

**Part 1            General**

1.1            GENERAL REQUIREMENTS

- .1            Division One – General Requirements is a part of this Section and shall apply as if repeated here.

1.2            WORK INCLUDED

- .1            The Work included under this Section shall conform to the industry standard and be accepted by the local construction and trade associations.

1.3            RELATED SECTIONS

- .1            Division 3 – Concrete
- .2            Division 4 – Masonry
- .3            Section 05 21 00 – Steel Joist Framing
- .4            Section 05 50 00 – Metal Fabrications
- .6            Section 09 90 00 – Painting
- .7            Refer to Structural Drawings for all other corresponding structural steel Specifications. Contractor shall notify Contract Administrator of any conflicts.

1.4            QUALITY ASSURANCE

- .1            Fabricator: Company specializing in fabricating structural steel in accordance with CAN3-S16.1M or latest with documented experience.
- .2            Welder: Company specializing in welding structural steel components in accordance with CSA W47.1 or latest, CSA W55.3 or latest, and CSA W59 or latest with documented experience.
- .3            Design structural Work under direct supervision of a professional experienced in design of the Work of this Section and registered in the Province of Manitoba.
- .4            Submit 3 certified copies of Material mill reports upon Contract Administrator's request.

1.5            SHOP DRAWINGS

- .1            Submit Shop Drawings and product data to requirements of Section 01 33 00 – Submittal
- .2            Indicate on Shop Drawings, profiles, sizes, spacing, and locations of structural members, connections, attachments, fasteners, cambers, and loads.
- .3            Structural steel Shop Drawings for both review and fabrication are to bear the signature and seal of professional registered in the Province of Manitoba.

**Part 2            Products**

2.1            MATERIALS

- .1            Structural Steel Members: CAN3-G40.20M or latest and CAN3-G40.21M or latest, All rolled or steel structural sections shall be G40.21-50W unless otherwise noted on Structural Drawings. All angles, channels and plates shall be G40.21 44W, shop primed.
- .2            Structural H.S.S. Tubing: CAN3-G40.21M or latest, Grade 350 W, shop primed.

- .3 Bolts, Nuts, and Washers: ASTM A325 or latest.
- .4 Welding Materials: CSA W59 or latest, type required for Materials being welded.
- .5 Primer: CGSB 85-GP-10M or latest for plain steel surfaces and CGSB 85-GP-16M or latest for galvanized surfaces.
- .6 All Materials are to be new.

## 2.2 FABRICATION

- .1 Fabricate structural steel members in accordance with CAN3-S16.1 or latest.
- .2 Verify all Drawing dimensions prior to commencing fabrication.
- .3 Design details and connections to requirements of CAN3-S16-1 or latest to resist forces, moments, and shears indicated on Drawings.
- .4 All shop connections are to be welded as shown on Drawings.
- .5 Accurately cut and mill column ends and bearing plates to assure full contact of bearing surfaces prior to welding.
- .6 Close and weatherproof all gaps, butt joints and connections exposed to exterior of building. Grind all exposed welds flush with surface of welded members.

## 2.3 SHOP PAINTING

- .1 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter.
- .2 Apply one coat of prime paint in the shop to all steel surfaces.
- .3 Apply paint under cover, on dry surfaces only when surface and air temperatures are above 5 °C.
- .4 Maintain dry conditions and 5 °C minimum temperature until paint is thoroughly dry.
- .5 Patch paint bolts, nuts, sharp edges and corners one coat before full prime coat is applied.
- .6 Apply paint by brush or spray to a dry film thickness of 0.05 mm minimum.

## Part 3 Execution

### 3.1 EXAMINATION

- .1 Before starting erection, take field measurements and examine other Work that may affect this Work.
- .2 Notify the Contract Administrator of any conditions that prejudice proper installation of this Work.
- .3 Commencement of this Work implies acceptance of existing conditions.

### 3.2 DAMAGED MEMBERS

- .1 Repair or replace members damaged during transit or erection, before securing in position.
- .2 Report serious bends, twists or other damage immediately.

### 3.3 ERECTION

- .1 Erect structural steel in accordance with CSA S16.1 or latest, and Drawings.
- .2 Do not field weld surfaces during rain unless under cover.
- .3 Do not weld at temperature below 5 °C except with express permission.
- .4 Conform to the requirements of CSA W59 or latest, for minimum preheat and inter pass temperatures.
- .5 Make adequate provision for all erection loads, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing.
- .6 Set column bases and other vertical members to design elevations.
- .7 Use only light drifting to draw parts together. Enlarge holes for bolted connections with reamers or twist drill only. Do not burn to form holes, enlarge holes or match unfair holes.
- .8 Erection error is not to exceed requirements of CSA S16.1 or latest.
- .9 Obtain written permission prior to field cutting or altering structural members.
- .10 After erection, field prime welds, nuts, bolts, washers and touch up abrasions and damage to shop primed surfaces.

#### 3.4 GROUTING

- .1 Grout underside of steel column base plates with non-shrinking grout to manufacturer's specifications and where indicated on Drawings.

**END OF SECTION**

**Part 1            General**

1.1            RELATED REQUIREMENTS

- .1            Refer to Structural Drawings for all other corresponding open web joist Specifications. Contractor shall notify Contract Administrator of any conflicts.

1.2            REFERENCES

- .1            Canadian General Standards Board (CGSB)
  - .1            CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .2            Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
  - .1            CISC/CPMA 2-75 1975, Quick-Drying, Primer for Use on Structural Steel.
- .3            CSA International
  - .1            CSA G40.20/G40.21-R2009, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2            CSA S16-09, Design of Steel Structures.
  - .3            CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members.
  - .4            CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
  - .5            CSA W55.3-08, Certificate of Companies for Resistance Welding of Steel and Aluminum.
  - .6            CSA W59-R2008, Welded Steel Construction (Metal Arc Welding)

1.3            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 steel joist framing and include product characteristics, performance criteria, physical size, finish and limitations.
- .3            Shop Drawings:
  - .1            Submit layout and joist design Drawings stamped and signed by a Professional registered in the Province of Manitoba.
  - .2            Indicate on erection Drawings, relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and details.
  - .3            Indicate 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.

1.4            DELIVERY, STORAGE AND HANDLING

- .1            Deliver, store and handle Materials in accordance with Section 01 60 00 – Basic 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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged Materials with new.

**Part 2 Products**

**2.1 DESIGN CRITERIA**

- .1 Design steel joists and bridging to carry loads indicated in joist schedule shown on Drawings to CSA S16.
- .2 Design joists and anchorages for uplift forces as indicated.
- .3 Ensure joists are manufactured to consider load effects due to fabrication, erection and handling.
- .4 Limit floor joist deflection due to specified live load to L/240 maximum of span and deflection due to specified total load to L/360 maximum of span.

**2.2 MATERIALS**

- .1 Open web steel joists: to CSA S16 & CSA S136.
- .2 Structural steel: to CSA G40.20/G40.21 and CSA S136.
- .3 Welding Materials: to CSA W59.
- .4 Shop paint primer: to MPI - INT 5.1A
- .5 Shear studs: to CSA W59, Appendix H.

**2.3 FABRICATION**

- .1 Fabricate steel joists and accessories as indicated in accordance with CSA S136 and in accordance with approved Shop Drawings.
- .2 Weld in accordance with CSA W59.
- .3 Provide top or bottom chord extensions where indicated.
- .4 Provide diagonal and horizontal bridgings and anchorages as indicated.

**2.4 SHOP PAINTING**

- .1 Clean, prepare and shop prime surfaces of steel joists to CSA S16.
- .2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces to SSPC SP1 brush blast.
- .3 Apply one coat of CISC/CPMA 2 primer to steel surfaces to achieve dry film thickness of .065 mm to .080 mm maximum 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.
- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 °C.
- .5 Maintain dry condition and 5 °C minimum temperature until paint is thoroughly dry.
- .6 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for steel joist framing installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate and inform Contract Administrator of unacceptable conditions immediately upon discovery
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed.

#### **3.2 INSTALLATION**

- .1 Do structural steel Work: to CSA S16.
- .2 Do welding: in accordance with CSA W59.
- .3 Ensure installers are certified to CSA W47.1 for fusion welding and/or CSA W55.3 for resistance welding.
- .4 Contractor to submit certification that installers and associated welded joints are qualified by Canadian Welding Bureau.

#### **3.3 CONNECTION TO EXISTING WORK**

- .1 Verify dimensions and condition of existing Work; report discrepancies and potential problem areas before commencing fabrication.

#### **3.4 FIELD QUALITY CONTROL**

- .1 Inspection of Materials and workmanship will be carried out by Contract Administrator.

#### **3.5 ERECTION**

- .1 Erect steel joists and bridging as indicated to CSA S16 and in accordance with approved erection Drawings.
- .2 Complete installation of bridging and anchorages before placing construction loads on joists.
- .3 Field cutting or altering joists or bridging to approval of Contract Administrator and joist supplier.
- .4 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.

#### **3.6 CLEANING**

- .1 Progress Cleaning: Leave Work Area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus Materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste Materials for reuse and recycling.
  - .1 Remove recycling containers and bins from Site and dispose of Materials at appropriate facility.
- 3.7 PROTECTION
  - .1 Protect installed products and components from damage during construction.
  - .2 Repair damage to adjacent Materials caused by steel joist framing installation.

**END OF SECTION**

**Part 1**

**General**

1.1

RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 60 00 – Basic Product Requirements
- .3 Section 03 30 00 – Cast-in-Place Concrete
- .4 Division 04 – Masonry
- .5 Section 05 12 00 – Structural Steel
- .6 Section 05 21 00 – Steel Joist Framing
- .7 Division 06 – Wood Plastics and Composites
- .8 Division 08 – Openings
- .9 Section 09 90 00 – Painting

1.2

REFERENCES

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM A53/A53M-99b, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless or latest.
  - .2 ASTM A269-98, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service or latest.
  - .3 ASTM A307-97, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength or latest.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer or latest.
  - .2 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint. or latest
  - .3 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating or latest.
- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel or latest.
  - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles or latest.
  - .3 CAN/CSA-S16.1-94, Limit States Design of Steel Structures or latest.
  - .4 CSA W48.1-M1991(R1998), Carbon Steel Covered Electrodes for Shielded Metal Arc Welding or latest.
  - .5 CSA W48.2-M1992(R1998), Chromium-Nickel Steel Covered Electrodes for Shielded or latest.
  - .6 CSA W48.3-M1993(R1998), Low Alloy Steel Covered Electrodes for Shielded Metal Arc Welding or latest.
  - .7 CSA W48.4-95, Solid Carbon Steel Filler Metals for Gas Shielded Arc Welding.
  - .8 CSA W48.5-M1990(R1996), Carbon Steel Electrodes for Flux- and Metal-Cored Arc Welding or latest.
  - .9 CSA W48.6-96, Fluxes and Carbon Steel Electrodes for Submerged Arc Welding or latest.



.10 CSA W59-M1998, Welded Steel Construction (Metal Arc Welding) or latest.

1.3 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 Miscellaneous steel Shop Drawings for Work of this Section are to meet all necessary Codes and regulations and bear the signature and seal of a Professional registered in the Province of the Work.

1.4 PROTECTION

- .1 Deliver, store, handle and protect Materials in accordance with Section 01 60 00 - Basic Product Requirements.
- .2 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job Site.
- .3 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

**Part 2 Products**

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350 W.
- .2 Steel pipe: to ASTM A53/A53M standard weight black finish.
- .3 Welding Materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
- .7 Shop coat primer: to CGSB 1-GP-40d.
- .8 Galvanized primer: zinc rich, ready to mix to CGSB 1-GP-181M.
- .9 Sulphur: commercial grade for setting metal posts.

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 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- .2 Do not prime surfaces in direct contact bond with concrete or where field welding is required.

- .3 Apply coatings in shop and before assembly. Where size permits, galvanize components after assembly.
  - .4 Prime paint items with one coat.
  - .5 Hot dip galvanize components where indicated after fabrication in accord with requirements of CSA Standard G164-M1981.
  - .6 Apply one coat of bituminous enamel to contact surfaces of metal components in contact with cementitious Materials and dissimilar metals.
- 2.4 MISCELLANEOUS STEEL SECTIONS
- .1 Supply all miscellaneous steel angles, plates, brackets, lintels, etc., as indicated and noted on the Drawings. Size according to loads, set plumb and true and securely fix. Continuously weld and grind smooth exposed connections. Also refer to Structural Drawings for connections.
- 2.5 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.
- 2.6 SHOP PAINTING
- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
  - .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.
  - .3 Clean surfaces to be field welded; do not paint.
- 2.8 STEEL STAIRS, RAILINGS AND GUARDS
- .1 Supply and install steel stairs and railings where shown on Drawings.
  - .2 Method of construction left to discretion of fabricator, but shall be in accordance with best standard practice and shall meet with the Contract Administrator's approval. Stairs shall safely support a 100 lb. Live load per sq. ft. (4.79 kN/sq. m). Structural members shall be positively and securely attached to the building structure. Weld all connections where possible, where not possible, bolted connections shall be cut off flush with nuts and made as inconspicuous as possible.
  - .3 Stringers and landing supports shall be of size and shapes as noted on Drawings. All pan construction and metal framing of stairs and landings by stair supplier.
  - .4 Railings shall be plumb, true and rigid and of standard steel pipe, solid rods and flat bars of sizes indicated on Drawings. Unless shown otherwise on Drawings, close ends of tubes, joints and intersecting members welded and ground smooth; where rails return to walls or other vertical faces, cut off and grind smooth 6mm from vertical face. All corners shall be curved to a 75mm face.
  - .5 Prime all metal Work for stairs, handrails and railings, ready for painting at interior areas. All exterior stairs and railings to be hot dipped galvanized after fabrication.
  - .6 NOTE: Railings shall resist a horizontal load of 103 lb./lin. ft. (1.5 kN/lin.m.) applied at the top of the rail and as required by Code.
- 2.9 MASONRY OPENING LINTELS

- .1 Provide lintels as per structural lintel schedule
  - .2 Provide all hot-dipped galvanized steel loose lintels at exterior openings and prime painted at interior openings.
  - .3 Provide lintels for all openings including windows, doors, ductwork, etc.
  - .4 Provide for min 150mm minimum bearing at ends.
- 2.10 MASONRY SUPPORT SHELF ANGLE
- .1 Provide a continuous steel angle to support all exterior masonry veneer walls, as shown on Drawings.
- 2.11 LATERAL SUPPORT FOR MASONRY
- .1 Provide deflection and lateral support angles for non-loadbearing masonry walls as detailed on Structural Drawings.
- 2.12 MISCELLANEOUS ITEMS, STEEL BRACKETS, SUPPORTS AND ANGLES
- .1 Supply for installation by respective trades steel brackets, supports, and angles as indicated on Drawings. Drill for countersunk screws and anchor bolts. Prime paint for interior, galvanize for exterior.
  - .2 Supply for installation by respective trades all steel sections, brackets, and angles as indicated on Drawings for interior and exterior benches, counters, vanities, etc.
- 2.13 MISCELLANEOUS STEEL SUPPORT CHANNELS FOR ELECTRICAL EQUIPMENT
- .1 Steel support channels for electrical equipment shall be Unistrut metal framing system, model P2000, 1 5/8" x 1 5/8" x 16 gauge with concrete inserts and all related accessories required. Refer to Drawings for lengths and locations, and coordinate with Electrical.

**Part 3 Execution**

**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 acceptable to Contract Administrator 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 building into Work 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 rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

**END OF SECTION**