

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 07 92 00 - Joint Sealants.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
  - .2 CAN/CSA-O86-09, Engineering Design in Wood (Limit States Design).
  - .3 CSA O121-08, Douglas Fir Plywood.
  - .4 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
  - .5 CAN/CSA-S269.3-M92 (R2008), Concrete Formwork.
- .2 Council of Forest Industries of British Columbia (COFI)
  - .1 COFI Exterior Plywood for Concrete Formwork.

### **1.3 SHOP DRAWINGS**

- .1 Submit shop drawings for formwork and falsework in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings.
- .3 Indicate sequence of erection and removal of formwork/falsework as directed by Consultant.
- .4 Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of Prince Edward Island, Canada.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Collect and separate for disposal waste material generated by this Section.
- .2 Place in appropriate on-site bins in accordance with Waste Management Plan.
- .3 A clean worksite is mandatory at all times.
- .4 Place materials defined as hazardous or toxic waste in designated containers.
- .5 Ensure emptied containers are sealed and stored safely for disposal.
- .6 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

## **2 Products**

### **2.1 MATERIALS**

- .1 Formwork materials:
    - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.
  - .2 Form release agent: non-toxic,.
  - .3 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.
  - .4 Falsework materials: to CSA-S269.1.
  - .5 Sealant: to Section 07 92 00 - Joint Sealing.
-

### **3 Execution**

#### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Consultant's approval for framing openings not indicated on drawings.
- .3 Fabricate and erect falsework in accordance with CSA S269.1.
- .4 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .5 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .6 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .7 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

END OF SECTION

---

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 30 00 - Cast-in-Place Concrete.

### **1.2 REFERENCES**

- .1 American Concrete Institute (ACI)
  - .1 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
  - .1 ANSI/ACI 315-80, Details and Detailing of Concrete Reinforcement.
- .3 American Society for Testing and Materials (ASTM)
  - .1 ASTM A 775/A 775M-076, Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
  - .2 CAN3-A23.3-04, Design of Concrete Structures for Buildings.
  - .3 CSA G30.3-M1983 (R1998), Cold Drawn Steel Wire for Concrete Reinforcement.
  - .4 CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
  - .5 CSA G30.14-M1983 (R1998), Deformed Steel Wire for Concrete Reinforcement.
  - .6 CSA G30.15-M1983 (R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
  - .7 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.
  - .8 CAN/CSA-G40.21-04 (2009), Structural Quality Steels.
  - .9 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .10 CSA W186-M1990 (R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

### **1.3 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 4 weeks prior to commencing reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

### **1.4 SHOP DRAWINGS**

- .1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, 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. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada . ANSI/ ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

- .3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide type A tension lap splices where indicated.
- .4 Each drawing submitted shall bear the signature and stamp of qualified professional engineer registered to practice in Prince Edward Island.

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Collect and separate for disposal waste material generated by this Section.
- .2 Place in appropriate on-site bins in accordance with Waste Management Plan.
- .3 A clean worksite is mandatory at all times.

## **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 CAN/CSA-G30.18, unless indicated otherwise.
- .3 Cold-drawn annealed steel wire ties: to CSA G30.3.
- .4 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.
  - .1 All 152 x 152 MW x 18.7 x 18.7
- .5 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

### **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada. ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.
- .2 Obtain Departmental Representative's 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.

## **3 Execution**

### **3.1 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 a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

### **3.2 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .2 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.
- .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.

### **3.3 FIELD TOUCH-UP**

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

END OF SECTION

## **1 General**

### **1.1 DESCRIPTION OF WORK**

- .1 The work of this Section comprises the furnishings of all equipment, labor and materials necessary for the provision of all concrete for the work of this project, which includes but is not necessarily limited to, the following:
  - .1 All concrete work required for the building which includes, but is NOT necessarily limited to:
    - .1 Infill of concrete curb at removed exterior door.

### **1.2 RELATED SECTIONS**

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 20 00 - Concrete Reinforcing.

### **1.3 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C109/C109M-08, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).
  - .2 ASTM C260-06, Specification for Air-Entraining Admixtures for Concrete.
  - .3 ASTM C309-07, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .4 ASTM C332-09, Specification for Lightweight Aggregates for Insulating Concrete.
  - .5 ASTM C494/C494M-10, Specification for Chemical Admixtures for Concrete.
  - .6 ASTM C827-01a (2005), Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
  - .7 ASTM C939-02, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
  - .8 ASTM D1751-04(2008), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
  - .9 ASTM D1752-04a(2008), Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A3000-08, Cementitious Materials Compendium.
  - .2 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
  - .3 CAN/CSA-A23.2-09, Methods of Test for Concrete.

### **1.4 CERTIFICATES**

- .1 Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

### **1.5 TESTING AND INSPECTION**

- .1 Testing and inspection of concrete and concrete materials will be carried out by testing laboratory engaged and paid by the Contractor in accordance with Section 01 29 83 - Payment Procedures: Testing Laboratory Services. Frequency of tests will be determined by the testing laboratory.
- .2 Remove defective concrete and embedded debris and repair as directed by Consultant.

## **1.6 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Submit to Consultant, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
- .3 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Consultant on following items:
  - .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Finishes.
  - .6 Formwork removal.
  - .7 Joints.

## **1.7 ENVIRONMENTAL CONDITIONS**

- .1 Provide all protection during concrete placing and curing in hot and in cold weather, and to CAN/CSA-A23.1, Clause 21.
- .2 Prior to placing, ensure that all needed material and equipment is on hand, and obtain the Consultant's approval for particular methods to be used.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Collect and separate for disposal waste material generated by this Section.
- .2 Place in appropriate on-site bins in accordance with Waste Management Plan.
- .3 A clean worksite is mandatory at all times.
- .4 Use excess concrete for: additional paving, post footing anchorage, swale rip-rap reinforcing, mud slab, flowable fill, retaining wall footing ballast, storm structure covers, underground utility pipe kickers, storm pipe flared end section, toe wash protection, shoulder and toe outfall restraints for temporary erosion pipes.
- .5 Use trigger operated spray nozzles for water hoses.
- .6 Designate a cleaning area for tools to limit water use and runoff.
- .7 Carefully coordinate the specified concrete work with weather conditions.
- .8 Ensure emptied containers are sealed and stored safely for disposal.
- .9 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
- .10 Choose least harmful, appropriate cleaning method which will perform adequately.

## **2 Products**

### **2.1 MATERIALS**

- .1 Portland cement: to CAN/CSA-A5.
  - .2 Blended hydraulic cement: to CSA A362-98.
  - .3 Supplementary cementing materials: to CAN/CSA-A23.5.
  - .4 Cementitious hydraulic slag: to CAN/CSA-A363.
  - .5 Water: to CAN/CSA-A23.1.
  - .6 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
  - .7 Air entraining admixture: to CSA CAN3 - A 266.1
  - .8 Chemical admixtures: to CSA CAN3 - A 266.2 Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.
  - .9 Curing compound: to CAN/CSA-A23.1 white and to ASTM C309, Type 1-chlorinated
-

rubber. Coordinate with finish floor materials for compatibility.

## **2.2 MIXES**

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give following properties:
  - .1 Concrete generally:
    - .1 Cement: use Type 10 Portland cement.
    - .2 Minimum compressive strength at 28 days: 25 MPa.
    - .3 Class of exposure: N.
    - .4 Nominal size of coarse aggregate: 20mm.
    - .5 Slump at point and time of discharge: 80mm +/- 20
- .2 Use of calcium chloride not permitted.

## **2.3 ADMIXTURES**

- .1 Admixtures will be permitted only to correct deficiency in mixture or to make correct placement requirements as recommended by Testing Laboratory and approved by Consultant.
- .2 Use of accelerating admixtures, if approved by Consultant, will not relax cold weather placement requirements of CAN/CSA-A23.1. Use of calcium chloride not permitted.

## **3 Execution**

### **3.1 PREPARTION**

- .1 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .2 In locations where new concrete is doweled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with shrinkage compensating grout or as noted on drawings to anchor and hold dowels in positions as indicated.

### **3.2 CONSTRUCTION**

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts.
  - .1 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Consultant before placing of concrete.
  - .2 Check locations and sizes of sleeves and openings shown on drawings.
- .3 Anchor bolts.
  - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
- .4 Dowels: In locations where new concrete is doweled to existing concrete drill holes in existing concrete to depths, diameters and spacing indicated and install dowels using natural aggregate grout mixed to flow consistency to suit application, in strict accordance with manufacturer's instructions or as noted on drawings.
- .5 Finishing.
  - .1 Finish concrete to CAN/CSA-A23.1.

### **3.3 SITE TOLERANCE**

- .1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method.

END OF SECTION