

**Part 1 General**

<b>1.1 Related Requirements</b>	.1	Section 06 10 00 – Rough Carpentry.
	.2	Section 03 30 00.01 – Cast-in-Place Concrete – Short Form
	.3	Section 01 14 00 – Work Restrictions.
<b>1.2 References</b>	.1	ASTM International
	.1	ASTM A325M-09, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.
	.2	ASTM A588 / A588M – 10, Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance.
	.3	ASTM A847 / A847M – 12, Standard Specification for Cold-Formed Welded and Seamless High-Strength, Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance
	.2	CSA International
	.1	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	CSA S16-09, Design of Steel Structures.
	.4	CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
	.5	CSA W59-03(R2008), Welded Steel Construction, (Metal Arc Welding).
<b>1.3 Action And Informational Submittals</b>	.1	Submit in accordance with Section 01 33 01 – Shop Drawings, Product Data, and Samples.
	.2	Product Data:
	.1	Submit manufacturer's instructions, printed product literature and data sheets for structural steel and include product characteristics, performance criteria, physical size, finish and limitations.
	.2	Submit two copies of WHMIS MSDS in accordance with Section 01 35 33 - Health and Safety Requirements.
	.3	Shop Drawings:
	.1	Indicate shop and erection details including shop splices, cuts,

		<p>cofes, connections, holes, bearing plates, threaded fasteners, rivets and welds. Indicate welds by CSA W59, welding symbols.</p> <p>.2 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.</p> <p>.3 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel.</p>
<b>1.4 Delivery, Storage And Handling</b>	.1	<p>Deliver, store and handle materials in accordance with Section 01 61 10 - Product Requirements and with manufacturer's written instructions.</p> <p>.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.</p> <p>.1 Ensure Departmental Representative has delivery schedules 7 days minimum prior to shipping.</p> <p>.3 Storage and Handling Requirements:</p> <p>.1 Provide protective blocking for lifting, transportation and storing.</p> <p>.1 Exercise care during fabrication, transportation and erection of girders, beams and trusses.</p> <p>.2 Do not notch edges of members.</p> <p>.3 Do not cause excessive stresses.</p> <p>.2 Mark mass on members weighing more than 3 tonnes.</p> <p>.3 Protect unpainted weathering steel, before erection, with waterproof covering.</p> <p>.4 Ensure that no portion of steel comes into contact with ground.</p> <p>.1 Replace defective or damaged materials with new.</p> <p>.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.</p>
<b>1.5 Quality Assurance</b>	.1	<p>Preconstruction Testing:</p> <p>.1 Provide suitable facilities and cooperate with inspection organization and Departmental Representative in carrying out inspection and tests required.</p>

**Part 2 Products**

<b>2.1 Materials</b>	.1	Structural steel: to CSA G40.20/G40.21, grade and types 300W, 350AT Category 2, ASTM A588, and ASTM A847 as indicated on drawings.
	.1	Leave atmospheric corrosive resistant steel and connections material in unpainted, include bolts, nuts, washers and weld deposits of compatible weathering characteristics.
	.2	Pipe sections to ASTM A53 (Fy = 240MPa).
	.3	High strength bolts, nuts and washers: to ASTM A325M Type 3 (self-weathering) approved by Departmental Representative.
	.4	Anchor bolts, washers and nuts: to CSA G40.20/G40.21.
	.5	PTFE slide bearings: Design by contractor to performance requirements indicated on drawings, purpose made, plate to CSA G40.20/G40.21, Grade 350AT, coordinate details with structural steel framing.
	.6	Slide bearings: Detail as indicated on drawings, Teflon pads, plate to CSA G40.20/G40.21, Grade 350AT.
	.7	Welding electrodes: to CSA W48 series.
	.8	Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 600 g/m <sup>2</sup> .
	.9	Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents. Minimum compressive strength of 50 MPa at 28 day.
<b>2.2 Source Quality Control</b>	.1	Steel producer qualifications: certified in accordance with CSA G40.20/G40.21.
	.2	Submit Departmental Representative 2 copies of certified test reports for Charpy V-notch test.
	.3	Provide suitable facilities and co-operate with inspection organization and Departmental Representative in carrying out inspection and tests required.

**Part 3 Execution**

<b>3.1 Examination</b>	.1	Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions.
	.1	Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- 3.2 Preparation**
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- .1 Clean steel surfaces as directed by Departmental Representative when staining or defacing occurs.
  - .2 Verify location of substructure units, elevations of bearing seats and location of anchor bolts before erection of structural steel; report discrepancies to Departmental Representative.
  - .3 Work near river banks or embankments in accordance with Section 01 14 00 - Work Restrictions.
  - .4 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.
    - .1 Enlarge holes if necessary by reaming only after receipt of written approval from Departmental Representative.
    - .2 Ensure reamed holes are 2 mm maximum larger than bolt size used.
  - .5 Fabricate and install bearings as indicated.
  - .6 Place anchor bolts at elevations and locations indicated.
    - .1 Protect holes against entry of water and foreign material.
    - .2 Provide heating and protection as directed by Departmental Representative and completely fill space around anchor bolts with grout.
- 3.3 Installation**
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- .1 Do falsework in accordance to CSA S269.1.
  - .2 Do fabrication and erection of structural steel in accordance with CAN/CSA S6, Design of Highway Bridges.
  - .3 Do welding in accordance with CSA W59, except where specified otherwise.
    - .1 For CSA G40.20/G40.21, grade 350AT steel, deposited weld metal to have Charpy V-Notch value not lower than that of steel.
    - .2 Do welding in shop unless otherwise permitted by Departmental Representative.
    - .3 Weld only at locations indicated.
  - .4 High strength bolting: in accordance with CAN/CSA S6. Use 'turn-of-nut' tightening method.
  - .5 Finish: members true to line, free from twists, bends, open joints, sharp corners and sharp edges.

- .6 Allowable tolerance for bolt holes:
  - .1 Matching holes for bolts to line up so that dowel 2 mm less in diameter than hole passes freely through assembled members at right angles to such members.
  - .2 Finish holes not more than 2 mm in diameter larger than diameter of rivet or bolt unless otherwise specified by Departmental Representative.
  - .3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
  - .4 Centre-to-centre distance between any two groups of holes to vary not more than maximum of the following:

Centre-to-Centre distance in metres	Tolerance in plus or minus mm
less than 10	1
10 to 20	2
20 to 30	3
  - .5 Correct mispunched or misdrilled members only as directed by Departmental Representative.
- .7 Span length tolerances:
  - .1 Girders and beams: plus or minus 6 mm
  - .2 Centre-to-centre of bearing stiffeners and bearing plates: plus or minus 3 mm.
- .8 Shop splices:
  - .1 Use complete joint penetration groove welds finished flush.
  - .2 Details of butt joints to CSA W59.
  - .3 Use only as approved by Departmental Representative.
- .9 Shop erection:
  - .1 Support each girder on its bearing points and measure and record deflection at same points indicated for measurement of camber.
  - .2 Measure deflections in plane of girder web or truss depth.
  - .3 Submit diagram to Departmental Representative showing deflection measurements for each girder or truss before delivery.
  - .4 Shop erection is not required for single span girders with no field splices.
- .10 Field splices: to approval of Departmental Representative.
- .11 Mark members in accordance with CSA G40.20/G40.21.
  - .1 Do not use die stamping.
  - .2 Place marking at locations hidden when viewed from exterior

after erection when steel is to be left in unpainted condition.

- .12 Match marking: shop mark bearing assemblies and splices.

### **3.4 Field Quality Control**

- .1 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, protecting and cleaning of steel.
  - .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Ensure manufacturer's representative is present before installation, during critical periods of installation and during construction of field joints and testing.
  - .4 Schedule site visits:
    - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
    - .2 Twice during progress of Work at 25% and 60% complete.
    - .3 Upon completion of the Work, after cleaning is carried out.

### **3.5 Cleaning**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .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 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**