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| **Section Cover Page** |
| **Section 05 12 00**  **2019-06-05 Structural Steel Framing** |
| Refer to “Green Building Notes” page for additional guidance for projects following a sustainable rating system.  Revise Green Building requirements if the Province has determined that the work of this Contract is not to attain a sustainable rating system certification. |

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**Green Building Notes:**

If the project is **not** designated to use a sustainable rating system it is still be prudent to leave in relevant green building requirements as part of an effort towards sustainability.

**Review and incorporate requirements from the following documents into the project:**

Section 1.0 “Sustainability” and “Appendix G – Green Building Standards” of the “Technical Design Requirements for Alberta Infrastructure Facilities”

<http://www.infrastructure.alberta.ca/doctype486/TechDesignRequirements.pdf>

**LEED Specific Documents (if required):**

LEED Project Delivery Process Manual

<http://www.infrastructure.alberta.ca/Content/docType486/Production/LEED_PD_Manual.pdf>

LEED Project Delivery Process Manual – Appendices

<http://www.infrastructure.alberta.ca/Content/docType486/Production/LEED_PD_Appendices.pdf>

All documents can be found on Infrastructure’s Technical Resource Centre, Guidelines and Standards page: <http://www.infrastructure.alberta.ca/992.htm>

1. General
   1. RELATED WORK SPECIFIED IN OTHER SECTIONS

.1[Section 01 32 16 – LEED Submittal Forms]

.2 [Section 01 35 18 – LEED Requirements]

.3 [Section 01 35 20 – Environmental Procedures]

.4 Section 01 74 19 – Waste Management and Disposal

.5 Section 05 05 05 – Steel Testing and Inspection

.6 Section 05 21 19 – Open Web Steel Joists

.7 Section 05 30 00 – Metal Decking

.8 Section 05 50 00 – Custom Metal Fabrications

* 1. REFERENCE DOCUMENTS

*SPEC NOTE: Latest versions of the following standards to be used*

* + 1. American Society for Testing and Materials (ASTM):
       1. ASTM A108-13 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
       2. ASTM F1554-15e2 Standard Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Yield Strength
       3. ASTM F3125/F3125M-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. Canada Green Building Council (CaGBC):
       1. LEED Canada 2009 Rating System LEED Canada for New Construction and Major Renovations. LEED Canada for Core and Shell Development. Website: [www.cagbc.org](http://www.cagbc.org)
    3. Canadian Institute of Steel Construction (CISC) / Canadian Paint Manufacturer's Association (CPMA):
       1. CISC/CPMA 1-73a A Quick Drying One‑Coat Paint for use on Structural Steel
       2. CISC/CPMA 2-75 A Quick Drying Primer for use on Structural Steel
    4. Canadian Standards Association (CSA):
       1. CSA G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels
       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 W47.1‑09 (R2014) Certification of Companies for Fusion Welding of Steel Structures
       5. CSA W59‑13 Welded Steel Construction (Metal Arc Welding)
    5. Green Seal: Standards:
       1. GS‑11‑15 Paints and Coatings, Edition 3.2, October 26, 2015
    6. International Organization for Standardization (ISO):

.1 ISO/IEC 17025:2005 General Requirements for the Competence

of Testing and Calibration Laboratories

* + 1. Master Painters Institute:
       1. Master Painters Institute Green Performance Standard GPS‑1‑12
    2. The Society for Protective Coatings (SSPC):
       1. SSPC SP 3‑2004 Power Tool Cleaning
       2. SSPC SP‑6‑2007 Commercial Blast Cleaning
    3. American Institute of Steel Construction (AISC):
       1. Vibrations of Steel‑Framed Structural Systems Due to Human Activity, 2nd Edition, 2016.
  1. DESIGN CRITERIA
     1. Design connections and other work not detailed on drawings, but necessary for completion of the Work, in accordance with requirements of the Alberta Building Code, CSA S16 and CSA S136.
     2. Vibration Control for Floors – The Structural Consultant shall coordinate with the Steel Fabricator to ensure that the Vibration Criteria are satisfied.
  2. ADMINISTRATIVE REQUIREMENTS
     1. Coordination:
        1. Where structural steel is scheduled to be finish painted, ensure that shop paint primer is compatible with painting coats specified in Division 09, Painting and Finishing Schedules, [and product meets MPI GPS‑1 standard for maximum allowable VOC content].
  3. SUBMITTALS
     1. Product Data:
        1. Submit manufacturer's printed product literature, specifications, and data sheet in accordance with Section 01 33 00 – Submittal Procedures.
     2. Shop Drawings:
        1. Submit shop drawings and product data prior to commencement of fabrication.
        2. Shop Drawings shall include shop details and erection diagrams and shall indicate framing and grid lines, bearing and anchorage details, framed openings, accessories, schedule of materials, camber and loadings, fasteners, method of torquing bolts, and welds using American Welding Society basic weld symbols.
        3. Shop drawings for work designed by fabricator shall bear the stamp and signature of a Speciality Structural Engineer registered in the Province of Alberta.
     3. Manufacturer Reports:
        1. Submit three copies of certified mill test reports for the materials used.
           1. Where mill test reports originate from a mill outside of Canada or the United States of America, the Contractor shall have mill test reports verified by a certified laboratory in Canada by testing the material to the specified material standards, including boron content. The testing laboratory shall be certified to ISO/IEC 17025 by an organization accredited by the Standards Council of Canada for the tests required. Samples for testing shall be collected by personnel employed by the certified laboratory. A verification letter shall be provided by the certified laboratory that includes at a minimum, the applicable mill test reports, testing standards, date of verification testing, and declaration of material compliance with Contract requirements. The verification letter shall be signed by an authorized officer of the certified laboratory.
     4. Sustainable Design Submittals:
        1. LEED Submittals: submit LEED submittal forms for Credit MR 4 in accordance with Section 01 35 18 LEED Requirements and the following:
           1. Documentation identifying quantity by weight of recycled content in steel product if content is over 25% and to be claimed as such toward LEED credits.
        2. LEED Submittals: submit LEED submittal forms for Credit MR 5 in accordance with Section 01 35 18 LEED Requirements and the following:
           1. Regional Materials: provide evidence that project incorporates required percentage [20] [30] % of regional materials/products, showing their cost, distances from extraction to manufacture and manufacture to project site, and total cost of materials for project.
        3. Submit shop paint primer manufacturer's product data [verifying compliance with MPI Green Performance Standard GPS‑1, for VOC content].
        4. Submit product data for site applied touch-up primer for interior applications verifying compliance with GS-11, Paints and Coatings, for VOC content.
  4. QUALITY ASSURANCE
     1. Comply with applicable requirements of CSA S16 and CSA S136.
     2. Do welding in accordance with CSA W59.
     3. Welding shall be undertaken only by a company approved by the Canadian Welding Bureau to the requirements of CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
  5. DELIVERY, STORAGE, AND HANDLING
     1. Waste Management and Disposal:
        1. Separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 19 – Waste Management and Disposal.
  6. QUALIFICATIONS
     1. The Structural Steel Fabricator shall have minimum five (5) years of experience in the fabrication of structural steel.
     2. The Structural Steel Erector shall have minimum five (5) years of experience in the erection of structural steel.
     3. Steel fabricators and erectors must be certified under requirements of CSA W47.1 as required by CSA S16.
     4. Welding procedures, welders, and welding operations shall be qualified in accordance with Canadian Welding Bureau Standards.
  7. EXAMINATIONS
     1. Examine and verify all measurements and dimensions critical to the work of this contract.
  8. TESTING AND FIELD REVIEW
     1. See Section 05 05 05 – Steel Testing and Inspection.
     2. The Specialty Structural Engineer responsible for shop drawings, or their representative, shall visit the site to review in place the connections and components designed by that Specialty Structural Engineer. The Specialty Structural Engineer shall be satisfied or take steps to ensure that these connections and components substantially comply with the Specialty Structural Engineer’s design. The Specialty Structural Engineer shall then provide a sealed and signed letter to the Province to this effect.
     3. Prior to the commencement of work, provide a schedule of shop fabrication to the Testing Agency.
     4. The Contractor shall advise the Testing Agency of the scheduling of all shop and field work pertaining to this Project. The Contractor shall permit the testing agency full access to the fabrication shop and the site, for the purpose of carrying out his work and he shall provide assistance required to aid in the performance of the inspection and testing.

1. Products
   1. MATERIALS
      1. Steel:  Structural quality, to CSA G40.20.
         1. Structural steel with boron content exceeding 0.0008% will not be permitted.
         2. When steel is to be galvanized, the silicon content shall be either less than 0.04% or between 0.15% and 0.25%.
      2. Rolled Structural Steel Sections:  to CSA G40.21, Type [G] [W], grade [XXX] [indicated on drawings], [unprimed] [galvanized] [shop primed] [and finish painted].
      3. Hollow Structural Steel Sections:  to CSA G40.21, Grade [350W] [indicated on drawings], Class [C] [H], [unprimed] [galvanized] [shop primed] [and finish painted].
      4. Cold Rolled Sections: Conforming to CSA S136 with yield strength of 380 MPa.
      5. Bolts:  to ASTM [F1554] [F3125].
      6. Anchor Bolts: Conforming to ASTM F1554, yield strength [36] [55] [105] ksi.
      7. Welding Materials: Conforming to CSA W59.
      8. Shear Stud Connectors: to ASTM A108.
      9. Galvanizing: Conforming to CAN/CSA G164; minimum [600] [XXX] grams per square metre coating.
      10. Shop Paint Primer: [to CISC/CPMA 2‑75] [as specified in Division 09, Painting and Finishing Schedules] [meeting requirements of MPI GPS‑1 standard for VOC content] [to CISC/CPMA 1‑73a].
      11. Zinc rich paint and touch-up primer for interior surfaces: meeting requirements of Green Seal Standard GS‑11, Paints and Coatings, for VOC content to be less than 250 g/l.
   2. DESIGN
      1. Unless otherwise noted, connections and trusses shall be designed by the Specialty Structural Engineer to the reference Standards.
      2. Connections of the type and detail shown on the drawings shall be used. Modifications to the specified connection types and details will not be permitted without prior approval from the Consultant.
      3. The following connections, and any connections so noted on the structural drawings, shall be designed as slip critical and shall be pre‑tensioned:
         1. Trusses.
         2. Elements resisting crane loads.
         3. Connections for supports of running machines or other live loads that produce impact or cyclic loads.
         4. Connections where bolts are subject to repeated tensile loads.
         5. Connections using slotted holes in the direction of the load or oversize holes unless specifically designed to accommodate movement.
      4. Connections for wind or seismic lateral load‑resisting elements, such as bracing and drag struts, and others so noted on the structural drawings may be designed as bearing connections, but shall be pre‑tensioned.
      5. Other bolted connections may be snug tight.
      6. Use standard connection types where connections are not detailed on the structural drawings.
      7. Design shall be for the forces and loads shown on the drawings and shall allow for the effects of beam deflections. Provide a minimum of two (2) 19 mm (3/4") diameter ASTM F3125 bolts or an equivalent weld for all beam to girder and beam to column connections. If forces or loads are not given, the connection shall be designed for the maximum uniform distributed load that the member can carry for the span shown.
      8. Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non‑destructive testing as directed by the Province. The cost for such testing shall be borne by the Contractor.
      9. Provide stiffeners in beam webs at all locations where beams pass over supports. Unless noted otherwise in the structural drawings, web stiffeners shall be 10 mm minimum.
      10. Provide separators for all double members in accordance with CSA S16.
   3. FABRICATION
      1. Fabricate and assemble structural steel in shop to greatest extent possible, and as follows:
         1. Fabricate beams, columns, and other members of continuous sections in accordance with CSA S16; do not splice pieces unless specifically shown on the drawings or written authorization from the Consultant.
         2. Provide 10 mm web stiffeners to both sides of beams over all supports unless specifically noted otherwise.
      2. Fabricate structural steel in accordance with CSA S16 and CSA S136, reviewed fabrication and erection documents, and as follows:
         1. Camber structural steel members where indicated.
         2. Identify high strength structural steel and maintain markings until steel has been erected.
         3. Mark and match mark materials for site assembly.
         4. Fabricate ends of columns and other members subjected to compression factors to transmit full cross‑sectional capacity of column or member, under otherwise noted.
         5. Complete structural steel assemblies, including welding of units, before starting shop priming operations.
      3. Shop weld shear stud connectors with automatic stud welding equipment. Thoroughly clean surface to which studs are to be welded. Ensure stud stem is perpendicular to surface to which it is attached.
      4. Holes:
         1. Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members.
         2. Cut, drill, or punch holes perpendicular to steel surfaces; do not cut holes or enlarge holes by flame cutting.
         3. Drill holes in bearing plates.
         4. Provide weep holes 10 mm in diameter in tops and bottoms of all HSS columns.
   4. SURFACE PREPARATION AND SHOP PRIMING
      1. Where structural steel is scheduled to be finish painted, prepare surfaces in accordance with Steel Structures Painting Council, [SP‑3 – Power Tool Cleaning] [SP‑6 - Commercial Blast Cleaning]
      2. Apply shop paint primer in accordance with [CSA‑S16] [manufacturer’s instructions] to a dry film thickness of 50 to 75 micrometers.
2. Execution
   1. ERECTION
      1. Erect structural steel in accordance with CSA S16, CSA W59, and CSA S136.
      2. Structural steel erector is fully responsible for erection methods, equipment, workmanship, and safety precautions.
      3. Obtain the Consultant’s approval prior to field cutting or altering of members.
      4. Field touch up shop paint primer at bolts, welds and burned or scratched surfaces. Use same primer as applied in shop.

**END OF SECTION**