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| **Section Cover Page** |
| **Section 05 21 19**  **2012-04-01 Open Web Steel Joists** |
| 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. |

This Master Specification Section contains:

.1 This Cover Sheet

.2 LEED Notes and Credits

.3 Specification Section Text:

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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.

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 400g/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 Specifications for Steel Bars, Carbon, Cold-Finished, Standard Quality
    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 Manufacturers’ Association (CPMA)CISC/CPMA 2-75A 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 Steels
       2. CAN/CSA-S16-09 Design of Steel Structures
       3. CSA S136-07 Design of Cold-Formed Steel Structural Members
       4. CSA W47.1-09 Certification of Companies for Fusion Welding of Steel Structures
       5. CSA W59-03 (R2008) Welded Steel Construction (Metal Arc Welding)
    5. Green Seal: Standards:
       1. GS-11 Paints and Coatings, Third Edition, January 2010.
    6. Master Painters Institute:
       1. Master Painters Institute Green Performance Standard GPS-1-08
    7. The Society for Protective Coatings (SSPC):

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

* + - 1. SSPC SP -3-2004 Power Tool Cleaning
      2. SSPC SP-6 Commercial Blast Cleaning
  1. DESIGN CRITERIA
     1. Design members, connections and other work not detailed on drawings, but necessary for completion of the Work, in accordance with dimensions [and loadings] indicated on drawings, and requirements of Alberta Building Code, CAN/CSA‑S16 and CSA S136, the Canadian Institute of Steel Construction (CISC) “Code of Standard Practice for Buildings” and “Steel Joist Facts”.
     2. The deflection due to live load shall not exceed 1/360 of the span unless noted otherwise on the drawings.
  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 professional engineer registered in the Province of Alberta.
     3. Test and Evaluation Reports
        1. Minister may appoint and pay for services of testing agency to perform testing and inspection of work of this Section.
        2. Notify Minister prior to commencement of fabrication work so that testing and inspection may be properly scheduled.
        3. When defects are revealed, Minister may request additional testing and inspection at Contractor's expense.
     4. Manufacturer Reports:
        1. Submit three copies of certified mill test reports for the materials used.
     5. 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 spot-primer for interior applications verifying compliance with GS-11, Paints and Coatings, for VOC content.
  1. QUALITY ASSURANCE
     1. 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 - Management and Disposal.
  3. QUALIFICATIONS
     1. Open web steel joist fabricator shall have minimum five (5) years experience in the fabrication of open web steel joists.
     2. Steel Joist erector shall have minimum five (5) years experience in the erection of open web steel joists.
     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 critical to the work of this contract.
  5. SUBMITTALS
     1. The Contractor shall submit, [with the tender][before starting work] (\*\* Spec note: choose one), written evidence of qualification of the steel fabricators and erectors for welding under Canadian Welding Bureau requirements.
     2. The Contractor shall submit, [with the tender][before starting work] (\*\* Spec note: choose one), written evidence of ability to weld reinforcing steel to structural steel in accordance with CSA W186.
     3. When requested, submit copies of mill test reports properly correlated to the materials used on the project.
     4. Provide a schedule of fabrication to the Minister and Testing Agency prior to the commencement of the fabrication.
  6. 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.
  7. TESTING AND FIELD REVIEW
     1. See Section 05 00 50 - Testing of Structural Steel, Steel Joist Framing and Steel Decking.
     2. Prior to the commencement of work provide a schedule of shop fabrication to the Testing Agency.

1. Products
   1. MATERIALS
      1. Steel:  structural quality  to CAN/CSA‑G40.20 and CAN/CSA‑G40.21.
      2. Welding Materials: to CSA W59.

***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, for VOC content to be less than 250 g/l.
  1. DESIGN
     1. Unless otherwise noted open web steel joists shall be designed by the Specialty Structural Engineer to the reference Standards.
     2. Design joists of the depth and spacing shown on the drawings to carry the loads shown on the drawings in accordance with CSA S16.
     3. Design of bridging for steel joists shall conform to the requirements of CSA S16, unless otherwise indicated on the drawings. Refer to the drawings for areas of non-typical joist bridging and bracing.
     4. Joists shall have a live load deflection of less than 1/360 of the span unless noted otherwise.
     5. Line up openings and webs in adjacent joists to allow for passage of pipe, ducts, conduits, etc. Make allowance in joist design for support of pipes, ducts, conduits, etc.
     6. Where joists frame into both sides of a support, extend the top chord of the joists to the center of the support, unless shown otherwise.
     7. Where joists frame into one side of a support, extend the top chord of the joists to the far side of the support, unless shown otherwise.
  2. FABRICATION
     1. Fabricate steel joists and accessories in accordance with CAN/CSA‑S16 and CSA S136.

SPEC NOTE:  Ensure drawing details clarify requirements, including attachments of bottom chord to lateral support.

* + 1. Camber joists to dead load deflection indicated on drawings.
    2. Drill holes in chords where necessary for attachment of wood nailers. [Weld threaded studs to top chord for attachment of wood nailers.] Make allowance for the reduction in cross sectional area of tension flanges.
    3. Fabricate top [and bottom] chord extensions where indicated. [Provide ceiling support extensions to bottom chord as required to support ceiling construction.]
  1. SURFACE PREPARATION AND SHOP PRIMING
     1. Where steel joists are 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. The steel joist erector is fully responsible for erection methods, equipment, workmanship and safety precautions.
      2. Steel joists shall bear on beams as per section 2.2, but in no case shall be less than 65 mm on supporting steel members. Connect to supporting steel with a 5 mm x 30 mm long fillet weld at each side. Secure to bearing plates on masonry walls in the same manner, bearing 100 mm minimum.
      3. Erect steel joists and bridging in accordance with CAN/CSA‑S16, CSA W59 and CSA S136.
      4. Obtain Minister's approval prior to field cutting or altering of joists or bridging.
      5. Field touch up shop paint primer at bolts, welds and burned or scratched surfaces. Use same primer as applied in shop.

**END OF SECTION**