

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 04 99 - Masonry for Minor Works.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A500/A500M-13, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - .3 ASTM A572/A572M-15, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - .4 ASTM A992/A992M-11(2015), Standard Specification for Structural Steel Shapes.
 - .5 ASTM A1011/A1011M-17, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - .6 ASTM C881/C881M-15, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - .7 ASTM F3125/F3125-15a, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.40-97, Standard Specification for Anticorrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB 85.10-99, Standard Specification for Protective Coatings for Metals.
- .3 Canadian Institute of Steel Construction (CISC)
 - .1 Handbook of Steel Construction, Eleventh Edition.
- .4 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.
- .5 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI S6-2011, Guide Specification for Lightweight Steel Framing.
- .6 Canadian Standards Association (CSA)
 - .1 CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

- .2 CSA-S16-14, Design of Steel Structures.
- .3 CSA S136-16 North American Specification for the Design of Cold-Formed Steel Structural Members.
- .4 CSA S136.1-16 Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.
- .5 CSA-W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
- .6 CSA-W48-14, Filler Metals and Allied Metals for Metal Arc Welding.
- .7 CSA W55.3-08 (R2013), Certification of Companies for Resistance Welding of Steel and Aluminum.
- .8 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).
- .7 NB Regulation 91-191 Occupational Health and Safety Act.
- .8 The Society for Protective Coatings (SSPC)
 - .1 SSPC-SP1 Solvent Cleaning.
 - .2 SSPC SP6/NACE No.3 Commercial Blast Cleaning.
 - .3 SSPC-SP7/NACE No.4, Brush-Off Blast Cleaning.

1.3 SOURCE QUALITY CONTROL

- .1 If requested by the Departmental Representative, submit copies of mill test reports showing chemical and physical properties and other details of steel to be incorporated into work at least 4 weeks prior to fabrication of structural steel. Such mill test reports shall be certified by qualified metallurgists confirming that tests conform to requirements of CSA G40.20 and CSA G40.21.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .3 The Contractor is to provide written documentation from the Canadian Welding Bureau certifying that the steel subcontractor is qualified to requirements of CSA W47.1, Division 1 or 2.1. This document is to be submitted in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DESIGN REQUIREMENTS

- .1 Except where shown differently on the drawings, design details and connections in accordance with the requirements of CSA S16 and CSA S136 to resist forces, moments, shears and allow for movements indicated.
- .2 If connection for shear only, standard connection is required:
 - .1 Select framed beam shear connections from the industry accepted publication "Handbook of Steel Construction" by the Canadian Institute of Steel Construction.
 - .2 If shears are not indicated, select or design connections to support reaction from the maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam.

- .3 For non-standard connections, submit sketches and design calculations stamped and signed by a qualified professional Engineer registered or licensed to practice in the Province of New Brunswick.
- .4 Unless otherwise indicated on drawings, shop connections shall be with 19 mm diameter high tensile bolts conforming to ASTM F3125, Grade A325, or by welding.
- .5 Unless otherwise indicated on drawings, field connections shall be with 19 mm diameter high tensile bolts conforming to ASTM F3125, Grade A325. Field welded connections are not permitted unless indicated as such on drawings.
- .6 Splicing of members other than at locations shown on the drawings will not be permitted without prior approval of the Departmental Representative.

1.5 SUBMITTAL

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Provide drawings stamped and signed by professional engineer registered or licensed in the Province of New Brunswick.
- .3 Erection drawings:
 - .1 Submit erection drawings indicating 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.
- .4 Fabrication drawings:
 - .1 Submit fabrication drawings showing designed assemblies, components and connections stamped and signed by qualified professional engineer licensed in the Province of New Brunswick.
- .5 It is the responsibility of this Contractor to field confirm the exact locations and construction of the work to which work under this section connects to, or is supported on. Shop drawings to clearly show all locations and elevations of this work.
- .6 Exact location, elevation, slopes and details of construction may vary from those indicated on existing drawings.
- .7 Review of shop details and erection diagrams will extend to general design concept only. This review does not relieve the Contractor of the responsibility for accuracy of the detail dimensions, general fit-up of parts to be assembled, adequacy of connection details, or for errors or defects contained in the details.

1.6 ALTERNATIVE MATERIALS

- .1 Acceptable Materials: where materials are specified by trade name refer to the Instruction to Tenderers for procedure to be followed in applying for approval of alternatives.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 22 – Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Structural steel: to CSA G40.21 Grade 350W or ASTM A992 or ASTM A572 Grade 50 for beams, and CSA G40.21 Grade 300W for angles, plates and channels.
- .2 Hollow structural steel sections: to CSA G40.21, Grade 350W, Class C, or ASTM A500 Grade C.
- .3 Cold-Formed Purlins and Girts: to CSA S136-01, fabricated from steel conforming to the requirements of ASTM A1011 Grade 50.
- .4 Secondary Light Weight Structural Members: for roof framing system, including soffit framing, to CSSBI S6.
- .5 Anchor rods: to CSA G40.21, Grade 300W.
- .6 Bolts, nuts and washers: to ASTM F3125, Grade A325, Type 1.
- .7 Adhesive Anchors: Acrylic adhesive for dowel and anchor rod anchorage: to ASTM C881, Type IV, Grade 3, Class A, B, and C. Provide purpose made sieve or screens or anchor drilled into hollow concrete or masonry block units.
 - .1 Acceptable Products:
 - .1 Epcon Acrylic 7 by ITW Ramset/Red Head.
 - .2 HIT-HY 200 Injection Adhesive System by HILTI.
 - .3 Acrylic-Tie Anchoring System by Simpson Strong-Tie.
 - .4 Alternate Materials: Approved by addendum in accordance with Instructions to Tenderers.
 - .8 Welding materials: to CSA-W59 and certified by Canadian Welding Bureau.
 - .9 Hot dip galvanizing: galvanize steel, where indicated, to ASTM A123/A123M, minimum zinc coating of 610 g/m².
 - .10 Shop paint primer: to CISC/CPMA 2-75.

- .11 Substitutions for steel sections or materials shown on the drawings are not to be made unless specifically approved in writing by the Departmental Representative.

2.2 FABRICATIONS

- .1 Fabricate structural steel, as indicated, in accordance with CSA S16, CSA S136 and in accordance with reviewed shop drawings.
- .2 Provide 20 mm drain holes on other approved method of drainage at low point of all HSS members.
- .3 Provide minimum 4.8 mm thick cap plates at tops of all HSS columns.
- .4 Minimum fillet weld size shall be 4 mm.

2.3 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CSA S16.
- .2 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter.
- .3 Prepare surface according to SSPC SP7 (brush-off blast), for members not to be finish painted or galvanized.
- .4 Clean steel columns to be finish painted in accordance with SSPC SP1, Solvent Cleaning, followed by SSPC SP6, Commercial Blast Cleaning.
- .5 Apply one coat of CISC/CPMA 2-75 primer in shop to all steel surfaces including cold formed sections, to achieve minimum dry film thickness of 37-50 micrometers (1½ to 2 mils), except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces and edges to be field welded.
 - .3 Faying surfaces of friction-type connections.
- .6 Apply paint under cover, on dry surfaces only and when surface and air temperatures are above 5 degrees Celsius.
- .7 Maintain dry condition and 5 degrees Celsius minimum temperature until paint is thoroughly dry.
- .8 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

2.4 MARKING

- .1 Mark materials in accordance with CSA G40.20. 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 for fit and match.

Part 3 Execution

3.1 GENERAL

- .1 Do structural steel work in accordance with CAN/CSA S16, and CSA S136.
- .2 Do 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 INSPECTION

- .1 Examine the work of other sections upon which the work of this section depends and report any discrepancies to the Departmental Representative.
- .2 Verify that surfaces and conditions are ready to accept the work of this section.
- .3 Beginning of installation means acceptance of existing conditions.

3.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Exercise care in storing, handling, and erecting material and support materials properly at all times so that no piece will be bent, twisted, or otherwise damaged structurally or visually.

3.4 ERECTION

- .1 Erect structural steel as indicated and in accordance with CSA S16 and reviewed erection drawings.
- .2 The steel erector shall design and provide temporary bracing wherever necessary to withstand all loads which the structure may be subject to during construction. Temporary bracing shall remain in place as long as required for safety.
- .3 Prior to erection, the steel contractor shall review site conditions, dimensions and elevations, and location of anchor rods. Any discrepancies shall be reported immediately to the Departmental Representative.
- .4 Obtain written approval of Departmental Representative prior to field cutting or altering of structural members.
- .5 Provide temporary bracing and shoring as required for stability and until permanent connections are completed.
- .6 The erectability of the steel is the Contractor's responsibility, regardless of the Departmental Representative-reviewed shop drawings.
- .7 Specific welding procedures must be submitted for review by the Departmental Representative for all field welding.
- .8 Clean with mechanical brush and touch up shop primer to bolts, welds and burned or scratched surfaces at completion of erection.

3.5 FIELD PAINTING

- .1 Touch up all damaged surfaces and surfaces without shop coat with primer to CAN/CGSB-1.40 except as specified otherwise. Apply in accordance with CAN/CGSB 85.10.

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 11 – Closeout Procedures
- .2 Waste Management: separate waste materials in accordance with Section 01 74 22 – Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A 307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA Group
 - .1 CSA G40.20-13/G40.21-13, 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 CSA S16-14, Design of Steel Structures.
 - .4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding) Metric.
- .3 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .4 ULC Standards
 - .1 UL 2768-2011, Architectural Surface Coatings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections plates bolts and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit a copy of WHMIS SDS in accordance with Section 01 35 29 - Health and Safety Requirements.
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in New Brunswick, Canada.

- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 22 Construction Demolition Waste Management
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in in accordance with Section 01 74 22 - Construction Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.
- .2 Steel pipe: to ASTM A 53/A 53M standard weight, 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 Stainless steel tubing: to ASTM A 269, Type 304 commercial grade.
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof round headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Shop coat primer: MPI- EXT 5.1A in accordance with chemical component limits and restrictions requirements and VOC limits of UL 2768.
- .3 Zinc primer: zinc rich, ready mix to MPI- EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of CCD-047a.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.5 SHOP PAINTING

- .1 Primer: VOC limit 250 g/L maximum to GS-11.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Paint when temperature minimum 7 degrees C.
- .4 Clean surfaces to be field welded; do not paint.

2.6 ANGLE LINTELS

- .1 Steel angles: prime painted, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform DCC Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION - GENERAL

- .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 acceptable to Departmental Representative 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 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16 or Weld field connection.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
 - .1 Primer: maximum VOC limit 250 g/L to GS-11.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
 - .1 Primer: maximum VOC limit 250 g/L to GS-11.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 77 00 – Closeout Procedures.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 77 00 Closeout Procedures.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 22 – Construction Demolition Waste Management and Disposal.

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

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 ASTM A53/A53M-10 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .2 ASTM A153/A153M-09 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A307-10 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- .4 CAN/CGSB 1.40-97 - Anticorrosive Structural Steel Alkyd Primer.
- .5 CSA-G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel.
- .6 CSA-W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).
- .7 SSPC (The Society for Protective Coatings) - Steel Structures Painting Manual.

1.2 SUBMITTALS FOR REVIEW

- .1 Section 01 33 00: Submission procedures.
- .2 Shop Drawings:
 - .1 Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - .2 Indicate welded connections using standard welding symbols. Indicate net weld lengths.

1.3 QUALITY ASSURANCE

- .1 Welded Steel Construction: CSA-W59.

Part 2 Products

2.1 MATERIALS - STEEL

- .1 Steel Sections and Plates: CAN/CSA-G40.20/G40.21, Grade 350W.
- .2 Welding Materials: Type required for materials being welded.
- .3 Welding Filler Material: CSA-W48.

2.2 FABRICATION

- .1 Fit and shop assemble items in largest practical sections, for delivery to site.
- .2 Fabricate items with joints tightly fitted and secured.
- .3 Continuously seal joined members by continuous welds.

- .4 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- .5 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- .6 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATION TOLERANCES

- .1 Squareness: 3mm maximum difference in diagonal measurements.
- .2 Maximum Offset Between Faces: 1.5 mm.
- .3 Maximum Misalignment of Adjacent Members: 1.5 mm.
- .4 Maximum Bow: 3 mm .
- .5 Maximum Deviation From Plane: 3 mm.

2.4 FINISHES - STEEL

- .1 Prepare surfaces to be primed in accordance with SPCC SP 2.
- .2 Do not prime surfaces in direct contact with concrete or where field welding is required.
- .3 Shop Prime paint items with one (1) coat, unless noted to be galvanized.
- .4 Non-structural Items: Galvanized after fabrication to ASTM A123/A123M..

Part 3 Execution

3.1 EXAMINATION

- .1 Section 01 10 10 General Instructions: Verify existing conditions before starting work.
- .2 Verify that field conditions are acceptable and are ready to receive work.
- .3 Verify dimensions, tolerances, and method of attachment with other work.

3.2 PREPARATION

- .1 Clean and strip primed steel items to bare metal where site welding is required.
- .2 Supply steel items required to be embedded in masonry and cast into concrete with setting templates to appropriate sections.

3.3 INSTALLATION

- .1 Install items plumb and level, accurately fitted, free from distortion or defects.
- .2 Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- .3 Field weld components indicated on Drawings.
- .4 Perform field welding to CSA requirements. Welding to structural steel to be performed by Licensed Welders certified to CSA W47.1.

- .5 Obtain approval prior to site cutting or making adjustments not scheduled.
- .6 After erection, prime welds, abrasions, and surfaces not galvanized, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

- .1 Section 01 10 10 General Requirements: Tolerances.
- .2 Maximum Variation From Plumb: 6 mm per story, non-cumulative.
- .3 Maximum Offset From True Alignment: 6 mm.
- .4 Maximum Out-of-Position: 6 mm.

END OF SECTION