

**Part 1 General**

**1.1 RELATED SECTIONS**

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

**1.2 REFERENCES**

- .1 2012 Ontario Building Code;
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.40-97 Anticorrosive Structural Steel Alkyd Primer;
  - .2 CAN/CGSB 85.10-99, Protective Coatings for Metals;
  - .3 CAN/CGSB 1.181-99 Ready-Mixed Organic Zinc-Rich Coating;
- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
  - .1 CISC/CPMA 1-73a, 1975 Quick-Drying, One-Coat Paint for Use on Structural Steel.
  - .2 CISC/CPMA 2-75, 1975 Quick-Drying, Primer for use on Structural Steel.
- .4 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM A36/A36M-05, Standard Specification for Carbon Structural Steel.
  - .2 ASTM A307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - .3 ASTM A 325-06, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - .4 ASTM A 325M-05, Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric).
- .5 Canadian Standards Association (CSA International)
  - .1 CAN/CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
  - .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CAN/CSA-S16-01, Limit States Design of Steel Structures.
  - .4 CAN/CSA-S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members;
  - .5 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
  - .6 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

Project No. R.068270.006

- .7 CSA W55.3-1965 (R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 The Society for Protective Coatings (SSPC)
  - .1 SSPC SP-3-82 (R2004), Power Tool Cleaning.
  - .2 SSPC SP-6-00 (R2004) / NACE No. 3 Commercial Blast Cleaning.
- .7 Master Painters Institute
  - .1 MPI-INT 5.1-98, Structural Steel and Metal Fabrications.
  - .2 MPI-EXT 5.1-98, Structural Steel and Metal Fabrications.

### 1.3 DESIGN REQUIREMENTS

- .1 Design details and connections to requirements of CAN/CSA-S16-01 to resist forces, moments and shears indicated.
  - .1 Where forces not indicated:
    - .1 Unless beam supports concentrated loads, design beam connections to support reactions from maximum uniformly distributed load that can be safely supported by beam in bending.
    - .2 Where beam supports concentrated loads, request design reactions from Departmental Representative.
  - .2 Design connections in line with brace frames to resist lateral forces (tension and compression) indicated on the drawings.
  - .3 Bolts shall be bearing type, except for connections of members noted as carrying reversing axial load. For connection of members carrying reversing axial load, bolts in shear shall be slip critical, assuming a load factor of 1.5 for determining service loads
  - .4 Design brace frame connections in Code specified locations of seismic activity to requirements of CAN/CSA-S16-01, Clause 27.
  - .5 Design moment frame connections in Code specified locations of seismic activity to requirements of CAN/CSA-S16-01, Clause 27.2.5.

### 1.4 SHOP DRAWINGS

- .1 Submit shop details, erection drawings and fieldwork drawings in accordance with Section 01 33 00. Shop drawings must be original. Reproduction of Departmental Representative's design drawings is not acceptable. Allow ten working days for shop drawing review.
- .2 Erection drawings shall indicate all information necessary for assembly, including member size, base plate elevation, anchor bolt size and location
- .3 Clearly indicate shop and erection details including cuts, copes, connections, holes, threaded fasteners, rivets and welds. Indicate welds by AWS welding symbols.

Project No. R.068270.006

- .4 Submit, for information, final shop drawings for all mechanical and electrical equipment to be installed. Drawings to indicate overall geometry of the equipment, geometry of floor openings, and weight of the unit.
- .5 Each drawing submitted shall bear the signature and stamp of a qualified professional engineer registered in Ontario, and holder of a BCIN number.
- .6 Do not proceed with work until final review of shop drawings.

#### 1.5 **QUALITY ASSURANCE**

- .1 If requested, submit certified copies of mill reports showing chemical and physical properties of steel used in this Work.
- .2 Work of this Section shall be done by a structural steel fabricator/erector who is fully accredited and a current member in good standing of Canada Institute of Steel Construction, or who has submitted a list of experience reference acceptable to the Departmental Representative at least one week prior to tender closing. Failure to meet this requirement may result in disqualification of fabricator/erector.
- .3 Welding shall be done by a fabricator fully certified to the conditions of CSA Qualification Code W55.3 or W47.1 respectively. Conform to CAN/CSA-S16.1 where requirements are at variance. Submit Canadian Welding Bureau certificate.
- .4 An inspection and testing company shall be selected to verify that materials and fabrication, including alignment, plumbness, bearing, tolerances, connections, bolts, torque, welds, and painting conform to this specification, to CAN/CSA-S16.1, to CSA-W59, and to other applicable Standards. Welding inspections to be visual, except where non-destructive testing is deemed necessary by the Testing Agency or Departmental Representative. Submit 4 copies of inspection reports, outlining progress of work, and stating whether or not it conforms to the Contract Documents.
- .5 Advise Departmental Representative of proposed fabrication schedule, at least ten working days prior to starting, to permit the Testing Agency to arrange for inspection of Work in the shop.
- .6 Co-operate with Testing Agency and Departmental Representative in providing access to the work, including scaffolding where necessary. Give minimum 24-hour notice for inspection prior to concealment of Work by fireproofing or finishes.

#### 1.6 **WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 20 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

Project No. R.068270.006

- .3 Collect and separate for disposal paper, plastic polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .5 Divert unused paint material from landfill to official hazardous material collections site approved by Departmental Representative.
- .6 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Structural steel: to CAN/CSA-G40.21, Type 350W.
- .2 HSS Sections: to CAN/CSA-G40.21, Type 350W (Class C).
- .3 Anchor bolts: to ASTM A307 unless otherwise noted.
- .4 Bolts, nuts and washers: to ASTM A325M. Bolts shall be bearing type, unless otherwise noted.
- .5 Welding materials: to CSA W59
- .6 Shop paint primer: to CAN/CGSB-1.40 or CAN/CGSB-1.181, (Refer to Section 2.3 below).
- .7 Shop galvanizing: hot dip galvanizing to CAN/CSA-G164, minimum zinc coating of 600 g/m<sup>2</sup>.

### **2.2 FABRICATION**

- .1 Fabricate structural steel in accordance with CAN/CSA - S16.1 and in accordance with reviewed shop drawings. Mark and match-mark units for field assembly.
- .2 Do not fabricate structural steel prior to receiving written acceptance from the Departmental Representative of the weight of the mechanical and electrical equipment to be carried by the steel framing.
- .3 Connections shall be as shown on final shop drawings. In general, use welded connections for shop work, and high strength bolts for all field connections, except as otherwise indicated.
- .4 Furnish templates for anchor bolt installation by others.
- .5 Provide anchor bolts, bearing assemblies, inserts, wall plates and

Project No. R.068270.006

other hardware (including setting templates) for structural steel beam, joist and deck connections to cast-in-place concrete or masonry, for installation under the Work of Divisions 3 or 4.

- .6 Fabricate structural steel members to provide holes for securing other work and for passage of other work through steel framing. Reinforce openings to maintain required design strength. No openings shall be made without written approval of the Departmental Representative.
- .7 Weld adjustable masonry anchors to structural steel, as directed by mason.
- .8 Shop weld, to structural steel, anchorage devices for tie-back and lifeline anchors, davit bases, or other window-washing anchor devices, in accordance with manufacturer's instructions and reviewed shop drawings.
- .9 Continuously seal members by continuous welds where indicated.
- .10 Grind smooth where indicated in exposed work.
- .11 Supply and install end-welded shear studs in accordance with CSA W59.
- .12 Provide cambers to beams and/or purlins, as shown on the Drawings.

### 2.3 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel to CAN3-S16.1, CAN/CSA-S136, CGSB Standards, MPI INT 5.1, and MPI-EXT 5.1;
- .2 Primer to be compatible with finish coatings;
- .3 Interior Steel
  - .1 Surface preparation shall conform to SSPC SP-3, power tool cleaning.
  - .2 Primer shall be one coat oil alkyd type to CAN/CGSB 1.40 (or approved equivalent).
  - .3 Dry film thickness shall be 1.5 mils minimum.
- .4 Exterior Exposed Steel, Galvanized:
  - .1 Clean, prepare and galvanize to CSA G164 (610g/m<sup>2</sup>, hot dipped).
- .5 Do not paint:
  - .1 Surfaces and edges to be field welded, or to have field installed stud shear connectors,
  - .2 Surfaces that are in contact at bolted friction type connections or
  - .3 Surfaces that are in contact with concrete or mortar.

**2.4 ARCHITECTURALLY EXPOSED STEEL**

- .1 Shop weld connections where possible, otherwise use bolted connections.
- .2 Fabricate portions of the structure in sections as large and complete as practicable. Minimize bolted and /or field welded connections.
- .3 Continuously weld connection joints where exposed to view, and grind them smooth and flush with adjacent surfaces. Make exposed connections of the same material, colour and finish as base material on which they occur.
- .4 Accurately form connections with exposed faces flush. Mitres and joints to be tight.
- .5 Align welded seams of adjacent HSS framing, and orient seams away from view in final structure.
- .6 Remove mill marks, identification, and surface imperfections by grinding smooth and flush with adjacent surfaces.
- .7 Apply primer and/or paint to exposed surfaces without runs or sags. Sand down and repaint areas not acceptable to the Departmental Representative.
- .8 Where indicated, exterior exposed steel shall be galvanized in conformance with CAN/CSA G164.

**Part 3 Execution**

**3.1 GENERAL**

- .1 Erect structural steel as indicated in accordance with CAN/CSA-S16, CAN-S136, and in accordance with reviewed shop drawings.
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

**3.2 CONNECTION TO EXISTING WORK**

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

**3.3 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.

Project No. R.068270.006

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

### **3.4 ERECTION**

- .1 Erect structural steel as indicated in accordance with CAN/CSA-S16.1, CAN-S136, and in accordance with reviewed shop drawings.
- .2 Provide necessary erection equipment, bracing, shoring and temporary flooring as required for erection and for all safety regulations. Brace and support structure during erection to ensure that it is maintained in alignment under construction and other loading and until all other construction elements contributing to stability are in place.
- .3 Check anchor bolt and insert layout before erection. Arrange for correction of discrepancies.
- .4 Set base plates on cleaned bearing surfaces. Solidly pack open spaces between shims with bedding mortar consisting of non-shrink grout as specified in Section 03 30 00.
- .5 Obtain permission of Departmental Representative prior to field cutting or altering of structural members not shown on Drawings.
- .6 Clean field welds, bolted connections and abraded areas. Apply touch up shop primer (or zinc rich paint for galvanized steel) to bolts, welds and burned or scratched surfaces at completion of erection.
- .7 Continuously seal members by continuous welds where indicated. Grind smooth.

### **3.5 FIELD QUALITY CONTROL**

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .3 Submit inspection reports to Departmental Representative within 3 days of completion of inspection.
- .4 Departmental Representative will pay costs of tests as specified in Section 01 29 83 - Payment Procedures Testing Laboratory Services.

### **3.6 DEFECTIVE WORK**

- .1 Remove and replace, or repair, damaged or defective work, at no cost to the Contract.

Project No. R.068270.006

- .2 Contractor shall be responsible for the cost of additional testing and re-inspection made necessary by the occurrence of deficient Work.
- .3 Submit in writing details of proposed method of remedial work, for approval by the Departmental Representative. Details to be signed and sealed by a licensed Professional Engineer retained by the Contractor.
- .4 Correction of misaligned holes or other field modifications by flame-cutting is not permissible.

**END OF SECTION**