

## STRUCTURAL STEEL

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### **1. GENERAL**

#### **1.1 Work Included**

- .1 Structural platform and ramp framing.
- .2 Bearing plates, anchor bolts forming part of structural framing.
- .3 Welds, bolts, washers, nuts, shims.
- .4 Galvanized structural steel members and appurtenances.
- .5 Field touch-up of galvanized surfaces including field welding.
- .6 Scale tire guards.

#### **1.2 Related Work**

- .1 Grouting bearing plates: Section 03600
- .2 Metal Fabrications: Section 05500

#### **1.3 Design Standards, Code Requirements**

- .1 Conform to requirements of CAN/CSA S16.1, the Canadian Institute of Steel Construction (CISC) "Code of Standard Practice for Buildings", and the Provincial Construction Safety Act.
- .2 Use loads, load combinations and stress levels shown on drawings and in accordance with the National Building Code of Canada.
- .3 Connections are to be designed by a Professional Structural Engineer registered in the Province of Manitoba.
- .4 Perform all welding in accordance with requirements of CSA W59.
- .5 Connections are to be designed by a registered Professional Structural Engineer, registered in the Province of Manitoba.

#### **1.4 Qualifications**

- .1 All work is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of CSA W47.1.
- .2 All welders employed for erection are to possess valid "S" Classification Class "O" certificates issued by the Canadian Welding Bureau.

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### 1.5 Inspection and Testing

- .1 Shop and field inspection and testing is to be performed by an Inspection and Testing Firm appointed and paid by the City.
- .2 Provide free access to all portions of work in the shop and in the field and cooperate with appointed firm.
- .3 Pay all additional costs for inspection and re-inspection due to defective workmanship or materials.
- .4 If requested by the Contract Administrator, submit four (4) copies of mill test reports, properly correlated to materials actually used.
- .5 Radiographic and magnetic particle inspection of welds is to be performed by the Inspection and Testing Firm, in accordance with CSA W59 and ASTM E109, when required by the Contract Administrator.
- .6 Welds are to be considered defective if they fail to meet quality requirements of CSA W59.
- .7 Additionally, all welds are to be visually inspected.
- .8 High Tensile bolted connections are to be inspected and tested in accordance with Clause 22.7, CAN/CSA S16.1.

### 1.6 Shop Drawings, Submittals

- .1 Provide a fabrication and erection schedule to the Contract Administrator prior to commencement of shop fabrication and field erection, in ample time to allow proper scheduling of inspection and testing.
- .2 Submit details of typical connections and special connections for review prior to preparation of shop drawings.
- .3 Shop drawings and design briefs are to bear the seal of a Professional Structural Engineer, registered in the Province of Manitoba.
- .4 Submit shop drawings for review in accordance with Section 01300.
- .5 Clearly indicate profiles, sizes, spacing and locations of structural members, connections, attachments, reinforcing, anchorage, framed openings, size and type of fasteners, cambers and loads, accessories, column anchor bolt locations, setting details.
- .6 Include erection drawings, elevations and details.
- .7 Indicate welded connections using welding symbols in compliance with CISC Welding Standards. Clearly indicate net weld lengths.

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- .8 Shop drawing review by the Contract Administrator is solely to ascertain conformance to the general design concept.
- .9 Responsibility for approval of detail design inherent in shop drawings rests with the Contractor and review by the Contract Administrator shall not imply such approval.
- .10 Review shall not relieve the Contractor of his responsibility for errors or omissions in shop drawings or for proper completion of the Work in accordance with the Contract Documents.
- .11 Responsibility for verification and correlation of field dimensions, fabrication processes, techniques of construction, installation and coordination of all parts of the Work rests with the Contractor.

## 2. PRODUCTS

### 2.1 Materials

- .1 All materials are to be new.
- .2 Structural Steel: conforming to CAN/CSA G40.21, Type W with yield strength of 350 MPa galvanized.
- .3 Bolts, Nuts and Washers: conforming to ASTM A307; finished to match members to which they attach.
- .4 Welding Materials: conforming to CSA W59.
- .5 Concrete Anchors: Hilti Kwik Bolts, manufactured by Hilti (Canada) Ltd.
- .6 Galvanizing: conforming to CSA G164; minimum 600 g/m<sup>2</sup> coating.

### 2.2 Fabrication

- .1 Fabricate structural steel members in accordance with CAN/CSAS16.1 and CAN/CSA S136.
- .2 Verify all drawing dimensions prior to commencing fabrication.
- .3 Provide openings and punched holes 10 - 30 mm in diameter in structural members for other building components. Reinforce openings with steel plates sized and welded in place, to restore members to original design strength. Locate holes so as to cause no appreciable reduction in strength of members.
- .4 Provide connection holes for future construction as shown.
- .5 Provide connections for loads shown.
- .6 Provide connections as detailed.

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- .7 All shop connections are to be welded or bolted.
- .8 Provide CISC double angle header connections wherever possible.
- .9 Provide top and bottom flange angle clips for all spandrel beams.
- .10 Accurately cut and mill column ends and bearing plates to assure full contact of bearing surfaces prior to welding.
- .11 Close and weatherproof all gaps, butt joints and connections exposed to exterior of building. Grind all exposed welds flush with surface of welded members.
- .12 Design and detail connections for structural steel so that corrosion potential is minimized.

### 2.3 Finishes

- .1 Clean all members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces according to SSPC SP 7.
- .2 Galvanizing: conforming to CAN/CSA-G164. Primer and galvalume for touch-up.

## 3. EXECUTION

### 3.1 Examination

- .1 Before starting erection, take field measurements and examine other work may affect this work.
- .2 Notify the Contract Administrator of any conditions which would 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.

### 3.3 Erection

- .1 Erect structural steel in accordance with CAN/CSA S16.1 and drawings.
- .2 Field connections are to be bolted or welded.
- .3 Do not field weld wet surfaces or during rain unless under cover.
- .4 Do not weld at temperature below 5°C except with express permission of the Contract Administrator.

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- .5 Conform to requirements of CSA W59 for minimum preheat and interpass temperatures.
- .6 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.
- .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 Obtain Contract Administrator's written permission prior to field cutting or altering structural members.
- .9 After erection field prime welds, nuts, bolts, washers and touch up abrasions and damage to shop primed surfaces.
- .10 Touch up all damaged shop finish paint, prime and finish paint all welds, nuts, bolts and washers.

**END OF SECTION**

## **METAL FABRICATIONS**

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### **1. GENERAL**

#### **1.1 Work Included**

- .1 Shop fabricated ferrous metal items, galvanized and prime painted. The following is a list of principal items only. Refer to Drawings for items not specifically listed.
  - .1 Mechanical supports
  - .2 Boot scrapers (galvanized)
  - .3 Steel grating and steel stair treads (galvanized)
  - .4 Anchors, plates, bolts, nuts, screws, brackets, etc. required for Work of this Section

#### **1.2 Design Code, Quality Assurance**

- .1 Design and fabricate stairs, landings, handrails, and balustrades to conform to requirements of the National Building Code of Canada, 2005
- .2 Perform welding in accordance with requirements of CSA W59
- .3 Welding Work on all load carrying structures and assemblies is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of CSA W47.1.

#### **1.3 Shop Drawings**

- .1 Submit Shop Drawings in accordance with Section 01300 - Submittals.
- .2 Clearly indicate profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of fasteners and accessories.
- .3 Include erection drawings, elevations, and details where applicable.
- .4 Indicate welded connections using CISC standard welding symbols. Clearly indicate net weld lengths.
- .5 Shop Drawings and design briefs are to be signed and sealed by a Professional Engineer registered in the Province of Manitoba.

### **2. PRODUCTS**

#### **2.1 Materials**

- .1 Steel: conforming to CAN/CSA-G40.21; Type W with minimum yield strength of 300 MPa.
- .2 Welding Materials: conforming to CSA W59

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- .3 Bolts, Nuts, and Washers: conforming to ASTM A325 unless specified otherwise
- .4 Steel grating: style 30M-102M as manufactured by Fisher & Ludlow using steel bearing bars and cross bars. Provide serrated grating for exterior applications.
- .5 Steel stair treads: to style Type A-Checker Plate Nosing, width 278 mm wide as manufactured by Fisher & Ludlow. Provide serrated grating for exterior applications.

### **2.2 Finishes**

- .1 Primer: CISC/CPMA 2-75
- .2 Galvanizing: conforming to CAN/CSA-G164; minimum 610 g/m<sup>2</sup>.
- .3 Touch-up damaged galvanizing with minimum two (2) coats of zinc rich primer.

### **2.3 General Fabrication**

- .1 Verify all dimensions on-site prior to shop fabrication.
- .2 Fabricate items of sizes and profiles detailed on Drawings, with joints neatly fitted and properly secured.
- .3 Fit and shop assemble in largest practical sections, for delivery to Site.
- .4 Supply all components required for proper anchorage of miscellaneous metals. Fabricate anchorage and related components of same material and finish as metal fabrications, unless otherwise specified or shown.
- .5 Weld connections where possible, otherwise bolt connections. Counter-sink all exposed fastenings. Cut off bolts flush with nuts.
- .6 Accurately form all connections and joints with exposed faces flush, mitres and joints tight.
- .7 Exposed welds and metal sections shall be smooth and flush; grind or file if required.
- .8 Provide for flush welded or hairline butt field joints.
- .9 Shop fabricate openings in members for other building components. Reinforce openings to restore member to original design strengths.
- .10 Provide lugs, clips, brackets, hangers and struts as required for attaching miscellaneous metal items securely to building structure.
- .11 Thoroughly clean all surfaces of rust, scale, grease and foreign matter prior to prime painting or galvanizing.

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- .12 Galvanize and prime paint items as shown. Do not shop prime surfaces in contact with or embedded in concrete or requiring field welding.

### **3. EXECUTION**

#### **3.1 Examination**

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

#### **3.2 Erection**

- .1 Obtain Contract Administrator's permission prior to Site cutting or making adjustments which are not part of scheduled Work.
- .2 Install items plumb, square and level, fit accurately, and maintain free from distortion or defects detrimental to appearance and performance.
- .3 Make provision for erection stresses and temporary bracing. Keep Work in alignment at all times.
- .4 Replace items damaged in course of installation.
- .5 Perform required field welding. Exposed welds shall be smooth and flush; grind or file if required.
- .6 Perform necessary cutting and altering for the installation of Work of other Sections, and as indicated on Drawings. No additional cutting is to be done without the permission of the Contract Administrator.
- .7 Perform all field assembly bolting and welding to match standard of shop bolting and welding. Bolts and screws are to be concealed whenever possible.
- .8 After installation, touch up field bolts, nuts, welds, and scratched and damaged prime painted surfaces. Field touch-up primer to be same as shop primer. Touch up galvanized surfaces with two (2) coats of zinc rich primer.
- .9 Supply, to appropriate sections, items required to be cast into concrete and built into masonry, complete with necessary setting templates.

**END OF SECTION**