

## **1.0 GENERAL**

### **1.1 WORK SEQUENCE**

- .1 Provide all labour, materials, equipment and services necessary to supply and install new reinforcing steel work shown on indicated in all the Contract Drawings and Specifications including accessories such as hanger bars, spirals, wire ties, support bars, chairs, spacers supports or other devices required to position reinforcing properly.

### **1.2 REFERENCE STANDARDS**

- .1 CSA-A23.1-09 Concrete Materials and Methods of Concrete Construction
- .2 CSA-G30.5-M1983 R98 Welded Steel Wire Fabric for Concrete Reinforcement (**Withdrawn**)
- .3 CSA-G30.18 09 Carbon Steel Bars for Concrete Reinforcement
- .4 ASTM A775/A775M-07b Standard Specification for Epoxy-coated Reinforcing Steel Bars
- .5 ACI Manual of Standard Practice for Detailing – 28<sup>th</sup> Edition
- .6 Reinforcing Steel Manual of Standard Practice – June 2010
- .7 SP-71(08): ASTM Standards in 318-08
- .8 CSA-23.3-04 Design of Concrete Structures
- .9 CSA W186-M1990 (R2007) Welding of Reinforcing Bars in Reinforced Concrete Construction

### **1.3 SUBMITTALS**

- .1 Mill Tests:
  - .1 Upon request, provide the Departmental Representative with a certified copy of mill tests of steel supplied, showing physical and chemical analysis, minimum 2-weeks prior to commencing reinforcing work.

### **1.4 PRODUCT DELIVERY, STORAGE AND HANDLING**

- .1 Store and protect reinforcement in a manner to prevent excessive rusting and fouling with dirt, grease, form-oil and other bond-breaking coatings.
- .2 Reinforcement at the time concrete is placed shall be free from excessive rusting, mud, oil or other coatings that adversely affect its bonding capacity.

## 2.0 **PRODUCTS**

### 2.1 **MATERIALS**

- .1 Reinforcing steel bars shall conform to CSA G30.18-09 (grade 400 MPa) unless otherwise specified herein or on the drawings.
- .2 Reinforcing bars to be welded shall conform to CSA G30.18-09.
- .3 Welded wire fabric shall conform to CSA G30.5 (**Withdrawn**). Sizes and gauges as shown on the drawings.
- .4 Bar supports shall conform to ACI 316 unless otherwise approved by the Departmental Representative.
- .5 Chairs, bolsters, bar supports, spacers shall be epoxy coated or plastic. The use of pebbles, pieces of broken stone or brick, pipe, or wooden blocks will not be permitted.
- .6 Tie wire for coated reinforcing shall be plastic-coated.
- .7 Mechanical splices, to Departmental Representative's approval.

### 2.2 **FABRICATION**

- .1 Fabricate reinforcing to CSA-A23.1 and reviewed shop drawings.
- .2 Fabricate reinforcing steel within the following tolerances:
  - .1 Sheared length plus or minus ..... 25 mm
  - .2 Depth of truss bar plus or minus ..... 10 mm
  - .3 Outside dimension of stirrups, ties and spirals, plus or minus 10 mm
  - .4 Other bends plus or minus ..... 25 mm
- .3 Colour-code each bar to correspond with code mark appearing on bar list.
- .4 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.
- .5 Bars shall not be field bent, straightened, or re-bent, except where indicated or authorized by the Departmental Representative. When field bending is authorized, bend without heat, applying slow and steady pressure. Replace bars that develop cracks or splits.

- .6 Splicing of reinforcing bars, unless indicated on the drawings, is prohibited except with the written approval of the Departmental Representative. Such splices shall conform to the splice length for that class of splice according to CAN3-A23.3-04. Splices, where possible, shall be staggered.
- .7 Fabrication, handling and shipping of epoxy-coated steel shall conform with MTO Form 905. and CSA-S413-07.

### 3.0 **EXECUTION**

#### 3.1 **INSTALLATION**

- .1 Reinforcement shall be accurately placed in the positions shown on the drawings, firmly tied, and supported by bar supports and side form spacers to assure proper concrete cover and spacing within allowable tolerances before and during placing of concrete.
- .2 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concreting. Bars shall be tied at all intersections, except where spacing is less than 250-mm in each direction, when alternate intersections shall be tied.
- .3 Bars shall be placed to the following tolerances unless noted otherwise.
  - .1 Clear concrete protection of reinforcement ..... 5 mm  $\pm$ .
  - .2 Where the depth of a flexural member, thickness of a wall or smallest dimension of a column is:
    - .1 200 mm or less ..... 5 mm  $\pm$ .
    - .2 larger than 200 mm but less than 600 mm ..... 10 mm  $\pm$ .
    - .3 600 mm or larger ..... 20 mm  $\pm$ .

Lateral spacing of these bars shall be within 30 mm  $\pm$  of the specified spacing.

  - .3 For longitudinal location of bends and ends of bars ..... 50 mm  $\pm$ .
  - .4 As Item 3 at discontinuous ends of members ..... 20 mm  $\pm$ .
  - .5 Specified spacing between bars ..... 10 mm  $\pm$ .
- .4 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. If bars are moved more than one bar diameter

or enough to exceed the specified tolerances, the resulting arrangement of bars shall be subject to approval of the Departmental Representative.

### **3.2 WELDING**

- .1 Any welding of reinforcing steel shall be in accordance with CSA W186-M1990 (R2007).
- .2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Departmental Representative prior to commencement of welding.

### **3.3 INSPECTION AND TESTING**

- .1 No concrete shall be placed until the Departmental Representative has completed his review of reinforcing in place. The Contractor shall provide a minimum of 24 hours notice of the time when the reinforcement will be substantially in place and ready for the Departmental Representative's review.
- .2 Inspection and testing of factory coated reinforcement to be conducted by a testing agency designated by the Departmental Representative. The Departmental Representative will pay cost of inspection and testing described in this Section.
- .3 Inspection and testing of reinforcement coated in place shall include visual inspection with flashlight and mirror.

**END OF SECTION**