

STRUCTURAL STEEL FOR BUILDINGS**Part 1 General****1.1 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 05 50 00 - Metal Fabrications

1.2 REFERENCES

- .1 National Building Code of Canada 2010.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
 - .1 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
 - .2 CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.
- .4 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 36/A36M-12, Carbon Structural Steel.
 - .2 ASTM A 307-12, Standard Specification for Carbon Steel Bolts and Stud, and Threaded Rods, 60,000 psi Tensile Strength.
 - .3 ASTM A 325M-13, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).
 - .4 ASTM A 490-12, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
 - .5 ASTM A123/A123M-12, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings On Iron and Steel Products.
- .5 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-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16-09, Limit States Design of Steel Structures.
 - .4 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
 - .5 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .6 CSA W55.3-08, Certification of companies for resistance welding of steel and aluminum.

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- .6 The Society for Protective Coatings (SSPC)
 - .1 SSPC SP-3-04, Power Tool Cleaning.
 - .2 SSPC SP-6-07, Commercial Blast Cleaning.
- .7 Master Painters Institute
 - .1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.
 - .2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

1.3 DESIGN REQUIREMENTS AND CONNECTIONS

- .1 Design details and connections to requirements of CAN/CSA-S16 to resist forces, moments and shears indicated.
- .2 Design beam connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending.
- .3 Design connections in line with brace frames to resist lateral forces (tension and compression) indicated on the drawings.
- .4 Bolts shall be bearing type, except for connection 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.
- .5 Design brace frame connections in Code specified locations of seismic activity to requirements of CAN/CSA-S16, Clause 27.

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.
- .2 On erection drawings, 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.
- .4 Each drawing submitted shall bear the signature and stamp of a qualified professional engineer registered in Ontario.

1.5 QUALITY ASSURANCE

- .1 If requested, submit certified copies of mill test reports covering chemical and physical properties of steel used in this work.

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 A325. 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/m².
- .8 Shear studs: to CSA W59, Appendix H.

2.2 FABRICATION

- .1 Fabricate structural steel as indicated to CAN/CSA-S16 and in accordance with reviewed shop drawings.
- .2 Provide wall anchors for wall bearing beams unless otherwise indicated.
- .3 Reinforce openings to maintain required design strength.

2.3 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel to CAN/CSA-S16.
- .2 Interior Steel:
 - .1 Surface preparation shall conform to SSPC SP-3.
 - .2 Primer shall be one coat oil alkyd type to CGSB 1-GP-40.
 - .3 Dry film thickness shall be 1.5 mils minimum.
- .1 Exterior Exposed Steel, Galvanized:
 - .1 Clean, prepare and galvanize to CSA G164 (610g/m², hot dipped).
- .2 Exterior Exposed Steel: Non-Galvanized:
 - .1 Surface preparation: to SSPC SP-6, commercial blast cleaning using mechanical shot blast techniques. Hand cleaning not permitted.

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.2 Primer: One coat zinc rich type: to CAN/CGSB-1.181-99, minimum 2 mil./maximum 3 mil. dry thickness.

.4 Primer to be compatible with finish paint.

Part 3 Execution**3.1 GENERAL**

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

.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 ERECTION

.1 Check anchor bolt layout before erection. Arrange for correction of discrepancies.

.2 Erect structural steel as indicated to CAN/CSA-S16 and in accordance with reviewed shop drawings.

.3 Obtain written permission from Departmental Representative prior to field cutting or altering of structural members that is not shown on shop drawings.

.4 Clean and touch up shop primer to bolts, welds and burned or scratched surfaces with compatible and appropriate field primer, colour to match shop primer, at completion of erection.

.5 Co-ordinate structural steel installation with concrete masonry wall installation including structural tie between structural steel columns and concrete block masonry wall construction.

3.3 FIELD QUALITY CONTROL

.1 If required, inspection and testing of materials and workmanship will be carried out by testing firm designated by Departmental Representative.

.2 Costs of tests will be paid as per Section 01 45 00 – Quality Control.

End of Section

PART 1 - GENERAL

- 1.1 RELATED SECTIONS**
- .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 03 30 00 - Cast-in-Place Concrete.
- 1.2 REFERENCES**
- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 53/A53M-Latest Edition, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 307-Latest Edition, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-Latest Edition, Anti-corrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181-Latest Edition, Ready-Mixed, Organic Zinc-Rich Coating.
 - .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-Latest Edition, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M92-Latest Edition, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA W48-Latest Edition, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .4 CSA W59-1989 Latest Edition, Welded Steel Construction (Metal Arc Welding) (Imperial Version).
 - .4 The Environmental Choice Program
 - .1 CCD-047a-98, Paints, Surface Coatings.
 - .2 CCD-048-98, Surface Coatings - Recycled Water-borne.
- 1.3 SUBMITTALS**
- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop Drawings
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories
 - .3 Detail and fabricate work in accordance with the NBC 2010. Ladder shop drawings shall bear the stamp of an independent qualified Professional Engineer, registered and licensed to practice in the Province of Ontario.
- 1.4 QUALITY ASSURANCE**
- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

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| <u>1.5 DELIVERY,
STORAGE, AND
HANDLING</u> | .1 | Packing, Shipping, Handling and Unloading: |
| | .2 | Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements. |

PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W. |
| | .2 | Steel pipe: to ASTM A 53/A53M extra strong galvanized finish. |
| | .3 | Welding materials: to CSA W59. |
| | .4 | Welding electrodes: to CSA W48 Series. |
| | .5 | Bolts and anchor bolts: to ASTM A 307. |
| | .6 | Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours. |
| <u>2.2 FABRICATION</u> | .1 | Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured. |
| | .2 | Where possible, fit and shop assemble work, ready for erection. |
| | .3 | Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. |
| <u>2.3 FINISHES</u> | .1 | Galvanizing: hot dipped galvanizing with zinc coating 600g/m ² to CAN/CSA-G164. |
| <u>2.4 ACCESS
LADDERS</u> | .1 | Stringers: as indicated. |
| | .2 | Steel Rungs: 19 mm diameter, welded to stringers at 300 mm on centre. |
| | .3 | Brackets: sizes and shapes as indicated, weld to stringers complete with fixing anchors. |
| | .4 | Security door: as indicated |
| | .4 | Galvanize exterior ladders after fabrication |
| <u>2.5 GATE FOOT
BOLT REST</u> | .1 | Fabricate work to details as indicated. |

3.1 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage as detailed and engineered by Professional Structural Engineer retained by the Contractor such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

**3.2 ACCESS
LADDERS**

- .1 Install access ladders in locations as indicated.
- .2 Erect ladders 200 mm clear of wall on bracket supports.

3.3 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.