope shall have a minimum coating of Z180 galvanizing in accordance with ASTM A653/A653M. Other coatings, such as aluminum-zinc alloy, providing equal or better corrosion protection may be used.

.1 Interior members not forming part of exterior building envelope shall have a minimum coating of Class C electrogalvanizing in accordance with ASTM A879/A879M. Other coatings, such as electro-deposited zinc, chromate treated, zinc-iron alloy or aluminum-zinc alloy, providing equal or better corrosion protection may be used.

.2 Sheet metal screws shall have a minimum coating thickness of 0.008 mm of zinc or cadmium. Other coatings providing equal or better corrosion protection may be used.

.4 Welding electrodes: to CSA W59; 480 MPa minimum tensile strength series (e.g., E480XXX, E480S-X).

.5 Touch-up primer: zinc rich, to CAN/CGSB-1.181.

3 Execution

3.1 GENERAL

.1 Fabrication and erection shall conform to reviewed shop drawings. Modifications required to accommodate as-built conditions other than minor dimensional changes) shall be submitted for review.

3.2 WELDING

.1 Do welding in accordance with CSA W59.

.2 Companies engaged in welding shall be certified by the Canadian Welding Bureau in accordance with CSA W47.1, and have welding procedures approved and welders qualified for base material types and thicknesses being welded.

.3 Welds shall conform to CSA W59 or AWS D1.3/D1.3M whichever is applicable.

.4 For material less than 3 mm thick, shop drawings may show nominal weld leg sizes. For such material, the effective throats of welds shall not be less than thickness of thinnest connected part.

.5 Touch up welds with touch-up paint.

3.3 SCREWS

.1 Diameter of steel screws shall equal or exceed minimum diameter indicated on shop drawings.

.2 Ensure screw penetration beyond joined materials is not less than 3 exposed threads.

.3 Thread types and drilling capability shall conform to manufacturer's recommendations.

.4 Screws covered by sheathing materials shall have low profile heads.

3.4 FABRICATION

.1 Do not fabricate until shop drawings are reviewed.

.2 Cutting of members may be by saw or shear. Torch cutting is not permitted.

.3 Fabrication tolerances for members shall be as follows:

| Member Type | Member Depth A (mm) | Flange Width B (mm) | Lip Length C (mm) | Thickness T (mm) | Inside Radius r (mm) | Corner Angles |
|---|---|---|---|---|---|---|
| Track, stud joist or rafter | -1, +2 | -1, +2 | -0, +4 | -0 | | +30 |

.4 Mark steel thickness, exclusive of coating, on each member by embossing, stamping with indelible ink or by colour coding.

3.5 ERECTION

.1 Methods of construction may be either piece-by-piece (stick-built) or by fabrication into panels (panelized) either on or off site.

.2 Erect lightweight steel framing true and plumb within specified tolerances. Employ temporary bracing wherever necessary to withstand loads to which structure may be subject during erection and subsequent construction. Leave temporary bracing in place as long as required for safety and integrity of structure. Erector shall ensure that during erection a margin of safety consistent with requirements of the National Building Code and CSA S136 exists in the uncompleted structure.

.3 Seat studs into top and bottom tracks.

.4 Take field measurements necessary to ensure proper fit of members.

.5 Place insulation equal to that specified in jamb and header assemblies that will be inaccessible after their installation into wall. Insure that insulation is kept dry and not compressed.

.6 Handling and lifting of prefabricated panels shall not cause permanent distortion to any member or collateral material.

3.6 ERECTION TOLERANCES

.1 Wind bearing studs:
- .1 Plumbness: not exceed 1/500th of member length.
- .2 Straightness (camber and sweep): not to exceed 1/1000th of member length.

.2 Track:
- .1 Camber: not to exceed 1/1000th of member length.

.3 Gap between end of stud and web of track shall not exceed 4 mm for wind bearing studs.

.4 Align adjacent prefabricated panels to provide surface continuity at interface.

.5 Spacing: not more than 3 mm from design spacing. Cumulative error in spacing shall not exceed requirements of finishing materials.

3.7 CUTOUTS

.1 Provide cutouts centred in webs of members to accommodate services.

.2 Maximum size of cutouts for services as follows:

| Member Depth (mm) | Across the Member Web (mm) | Along the Member Length (mm) | Centre to Centre Spacing (mm) |
|---|---|---|---|
| 92<br>>152 | 40 max.<br>45 max. | 105 max.<br>115 max. | 600 min.<br>600 min.<br>300 min. to end of member |

.3 Consider the effect of cut-outs on strength and stiffness of member.

3.8 INSPECTION

.1 Lightweight steel framing design engineer, responsible for the production of shop drawings, shall provide periodic field review during construction and shall submit reports in accordance with Article 1.8.

.1 Contractor shall pay for field review.

.2 Additional inspection and testing of materials and workmanship will be carried out by a qualified independent inspection agency as specified under Section 01 45 00 - Quality Control.

.1 Inspection shall include:

.1 Checking that mill test reports are properly correlated to materials.

.2 Sampling fabrication and erection procedures for general conformity to requirements of specification.

.3 Checking that welding conforms to requirements of Article 3.2.

.4 Checking fabricated members against specified member shapes.

.5 Visual inspection of welded connections including sample checking of joint preparation and fit-up.

.6 Sample checking of screwed and bolted joints.

.7 Sample checking that tolerances are not exceeded during fit-up or erection.

.8 Additional inspection and testing of welded connections as required by CSA W59.

.9 General inspection of field cutting and alterations required by other trades.

END OF SECTION

# 1 General

## 1.1 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-Place Concrete: installation of embedded parts.

.2 Division 4 - Masonry.

.3 Section 05 05 14 - Powder Coating.

.4 Section 05 12 23 - Structural Steel for Buildings.

.5 Section 05 21 00 - Steel Joist Framing.

.6 Section 05 31 00 - Steel Decking.

.7 Section 09 91 23 - Painting.

## 1.2 DEFINITIONS

.1 Miscellaneous metal items: all metal items shown on the following drawings: Civil (200-Series), Concrete (300-Series) excluding columns which are by structural, and Architectural (600-Series).

.2 Structural steel items: all items shown on Structural Steel Drawings (500-Series) and columns shown on Concrete Drawings (300-Series). Structural steel items are specified in Section 05 12 23 – Structural Steel for Buildings.

## 1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM A36/A36M-12, Standard Specification for Carbon Structural Steel.

.2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.3 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength.

.4 ASTM A325-14, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.5 ASTM A563-15, Specification for Carbon and Alloy Steel Nuts.

.6 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.7 ASTM B241/B241M-12e1, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

.8 ASTM D4956-13, Standard Specification for Retroreflective Sheeting for Traffic Control.

.9 ASTM F436-11, Standard Specification for Hardened Steel Washers.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA)

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

.2 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.

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

.4 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.

1.4 CODES AND STANDARDS

.1 Do welding in accordance with CSA W59, by companies certified by, and welders qualified in accordance with, CSA W47.1, Division 1 or 2.1.

.2 Submit written documentation within two weeks after award of contract from the Canadian Welding Bureau certifying that the steel subcontractor is qualified to requirements of CSA W47.1, Division 1 or 2.1.

.3 National Building Code of Canada 2010.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop drawings
.1 Show sections and plans; dimensions and assembly of components, anchors, welded, and bolted connections.
.2 Submit shop drawing for review before any fabrication begins.

.3 Samples
.1 Submit one (1) full size sample of security bollard. In-ground portion of bollard not required.
.2 Make modifications to sample as required by Departmental Representative.
.3 Sample will be used as standard for bollard construction.

1.6 SUSTAINABLE DESIGN SUBMITTALS

.1 Construction waste management plan.
.1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.

.2 Recycled Content.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
.2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
.3 For products not identified on list, source products with highest recycled content available when practical.
.4 Include following information with product data submission.
.1 Percentage of pre-consumer and post-consumer recycled content for each product.

.3 Regional Materials.
.1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
.2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
.1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.

.4 Adhesives and Sealants.
.1 Include following information with Product Data submission for materials specified under this section:
.1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

.5 Paints and Coatings.
.1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
.2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
.1 Interior and Exterior Paints: GS-11
.2 Anti-Corrosive Paint: GS-11
.3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.
.3 Submit manufacturer's certification indicating VOC limits of Products.

.6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

.1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
.1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
.1 General maximum VOC 25g/L.
.2 Electrical apparatus components and electronic components.
.3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
.2 Refer to SCAQMD for additional information and clarification and complete list of applications.
.3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, handle, and protect materials in a safe manner and in accordance with Section 01 10 01 – General Requirements.

.2 Deliver the products to the site in the largest practical sections. Tag or mark all items for identification.

.3 Schedule delivery of products and arrange storage area with Contractor.

2 Products

2.1 MATERIALS

.1 Steel plates and rods: CSA G40.20/G40.21, 300W.

.2 Rolled structural steel section material: to CSA G40.20/G40.21, 350W.

.3 Hollow structural steel (HSS) section material: to CSA G40.20/G40.21, 350W Class C; or ASTM A500, Grade C.

.4 Steel pipe: to ASTM A53/A53M, standard weight; black, galvanized, or heavy weight where indicated.

.5 Screws:
.1 Tamper-resistant: self-drilling, self-tapping, round or pan head, fabricated of 18-8 stainless steel; pin-type tamper-resistant style approved by Departmental Representative.

.6 Nuts and bolts:
.1 High-strength bolts: to ASTM A325M.
.2 Ordinary bolts: to ASTM A307.
.3 Anchor bolts: to ASTM A36/A36M complete with ASTM A563 nuts and ASTM F436 circular washers.

.7 Anchors:
.1 Adhesive anchors: HVA or HY 200 by Hilti or Epcon System by ITW Readhead.

.8 Primer: having MPI E2 or E3 "Environmentally Friendly" rating.
.1 Shop coat primer: to MPI#79 for interior or exterior use; MPI#76 for interior only.
.2 Zinc-rich primer: : to CAN/CGSB-1.181 or MPI#18.

2.2 WORKMANSHIP AND FABRICATION

.1 Fabricate miscellaneous metal work with structural qualities to withstand strain and stresses to which the item will be subjected.

.2 Fit and shop-fabricate the various items of work in sections as large and complete as possible. Make inconspicuous connections, and clearly mark matching surfaces to ensure correct reassembly on the site. Do not use paint or grease markers for identifying steel work sections.

.3 Fabricate the work true to dimensions and free from distortion and defects detrimental to the appearance and performance. Accurately fit joints and intersecting members with adequate fastening.

.4 Weld connections where possible; otherwise, bolt connections. Ensure bolts are free of burrs, deformations, discolorations, or other blemishes and of the same material, texture, colour, and finish as the base material on which they occur, unless required for structural or safety reasons.

.5 Drill or punch holes in base and template plates.

.6 Provide all miscellaneous clips, anchors, and necessary accessories.

.7 Separate dissimilar metals to prevent galvanic corrosion using fibrated paint.

.8 Grind exposed welds and steel sections smooth.

2.3 GALVANIZING

.1 Prepare irregular shaped items for hot-dipped galvanizing after fabrication as follows:
.1 Clip or drill holes at corners, closed ends of pipe and other areas where air may accumulate and prevent acid bath from completely cleaning surfaces.
.2 Make provisions in surface that will be hidden from view after installation. If all surfaces to be exposed to view, then obtain approval for location from Departmental Representative.
.3 Plug small holes after galvanizing with pear shaped lead, filed off smooth.
.4 Provisions for galvanizing shall not be detrimental to strength of item being galvanized.

.2 Hot-dip galvanize items in accordance with CAN/CSA-G164-M; where possible, galvanize after fabrication.

.3 Galvanize items as scheduled herein and indicated on drawings.

2.4 SHOP PAINTING

.1 Shop primer:
- .1 Thoroughly clean steel work to receive primer in accordance with manufacturer's written instructions and apply one coat, unadulterated, to items with exception of stainless steel, aluminum, galvanized items, surfaces to be embedded in concrete, and machined surfaces.
- .2 Clean surfaces to be field-welded and do not paint.

.2 Powder coating: as specified in Section 05 05 14 - Powder Coating.

2.5 MISCELLANEOUS METAL ITEMS

.1 Contractor is responsible for all miscellaneous metal items shown and specified.

.2 Refer to drawings for location, layout, and details of all miscellaneous items. Existing Work or Work supplied by others is indicated on the drawings.

.3 Fabricate items from steel unless noted otherwise.

.4 Miscellaneous metal items consist of, but are not limited to, the following:
- .1 Steel lintels for masonry:
  - .1 Prime finished for interior application; galvanized at exterior.
  - .2 Lintels supplied under this section and installed under Division 4 – Masonry.
- .2 Masonry wall lateral support:
  - .1 Lateral support supplied under this section and installed under Division 4 – Masonry.
- .3 Embedded plates in masonry walls.
- .4 Security bollards: galvanized steel pipe with powder coat finish as specified in Section 05 05 14 - Powder Coating. Use reflective powder coat finish in reveals.
- .5 Overhead door frames:
  - .1 Fabricate frame for overhead door from materials as indicated.
  - .2 Extend jambs of frame and provide plates for mounting of counterbalance and electric operator.
  - .3 Coordinate locations and spacing of plates with overhead door manufacturer.
- .6 Bent steel plate under threshold at Penthouse doors.
- .7 Architectural metal post.
- .8 Metal frame and bolts for bench.
- .9 Steel framing supports for casework.
- .10 Exterior handrail; galvanized and powder coated.

3 Execution

3.1 GENERAL

.1 Take necessary field dimensions where required before fabrication.

.2 Repair items with errors in fabrication, or where damaged during installation, to satisfaction of Departmental Representative. If items are beyond repair, replace with new at no additional cost to Departmental Representative. Departmental Representative's decision as to repair or replacement is final.

.3 Hand items over for casting into concrete or building into masonry.

3.2 INSTALLATION

.1 Install the work of this section using skilled craftsmen in accordance with industry standards (best practices) and according to the manufacturer's recommendations, where applicable.

.2 Install the work plumb, level, and structurally free from defects detrimental to the finished appearance. Install work rigidly and securely.

.3 Insulate where necessary to prevent electrolysis due to metal-to-metal contact, or contact between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper, or other suitable and approved means.

.4 Provide all drilling of concrete, masonry, or other materials for fastening of work specified in this section.

.5 Touch up bolts, field welds, and burned or scratched surfaces with primer.

END OF SECTION

# 1 General

## 1.1 RELATED REQUIREMENTS

.1 03 30 00 - Cast-in-Place Concrete: concrete fill for treads and landings.

.2 05 50 00 - Metal Fabrications.

.3 09 91 13 - Painting.

.4 10 95 00 - Miscellaneous Specialties: aluminum ship ladder.

## 1.2 REFERENCES

.1 ASTM International (ASTM).
- .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .2 ASTM A325M-13, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.
- .3 ASTM A1064/A1064M-13, Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 Canadian Standards Association (CSA)
- .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
- .2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.

.5 National Association of Architectural Metal Manufactures (NAAMM)
- .1 NAAMM AMP510-92, Metal Stairs Manual, Fifth Edition.

## 1.3 STAIR DESIGN CRITERIA

.1 Design stairs in accordance with National Building Code.

.2 Fabricate stairs to support a minimum uniform live load of 4.8 $kN/m^2$.

.3 Fabricate railing assembly to withstand a minimum uniform live load of 1.5 kN/m applied horizontally and vertically, but not simultaneously at any point.

.4 Detail and fabricate stair components not detailed on drawings in accordance with NAAMM Metal Stairs Manual.

## 1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of New Brunswick, Canada.
- .2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Steel plates and rods: CSA G40.20/G40.21, 300W.

.2 Rolled structural steel section material: to CSA G40.20/G40.21, 350W.

.3 Steel pipe: to ASTM A53/A53M, standard weight, black.

.4 Welding materials: to CSA W59.

.5 High strength bolts: to ASTM A325M.

.6 Welded wire mesh: to ASTM A1064/A1064M.

.7 Grating tread:
- .1 Grating: to ANSI/NAAMM MBG 531, steel, Type 19-4, bearing bar size to suit; serrated walking surface, hot-dipped galvanized finish.
- .2 Nosing: checker plate.

2.2 FABRICATION

.1 Fabricate 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 stairs in sections as large and complete as practicable.

2.3 STEEL PAN STAIRS

.1 Fabricate stairs with closed riser steel pan construction.

.2 Close ends and openings of stringers where exposed.

.3 Tack-weld wire mesh in treads.

.4 Finish: prime painted.

2.4 GRATING STAIRS

.1 Secure steel grating treads to stringers.

.2 Finish: prime painted stringers.

2.5 PIPE BALUSTRADES AND HANDRAILS

.1 Construct balusters and handrails from steel pipe.

.2 Cap and weld exposed ends of balusters and handrails.

.3 Terminate at abutting wall with end flange.

.4 Remove rough and sharp areas on travel surfaces.

.5 Finish: prime painted for interior work; hot dipped galvanized for exterior.

2.6 FINISHES

.1 Primer: having MPI E2 or E3 "Environmentally Friendly" rating.
- .1 Shop coat primer: to MPI#79 for interior or exterior use; MPI#76 for interior only.

2.7 SHOP PAINTING

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

.2 Apply one coat of primer except interior surfaces of pans.

.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°C.

.5 Do not paint surfaces to be field welded.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal stair 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.

3.2 INSTALLATION OF STAIRS

.1 Install stairs 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.

3.3 CLEANING

.1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.4 PROTECTION

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

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

END OF SECTION