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| **Section Cover Page** |
| **Section 03 20 00**  **2012-04-01 Concrete Reinforcing** |
| 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. |

Use this Section to specify concrete reinforcement for large scope (e.g. more than $25,000) cast-in-place concrete work except:

.1 Concrete reinforcement for sidewalks, driveways, aprons, pads, curbs and gutters, specified in Section 32 13 13 - Concrete Paving, Curbs and Gutters.

.2 Concrete reinforcement for street light bases, car plug-in posts, guard posts, etc., specified in Section 32 17 10 - Road and Parking Appurtenances.

.3 Use Section 03 30 10 – Cast-in-Place Concrete (Short Form) for small scope cast-in-place concrete work.

Requirements for recycled material should still be specified even if this project is not pursuing LEED Certification.

This Master Specification Section contains:

.1 This Cover Sheet

.2 LEED Notes and Credits

.3 Specification Section Text:

**1. General**

1.1 Reference Documents

1.2 Testing

1.3 Submittals

1. Quality Assurance

1.5 Delivery, Storage and Handling

**2. Products**

2.1 Reinforcement Materials

2.2 Fabrication

**3. Execution**

3.1 Field Bending

3.2 Placement Detailing

3.3 Placement

3.4 Field Touch-up

3.5 Cleaning

3.6 Schedule

**LEED Notes:**

N/A

**LEED Credits:**

Possible LEED credits are available through this section:

.1 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. Reinforcing for concrete is often made of recycled steel and if so, can contribute to these possible credits. The LEED Reference Guide allows a default value of 25% post-consumer content for steel. Claims above 25% will require documentation from the manufacturers.

.2 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. Reinforcing steel is a prime candidate for 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.

Delete LEED requirements for Credit MR 4 and MR 5 if these credits are not part of the points being sought.

1. General
   1. REFERENCES DOCUMENTS

*SPEC NOTE: Edit this article to include only standards referenced within this section.*

* + 1. American Concrete Institute (ACI):
       1. ACI 315-99 ACI Detailing Manual
    2. American Society for Testing and Materials (ASTM):
       1. A775/A775M-07b Standard Specification for Epoxy-Coated Steel Reinforcing Bars
    3. 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)
    4. Canadian Standards Association (CSA):
       1. CSA A23.1‑09 Concrete Materials and Methods of Concrete Construction
       2. CSA A23.3-04 (R2010) Design of Concrete Structures
       3. CAN/CSA-G30.18-09 Carbon Steel Bars for Concrete Reinforcement
       4. CAN/CSA-G40.21-04 Structural Quality Steels
       5. CAN/CSA-W186-M90(R2007) Welding of Reinforcing Bars in Reinforced Concrete Construction
    5. Concrete Reinforcing Steel Institute  (CRSI):
       1. Reinforcing Steel Manual of Standard Practice.
  1. TESTING
     1. As per Section 03 00 05 – Testing of Concrete and Reinforcement.
  2. SUBMITTALS
     1. Shop Drawings:
        1. Submit shop drawings including placing of reinforcement in accordance with Division 01.
        2. Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Minister, with identifying code marks to permit correct placement without reference to structural drawings. [Indicate sizes, spacings, and locations of chairs, bolsters, spacers, and hangers.] Prepare reinforcement drawings in accordance with [Reinforcing Steel Manual of Standard Practice – by Reinforcing Steel Institute of Canada] [ACI 315].

*SPEC NOTE: Drawings should indicate type of tension lap splice.*

* + - 1. Detail lap lengths and bar development lengths to CSA A23.3. Provide Class B tension lap splices unless otherwise indicated or stipulated by the Standard.
    1. 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 Credits 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 reinforcing 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 Credits 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.
  1. QUALITY ASSURANCE
     1. Provide Minister, upon request, with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, [minimum [4] [ ] weeks prior to commencing reinforcing work].
     2. Inform Minister, upon request, of proposed source of material to be supplied.
  2. DELIVERY, STORAGE AND HANDLING
     1. Deliver, store and handle reinforcing steel, welded wire fabric and accessories in manner that prevents contamination which reduces bond, and damage to fabricated forms.
     2. Protect reinforcement from rust, dirt, grease, form oil and other bond-breaking substances.
     3. Waste Management and Disposal:
        1. Separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 19 – Waste Management and Disposal.

1. Products
   1. REINFORCEMENT MATERIALS

*Spec Note: The following sentence should be retained if the intent is to attain LEED credit MR 4.1 and/or MR 4.2. Delete following note regarding recycled content depending upon availability of product and/or the above-mentioned credits are not being sought.*

* + 1. Provide materials with minimum 25% recycled content.
    2. Reinforcing Steel: billet steel, grade [300] [400], deformed bars to CAN/CSA G30.18, unless indicated otherwise; [Plain] [Galvanized] [Epoxy coated] finish.
    3. Reinforcing Steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.
    4. Plain Round Bars: to CAN/CSA G40.21.

*Spec Note: Use flat sheets in welded deformed steel wire fabric for 21 mm² wire and heavier*

* + 1. Epoxy Coating of Non-Prestressed Reinforcement: to A775/A775M.

*SPEC NOTE: Specify type of supports and spacers where rust spots and other blemishes at concrete surfaces are not acceptable.*

* + 1. Chairs, Bolsters, Bar Supports and Spacers: to CSA A23.1.
    2. Mechanical Splices: subject to Minister’s approval.
  1. FABRICATION
     1. Fabricate reinforcing steel in accordance with CSA A23.1, ACI 315[, and] [Reinforcing Steel Manual of Standard Practice – by Reinforcing Steel Institute of Canada].
     2. Obtain Minister’s approval for locations of reinforcement splices other than those shown on placing drawings.
     3. Upon approval of Minister, weld reinforcement in accordance with CAN/CSA W186.
     4. Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
     5. Bundle and transport epoxy coated reinforcement in accordance with ASTM A775/A775M.
     6. Fabricate within the following tolerances:
        1. Sheared Length: +/- 25 mm
        2. Stirrups, Ties and Spirals: +/- 10 mm
        3. Other Bends: +/- 25 mm
     7. Locate reinforcing splices not shown on drawings at points of minimum stress.

1. Execution
   1. FIELD BENDING
      1. Do not field bend or field weld reinforcement except where indicated or authorized by Minister.
      2. When field bending is authorized, bending procedure shall conform to the Standard.
      3. Replace bars which develop cracks or splits.
   2. PLACEMENT DETAILING
      1. Conform to CSA A23.1 and CSA A23.3 for hooks, bends, laps, and similar details not specifically shown.
      2. For support bars not shown on drawings, use the sizes and spacing for applications as follows:
         1. Slab Top Reinforcing (10M): 10M bars spaced at [1000] mm o.c. maximum.
         2. Slab Top Reinforcing (15M and larger): [15] [ ]M bars spaced at 1200 mm o.c. maximum.
         3. Slab Bottom Reinforcing: 15M bars spaced at 1200 mm o.c. maximum.
         4. Beam Stirrups: 15M bar in each corner.
      3. Reinforce slab and wall openings, unless otherwise shown, as follows:
         1. Openings with greatest dimension of 600 mm or less: four 15M diagonal bars, 900 mm longer than greatest opening dimension.
         2. Openings with greatest dimension larger than 600 mm: two 15M bars on each side, top and bottom, 1500 mm longer than greatest opening dimension.
         3. Reinforce circular openings as square.
      4. Secure chairs for reinforcing in place located at 1200 mm o.c. maximum.
      5. Provide horizontal "L" shaped corner bars of same cross section and spacing as horizontal bars or welded wire fabric around wall and grade beam corners.
      6. Cover electrical conduit, ductwork or piping buried in slabs with 600 mm wide strip of 102 x 102 x MW13.3 x MW13.3 welded wire fabric. If principal slab reinforcement is placed above conduit then place 600 mm strip under conduit. Position of reinforcing steel takes precedence over conduit, ductwork, or piping.
   3. PLACEMENT
      1. Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CSA A23.1. Chair slab reinforcing not further apart than 1.2 m in either direction.
      2. Place, support and secure reinforcement against displacement. Do not deviate from required position.
      3. Do not displace or damage vapour barrier. Repair and reposition vapour barrier as required.
      4. Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
      5. Prior to placing concrete, obtain Minister’s approval of reinforcing material and placement.
      6. Ensure reinforcement location is maintained to provide required concrete cover to reinforcement during placement of concrete.
      7. Place reinforcing steel in [                    ], [                    ] [, and] [                  ] to provide concrete cover for [      ] hour fire endurance, as required by the Alberta Building Code.
      8. Protect [epoxy] [and] [paint] coated portions of bars with covering during transportation and handling.
      9. Place reinforcing steel to provide concrete cover as follows:

|  |  |
| --- | --- |
| Item | Cover [mm] |
| Beam Stirrups | [40] [         ] |
| Supported Slabs and Joists | [20] [         ] |
| Column Ties | [40] [         ] |
| Interior Walls | [25] [         ] |
| Walls Exposed to weather or backfill | [50] [         ] |
| Footings and concrete formed against earth | [75] [         ] |
| Slabs on Fill | [50] [         ] |

* + 1. .Maintain alignment as follows:

|  |  |
| --- | --- |
| Item | Tolerance Plus or Minus [mm] |
| Slabs | [5] [        ] |
| Other Structural Members | [10] [        ] |
| Rebar bends and Ends | [50] [        ] |

* 1. FIELD TOUCH-UP
     1. Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.
  2. CLEANING
     1. Ensure concrete reinforcing is clean and free from oil and deleterious matter.
     2. Remove all loose scale, loose rust, and other deleterious matter from surfaces of reinforcing.
  3. SCHEDULE

*SPEC NOTE: Provide a schedule when differing reinforcement types or finishes are required. The following may assist in the development of such a schedule*

|  |  |
| --- | --- |
| Location | Reinforcement |
| Foundation walls, foundation framing members, and slabs-on-grade | Deformed bars and wire fabric, galvanized finish. Chairs, bolsters bar supports and spacers, non-corrosive finish or construction |
| Superstructure framing members | Deformed bars, unfinished |
| Parking structure framing members | Deformed bars, epoxy coated finish. |

end of section