

**Part 1            General**

**1.1               RELATED REQUIREMENTS**

- .1      Section 03 10 00 – Concrete forming and accessories
- .2      Section 03 20 00 – Concrete reinforcing
- .3      Section 03 37 26 – Underwater placed concrete
- .4      Section 03 41 00 – Precast structural concrete

**1.2               PRICE AND PAYMENT PROCEDURES**

- .1      Measurement and Payment
  - .1      No measurement will be made under this Section.
    - .1      Include reinforcement costs in items of concrete work in following sections:
      - 03 30 00.01 - Cast-In-Place Concrete short form.
      - 03 37 26 – Underwater placed concrete
      - 03 41 00 – Precast structural concrete

**1.3               REFERENCES**

- .1      American Concrete Institute (ACI)
  - .1      SP-66-04, ACI Detailing Manual 2004.
- .2      ASTM International
  - .1      ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .2      ASTM A-123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - .3      ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .4      ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- .3      CSA International
  - .1      CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2      CAN/CSA-A23.3-04 (R2010), Design of Concrete Structures.
  - .3      CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
  - .4      CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .5      CSA W186-M1990 (R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

- .4 Reinforcing Steel Institute of Canada (RSIC)
  - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

#### **1.4 ACTION/INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice
- .3 Shop Drawings
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Quebec of Canada.
    - .1 Indicate placing of reinforcement and:
      - .1 Bar bending details.
      - .2 Lists.
      - .3 Quantities of reinforcement.
      - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
      - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers. Use steel or plastic chair, concrete block is not allowed.
  - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3.

#### **1.5 QUALITY ASSURANCE**

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
  - .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum four (4) weeks prior to beginning reinforcing work.
  - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
- .4 All the reinforcing steel will be delivered free of rust except for that which may have been formed during transport to the site. It will be protected at all times against moisture, grease, dirt, mortar or cement until it is finally used.

**Part 2            Products**

**2.1            MATERIALS**

- .1      Substitute different size bars only if permitted in writing by Departmental Representative.
- .2      Reinforcing steel: billet steel, grade 400W, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3      Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .4      Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.
- .5      Welded steel wire fabric: to ASTM A185/A185M.
  - .1          Provide in flat sheets only.
- .6      Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m<sup>2</sup>.
  - .1          Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
  - .2          If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.
    - .1              Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
  - .3          If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.
    - .1              In this case, no restriction applies to temperature of solution.
  - .4          Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.
    - .1              Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .7      Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .8      Plain round bars: to CSA-G40.20/G40.21.

**2.2            FABRICATION**

- .1      Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2      Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3      Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4      Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **2.3 SOURCE QUALITY CONTROL**

- .1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum four (4) weeks prior to beginning reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Galvanizing to include chromate treatment.
  - .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

### **3.2 FIELD BENDING**

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

### **3.3 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.
- .2 Use plain round bars as slip dowels in concrete.
  - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
  - .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Welds points on reinforcing bars are prohibited

### **3.4 FIELD TOUCH-UP**

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse, recycling or elimination in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**END OF SECTION**