

**Part 1        General**

**1.1            RELATED REQUIREMENTS**

- .1        NOT USED

**1.2            REFERENCES**

- .1        ASTM International
  - .1        ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .2        ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .2        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        CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
- .3        Reinforcing Steel Institute of Canada (RSIC)
  - .1        RSIC-2004, Reinforcing Steel Manual of Standard Practice.

**1.3            ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00 - Submittal Procedures

**1.4            DELIVERY, STORAGE AND HANDLING**

- .1        Deliver, store and handle materials in accordance 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 indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2        Replace defective or damaged materials with new.

**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 400, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3        Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

- .4 Mechanical splices: subject to approval of Departmental Representative

## **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2
- .2 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **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 drawings and in accordance with CSA-A23.1/A23.2
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

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

- .1 NOT USED

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning
- .2 Waste Management in accordance with Section 01 74 21.

**END OF SECTION**

**Part 1        General**

**1.1            RELATED REQUIREMENTS**

- .1        NOT USED.

**1.2            REFERENCE STANDARDS**

- .1        ASTM International
  - .1        ASTM A1064 / A1064M - 17 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- .2        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
- .3        CSA International
  - .1        CSA-A23.1/A23.2-2014, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

**1.3            ADMINISTRATIVE REQUIREMENTS**

- .1        Pre-installation Meetings: convene pre-installation meeting one week prior to beginning concrete works.
  - .1        Verify project requirements.

**1.4            ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Provide submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2        Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

**1.5            QUALITY ASSURANCE**

- .1        Provide to Departmental Representative, 4 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
  - .1        Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.

**1.6            DELIVERY, STORAGE AND HANDLING**

- .1        Delivery and Acceptance Requirements:
  - .1        Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
    - .1        Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

- .2 Deviations to be submitted for review by the Departmental Representative.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

## **Part 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 Performance: to CSA A23.1/A23.2, and as described in MIXES below.

### **2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

### **2.3 MATERIALS**

- .1 Cement: to CSA A3001, Type HS
- .2 Water: to CSA A23.1/A23.2
- .3 Reinforcing bars: to CAN/CSA-G30.18, Grade 400
- .4 Welded steel wire fabric: to ASTM A1064 / A1064M.
- .5 Other concrete materials: to CSA A23.1/A23.2.

### **2.4 MIXES**

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
  - .2 Provide concrete mix to meet following plastic state requirements:
    - .1 Uniformity: Provide testing at beginning and end of each batch
    - .2 Workability: free of surface blemishes
    - .3 Finishability: Slump 100 mm +/- 25 mm
    - .4 Set time: 24 hours maximum.
    - .5 Air content: 5 to 8%.
  - .3 Provide concrete mix to meet following hard state requirements:
    - .1 Durability and class of exposure: S2
    - .2 Compressive strength within 56 days: 32 MPa minimum.
    - .3 Aggregate size 19 mm maximum.
    - .4 Volume stability: acceptable volume change range 6% due to shrinkage, creep and freeze thaw cycle.

- .4 Concrete supplier's certification.
- .5 Provide quality management plan to ensure verification of concrete quality to specified performance.

### **Part 3 Execution**

#### **3.1 PREPARATION**

- .1 Provide Departmental Representative 48 hours' notice before each concrete pour.
- .2 Place concrete reinforcing in accordance with drawings.
- .3 During concreting operations:
  - .1 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.
- .4 Protect previous Work from staining.
- .5 Clean and remove stains prior to application of concrete finishes.

#### **3.2 INSTALLATION/APPLICATION**

- .1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

#### **3.3 FINISHES**

- .1 All concrete screed to plane surfaces.

#### **3.4 CONTROL JOINTS**

NOT USED.

#### **3.5 EXPANSION AND ISOLATION JOINTS**

NOT USED.

#### **3.6 CURING**

NOT USED.

#### **3.7 SEALING APPLICATION**

NOT USED.

#### **3.8 SITE TOLERANCES**

NOT USED.

#### **3.9 FIELD QUALITY CONTROL**

- .1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Contractor.
- .2 Allow 24 hours for inspection before scheduling concrete placement

- .3 Take one test for each placement of concrete
  - .1 One test is defined as follows:
    - .1 Slump test, air content test and compressive strength tests. Four lab cured cylinders (one 7 day break, two 56 day breaks, one for special considerations.)
- .4 Additional tests may be taken as necessary to verify quality of concrete as directed by Departmental Representative

### **3.10 CLEANING**

- .1 Clean in accordance with Section 01 74 11 – Cleaning.
- .2 Use trigger operated spray nozzles for water hoses.
- .3 Designate cleaning area for tools to limit water use and runoff.
- .4 Cleaning of concrete equipment to be done in accordance with Section 01 35 43 Environmental Procedures.

**END OF SECTION**