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| **Section Cover Page** |
| **Section 05 12 00**  **2012-04-01 Structural Steel Framing** |
| Refer to “LEED Notes and Credits” page for additional guidance for LEED projects.  Delete LEED items if project:  .1 is excluded by the Department’s policy on LEED, or  .2 the Department has determined that the work of this Contract is not to attain a LEED rating. |

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**LEED Notes:**

Sustainable building practices and benefits of using steel:

- Steel is made from recycled material and is itself a recyclable product. Less energy is required to make steel from recycled material than to manufacture it from mined material. Steel is one of the few materials that can contain both post-consumer and pre-consumer content.

- LEED allows for steel to be up to 25% recycled content without verification from the manufacturer. The location of the steel fabricator, rather than the location of the steel mill may be used as the manufacturing location when calculating the amount of local and regional material used for a project.

This section is coordinated with Section 01 74 19, Waste Management and Disposal in order to reduce packaging material that often comes with steel building components, such as steel strapping, plastic wrap and other protective packaging.

There is no LEED requirement for off-site paint applications such as shop primer to have restrictions on VOC content. However, limiting VOC is an environmentally responsible choice because the emissions are harmful to the environment. Use of lower VOC products also improves indoor air quality during construction and over the life of the project.

Master Painters Institute (MPI) has established a Green Performance™ program which provides a list of products meeting certain environmentally conscious criteria as well as performance. Rust inhibiting paint such as that used in steel fabrication facilities can be specified to meet the GPS-1-08, which lists coatings having VOC’s less than 400 g/l. MPI has concerns that the low VOC’s required by Green Seal Standard GS-11(LEED) for rust protective coatings have poor performance.

**LEED Credits:**

Potential LEED credits are available through this section:

.1 MR Credit 3 Materials Reuse: Use salvaged, refurbished or reused materials, the sum of which constitutes at least 5% or 10% based on cost, of the total value of materials on the project. Salvaged structural members would qualify for this credit.

.2 MR Credit 4 Recycled Content: The criteria is that the sum of post-consumer recycled content plus one-half of the pre-consumer recycled content constitutes at least 10% or 20% of the total value of the materials in the project. Steel components have some recycled content and will contribute to the overall recycled content of components in the building. The LEED Reference Guide allows a default value of 25% post-consumer content for steel. Claims above 25% will require documentation from the manufacturers.

.3 MR Credit 5 Regional Materials: Use building materials or products that have been extracted, harvested, recovered and processed within 800 km (2400 km is shipped by rail or water) of the final manufacturing site. Demonstrate that the final manufacturing site is within 800 km (2400 km is shipped by rail or water) of the project site for these products. If fabricated regionally, steel will count in this credit. The contractor will be required to submit documentation consisting of cost, weight, transportation service and distances as evidence of compliance with credit requirements.

In order to meet the LEED EQ 4.2 Credit(Indoor Air Quality - Low Emitting Materials: Paints and Coatings), site applied touch-up primer on interior applications must meet GS-11, Green Seal Paints and Coatings, Third Edition, January 1, 2010. Maximum VOC content must be less than 250 g/l. There is no LEED requirement for restricting VOC content in paint of any kind for use in exterior applications.

1. General
   1. REFERENCE DOCUMENTS

***SPEC NOTE: Edit this article to include only standards referenced within the edited version of this Section, including LEED requirements and sustainable practices.***

* + 1. American Society for Testing and Materials (ASTM):
       1. ASTM A108-07 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
       2. ASTM F1554-07 Standard Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Yield Strength
       3. ASTM A325-10 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
       4. ASTM A490-11 Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
    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. CAN/CSA-G40.20/G40.21-04 General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels
       2. CAN/CSA-G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles
       3. CAN/CSA-S16-09 Design of Steel Structures
       4. CSA S136-07 Design of Cold-Formed Steel Structural Members
       5. CSA W47.1-09 Certification of Companies for Fusion Welding of Steel Structures
       6. CSA W59-03 (R2008) Welded Steel Construction (Metal Arc Welding)
    5. Green Seal: Standards:
       1. GS-11-10 Paints and Coatings, Third Edition, January 1, 2010
    6. Master Painters Institute:
       1. Master Painters Institute Green Performance Standard GPS-1-08
    7. The Society for Protective Coatings (SSPC):
       1. SSPC SP 3-2004 Power Tool Cleaning
       2. SSPC SP-6-2007 Commercial Blast Cleaning

***SPEC NOTE: Select one of SSPC SP-3 or SP-6***

* 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 Alberta Building Code, CAN/CSA‑S16 and CSA S136.
  2. ADMINISTRATIVE REQUIREMENTS
     1. Coordination:

***SPEC NOTE: Delete the MPI Green Performance Standard if sustainable building practices are not being followed***

* + - 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-1-08 standard for maximum allowable VOC content].
  1. 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 specialty structural engineer registered in the Province of Alberta.
     3. Manufacturer Reports:
        1. Submit three copies of certified mill test reports for the materials used.
     4. Sustainable Design Submittals:

***SPEC NOTE: Delete LEED submittal item if project is not to attain LEED certification or if Credit MR 4 is not being sought.***

* + - 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.

***SPEC NOTE: Delete LEED submittal item if project is not to attain LEED certification or if Credit MR 5 is not being sought.***

* + - 1. 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.

***SPEC NOTE: Delete the MPI Green Performance Standard if sustainable building practices are not being followed.***

* + - 1. Submit shop paint primer manufacturer's product data [verifying compliance with MPI Green Performance Standard GPS-1-08, for VOC content].

***SPEC NOTE: Delete LEED submittal item if project is not to attain LEED certification.***

* + - 1. Submit product data for site applied touch-up primer for interior applications verifying compliance with GS-11, Paints and Coatings, for VOC content.
  1. QUALITY ASSURANCE
     1. Comply with applicable requirements of CAN/CSA‑S16 and CAN/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.
  2. 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.
  3. QUALIFICATIONS
     1. Structural steel fabricator shall have minimum five (5) years experience in the fabrication of structural steel.
     2. Structural steel rector shall have minimum five (5) years 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.
  4. EXAMINATIONS
     1. Examine and verify all measurements and dimensions critical to the work of this contract.
  5. TESTING AND FIELD REVIEW
     1. See Section 05 00 50 - Testing of Structural Steel, Steel Joist Framing and Steel Decking.
     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 Minister 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 CAN/CSA‑G40.20.
      2. Rolled Structural Steel Sections:  to CAN/CSA‑G40.21, Type [G] [W], grade [     ] [indicated on drawings], [unprimed] [galvanized] [shop primed] [and finish painted].
      3. Hollow Structural Steel Sections:  to CAN/CSA‑G40.21, Type [W], grade [   ] [indicated on drawings], Class C [H], [unprimed] [galvanized] [shop primed] [and finish painted].
      4. Cold Rolled Sections: Conforming to CAN/CSA S136 with yield strength of 380 Mpa.
      5. Bolts:  to ASTM [F1554] [A325] [A490].
      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 CSA G164; minimum [600] [          ] grams per square metre coating.

***SPEC NOTE: Delete the MPI Green Performance Standard if sustainable building practices are not being followed.***

* + 1. Shop Paint Primer: [to CISC/CPMA 2-75] [as specified in Division 09, Painting and Finishing Schedules] [meeting requirements of MPI GPS-1-08 standard for VOC content] [to CISC/CPMA 1-73a].

***SPEC NOTE: Delete the following requirement for Green Seal Standard if project is not attaining LEED certification. Note that only interior applications must meet the VOC content requirement.***

* + 1. 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.
  1. 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 Minister.
     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 A325 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 Minister. 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.
  2. FABRICATION
     1. Fabricate structural steel in accordance with CAN/CSA‑S16 and CSA‑S136.
     2. Camber steel members as indicated on drawings.
     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.
  3. SURFACE PREPARATION AND SHOP PRIMING

***Spec Note: Specify the appropriate surface preparation as listed below. Refer to paint manufacturers literature and Master Painters Institute Manuals. Cost of surface preparation is not related to the numbering sequence.***

* + 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 [CAN/CSA‑S16] [manufacturer’s instructions] to a dry film thickness of 50 to 75 micrometers.

1. Execution
   1. ERECTION
      1. Erect structural steel in accordance with CAN/CSA‑S16, CSA W59, and CSA S136.
      2. Structural steel erector is fully responsible for erection methods, equipment, workmanship, and safety precautions.
      3. Obtain Minister’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**