

**PART 1 - GENERAL**

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| 1.1 | Basis of Payment | .1 | All materials and work required under this Section shall be based on Section 01 29 01 - Method of Measurement and Payment.             |
|     |                  | .2 | Supply and installation of anchor bolts, nuts, washers and bolt grout will be considered incidental to work                            |
| 1.2 | References       | .1 | American Association for State Highway and Transportation Officials (AASHTO).  |
|     |                  | .1 | AASHTO Standard Specifications for Highway Bridges.  |
|     |                  | .2 | American Society for Testing and Materials (ASTM).   |
|     |                  | .1 | ASTM A 325M, Specification for Structural Bolts, Steel, Heat Treated 120/105ksi Minimum Tensile Strength.                              |
|     |                  | .2 | ASTM A490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.                         |
|     |                  | .3 | ASTM F959M-02, Standard Specifications for Compressible-Washer-Type Direct Tension Indicators (DTI) for Use With Structural Fasteners. |
|     |                  | .4 | ASTM A370, Standard Methods and Definitions for Mechanical Testing of Steel Products.  |
|     |                  | .3 | Canadian Standards Association (CSA).  |
|     |                  | .1 | CAN/CSA-G40.20, General Requirements for Rolled or Welded Structural Quality Steel.  |
|     |                  | .2 | CAN/CSA-G40.21, Structural Quality Steels.   |
|     |                  | .3 | CAN/CSA S6-06, Canadian Highway Bridge Design Code.  |
|     |                  | .4 | CAN/CSA-S16.1-04, Limit States Design of Steel Structures.   |
|     |                  | .5 | CSA S269.1, Falsework for Construction Purposes.   |
|     |                  | .6 | CSA W48, Series, Various Dates, Electrodes.  |
|     |                  | .7 | CSA W59, Welded Steel Construction (Metal Arc Welding).  |
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- .8 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- 1.3 Shop Drawings
- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate shop and erection details including but not limited to shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, rivets, and welds. Indicate welds by CSA W59 welding symbols.
  - .3 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.
  - .4 Prepare and submit all drawings and documents necessary to describe the following:
    - .1 Type and capacity of equipment to be used.
    - .2 Sequence of operation: position of cranes, snooper vehicles, and trucks with members.
    - .3 Position of cranes and snooper vehicles with details of load distribution of wheels and outriggers.
    - .4 Lifting devices and lifting points.
    - .5 Details of temporary works: complete falsework and/or shoring plans where required including proposed methods to be used to ensure the required connections and structure shape are maintained prior to bolt torquing, method of providing temporary supports for stability.
    - .6 Details of temporary works: method of providing temporary supports for stability.
    - .7 Bolt torquing sequence and method.
    - .8 Details of release of falsework and/or shoring.
  - .5 Shop Drawings showing partial details or details of some elements but not all will not be reviewed until all details have been submitted to the Departmental Representative.
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- .6 The Erection Proposal submission or its approval shall not relieve Contractors of responsibility for providing proper methods, equipment, workmanship, and safety precautions.
- 1.4 Qualifications
- .1 Notify the Departmental Representative of all Subcontractors and be responsible for all Subcontractors. All terms of the Contract shall apply to the Subcontractor(s) as well.
- .2 The Fabricator shall operate a recognized steel fabricating shop approved by the Departmental Representative.
- .3 The Fabricator shall be fully approved by the Canadian Welding Bureau (CWB) as per CSA Standard W47.1.
- .4 Only welders, welding operators, and tackers approved by the CWB in their particular category shall be permitted to perform weldments. Their qualifications shall be current and available for examination by the Departmental Representative.
- 1.5 Delivery, Storage, and Handling
- .1 Deliver, store, and handle products in accordance with Section 01 61 10, Product Requirements.
- .2 Provide protective blocking for lifting, transportation, and storing. Exercise care during fabrication, transportation, and erection so as not to damage steel members. Do not notch edges of members. Do not cause excessive stresses.
- .3 Mark mass on members weighing more than 3 tonnes.
- .4 Ensure that no portion of steel comes into contact with the ground.
- .5 Provide Departmental Representative with delivery schedules a minimum of 7 days prior to shipping.

## PART 2 - PRODUCTS

- 2.1 General
- .1 Conform to applicable ASTM standards in the absence of applicable CSA or CGSB standards.
- .2 Integrate in the Works only new permanent materials, except when authorized in writing by the Departmental Representative.
- .3 Do not modify materials or construction details without previous written approval by the Departmental Representative, even if these modifications are deemed necessary or desirable by the Contractor.
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- 2.2 Materials
- .1 Structural steel: to CAN/CSA-G40.21, grades and types 300W, or as noted on drawings.
  - .2 High strength bolts, nuts, and washers: to ASTM A325M. Bolts to ASTM A490M may be used if approved by Departmental Representative.
  - .3 Welding electrodes: to CSA W48 series.
  - .4 Direct tension indicator washer: to ASTM F959M.
- 2.3 Source Quality Control
- .1 Provide Departmental Representative prior to fabrication, with four copies of steel producer certificates, in accordance with CAN/CSA G40.20. Include in certificates all mill test reports related to chemical analysis and physical tests for each heat from which elements have been fabricated.
  - .2 Make available for inspection all mill samples used for physical tests.
  - .3 When steel elements are obtained from stock, prove quality of materials by providing Departmental Representative with fabricator stamps and certificates stating that steel conforms to prescribed requirements.
  - .4 When steel elements are obtained from stock, Departmental Representative reserves the right to select elements and pieces to test at Contractor's expense.
  - .5 In the absence of mill certificates, for all steel from stock, provide Departmental Representative with a certificate stating that all steel conforms to prescribed requirements.
  - .6 Provide suitable facilities and cooperate with inspection organization and Departmental Representative in carrying out inspections and tests required.
    - .1 Inspection of the coating will be carried out by Departmental Representative. Supply power, scaffolding, weather protection, and access for the required testing procedures. Pay for all costs, including the cost of re-inspection and re-testing, associated with the correction or repair of rejected defects.
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- .2 Give the Departmental Representative not less than 24 hours notice of when work is ready for inspection. Include notice of the type and quantity of work to be inspected. Provide access to the Departmental Representative for all inspection procedures.

### PART 3 - EXECUTION

#### 3.1 Erection

- .1 Do not commence steel erection until approval of the Erection Proposal has been obtained from the Departmental Representative.
- .2 If staining or defacing occurs, clean steel surfaces to Departmental Representative's approval.
- .3 Do not disturb river banks or embankments without prior written permission of Departmental Representative.
- .4 The Contractor shall confirm, on site, all dimensions required for fabrication and dimensions shown on the Contract Drawings prior to any fabrication.

#### 3.2 Installation

- .1 Unless otherwise noted, carry out fabrication and erection of structural steel in accordance with CAN/CSA S6-06, Canadian Highway Bridge Design Code.
  - .2 Allowable tolerances for elements:
    - .1 Conform to Clause 28.9 of CAN/CSA S16.1-04 standard.
    - .2 Conform to prescriptions of CAN/CSA G40.20 standard.
    - .3 Conform to prescriptions of CAN/CSA W59 standard.
  - .3 Do falsework in accordance with CSA S269.1, except where specified otherwise.
  - .4 Welding: do welding in accordance with CSA W59, except where specified otherwise.
    - .1 For CAN/CSA G40.21, grade 300W steel, deposited weld metal to have Charpy V-Notch value not lower than that of steel.
    - .2 Unless indicated otherwise on the drawings, no welding, of whatever nature and extent, is allowed without the written authorization of the Departmental Representative, and then, only in such a way and at locations designated in his/her authorization.
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- .3 Minimal fillet weld size: conform to the requirements prescribed in CAN/CSA S6-06 standard. Detail these in shop drawings.
  - .4 Appoint and pay for the services of an independent welding inspector certified to visually inspect all completed welds as per CSA W59-M standard.
  - .5 High strength bolting: install bolts in accordance with CAN/CSA S6-06 and CAN/CSA S16.1-04 standards. Tighten as per manufacturer's requirements. Use Direct Tension Indicator (DTI) spacing washers in all cases.
  - .6 Finish: members true to line, free from twists, bends, open joints, sharp corners, sharp edges, etc.
  - .7 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 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 following:

Centre-to-Centre Distance (m)	Tolerance 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.
  - .8 Span length tolerances in accordance with CAN/CSA S6-06 and CAN/CSA S16.1-04 standards.
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- .9 Shop splices:
  - .1 Use complete joint penetration groove welds finished flush. Details of butt joints to CSA W59. Use only as approved by Departmental Representative.
- .10 Field splices: to approval of Departmental Representative.
- .11 Mark members in accordance with CAN/CSA G40.20. Do not use die stamping.
- .12 Match marking: shop mark bearing assemblies and splices.
- .13 Ensure that all participants in construction works comply with the requirements of CAN/CSA-Z94.4 standard regarding the use of respiratory apparatuses when working with paint or as required.

**END OF SECTION**

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PART 1 - GENERAL

- 1.1 References
- .1 American Society for Testing and Materials International, (ASTM)
    - .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    - .2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
    - .3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
    - .2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.
  - .3 Canadian Standards Association (CSA International)
    - .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
    - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
    - .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
    - .4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
    - .5 CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding) (Imperial Version).
- 1.2 Submittals
- 1. Product Data:
    - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
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2. Submit three copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
          1. For finishes, coatings, primers and paints.
      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.
  - 1.3 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.
    3. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 45 00 – Quality Control.
  - 1.4 Delivery, Storage and Handling
    1. Packing, Shipping, Handling and Unloading:
      1. Deliver, store, handle and protect materials in accordance with Section 01 61 10 - Product Requirements.
    2. Storage and Protection:
      1. Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
      2. Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.
  - 1.5 Waster Management and Disposal
    - .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.
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- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material off site for recycling in accordance with Waste Management Plan.
- 4. Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

**PART 2 - PRODUCTS****2.1 Materials**

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
- .2 Steel end protection: fabricated from bent DN200 STD pipe
- .3 CSP pipe piece: to ASTM A53/A53M standard weight, galvanized finish.
- .4 Welding materials: to CSA W59.
- .5 Welding electrodes: to CSA W48 Series.
- .6 Bolts and anchor bolts: to ASTM A307.

**2.2 Fabrication**

- .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.

**2.3 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. Wood.

**2.4 Steel Angles**

- 1. Steel angles: as shown on drawings.
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**PART 3 - EXECUTION**

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| 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 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 | 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 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.  |
| 3.2 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.  |

**END OF SECTION**

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