

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 20 00 – Concrete Reinforcing.
- .2 Section 03 30 00 – Cast-in-Place Concrete.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Tests Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-O86-09, Engineering Design in Wood.
 - .3 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
 - .4 CAN/CSA-S269.3-M92(R2013), Concrete Formwork.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork and falsework.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in New Brunswick, Canada.
- .3 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. Comply with CAN/CSA-S269.3 for formwork drawings.
- .4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .5 Indicate sequence of erection and removal of formwork/falsework as directed by Consultant.

Part 2 Products

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.

- .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .3 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal, (15 to 24 mm² /s) at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .4 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Consultant approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1.
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 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 CSA-A23.1/A23.2.
- .9 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .10 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corner joints, unless specified otherwise.
- .11 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

- .12 Construct forms for architectural concrete, and place ties as indicated or as directed.
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .13 Build in anchors, sleeves, and other inserts required to accommodate work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 3 days for walls and sides of beams.
 - .2 3 days for columns.
 - .3 28 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.
 - .4 1 day for footings and abutments.
- .2 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 3000 mm apart.
- .5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Part 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 315, Details and Detailing of Concrete Reinforcement.
 - .2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Tests Methods and Standard Practices for Concrete.
 - .2 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 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.
 - .6 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .3 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the province of New Brunswick, 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 Consultant, with identifying code marks to permit correct placement without reference to structural drawings.
- .2 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated.
- .1 Provide type C tension lap splices unless otherwise indicated.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Consultant.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.
- .4 Deformed steel wire for concrete reinforcement: to CSA G30.14.
- .5 Welded deformed steel wire fabric: to CSA G30.5.
 - .1 Provide in flat sheets only.
- .6 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .7 Mechanical splices: subject to approval of Consultant.
- .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, ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Consultant's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Consultant, 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 Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .2 Upon request inform Consultant of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

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

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Consultant's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

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

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 260/C 260M-10a, Air-Entraining Admixtures for Concrete.
 - .2 ASTM C 494/C 494M-11, chemical Admixtures for Concrete.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2-M89, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Damproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.
 - .3 CAN/CSA-A3000-13, Cementitious Materials Compendium.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, submit to Consultant samples of following materials proposed for use:
 - .1 Portland Cement.
 - .2 Admixtures.
 - .3 Aggregates.
 - .4 Water.
 - .5 Waterstops.
 - .6 Waterstops joints.
 - .7 Joint Filler.

- .3 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CERTIFICATES

- .1 Submit to Consultant, minimum 4 weeks prior to starting concrete work, a valid and recognized certificate that materials used in concrete mixture will meet specified requirements in accordance with CAN/CSA-A23.1.
- .2 Submit to Consultant, minimum 4 weeks prior to starting concrete work, a valid and recognized certificate from plant delivering concrete in accordance with CAN/CSA-A23.1.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 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.

Part 2 Products

2.1 MATERIALS

- .1 Cement: to CAN/CSA-A3001.
- .2 Supplementary cementing materials: to CAN/CSA-A3001.
- .3 Water: to CSA-A23.1.
- .4 Aggregates: to CAN/CSA-A23.1/A23.2.
- .5 Admixtures:
 - .1 Air entraining admixture: to CAN/CSA-A244.4M78. Consultant to approve air entraining admixtures during cold and hot weather placing.
 - .2 Chemical admixture: to CAN/CSA-A266. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .3 Premoulded joint fillers:

- .6 Bituminous impregnated fiber board: to ASTM D 1751.
- .7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA-A23.1/A23.2.
 - .1 Compressive strength: 50 MPa at 28 days.

2.2 MIXES

- .1 Proportion (normal) density concrete in accordance with CAN/CSA-A23.1.
 - .1 Exterior Foundation Walls:
 - .1 Class of exposure: F-2
 - .2 Minimum compressive strength at 28 days: 25 MPa.
 - .3 Nominal size of coarse aggregate: 19mm.
 - .2 Exterior Slab:
 - .1 Class of exposure: C-1
 - .2 Minimum compressive strength at 28 days: 35 MPa.
 - .3 Nominal size of coarse aggregate: 19mm.
 - .3 Footings, Interior Foundation Walls:
 - .1 Class of exposure: N
 - .2 Minimum compressive strength at 28 days: 25 MPa.
 - .3 Nominal size of coarse aggregate: 19mm.
 - .4 Interior Slab:
 - .1 Class of exposure: N
 - .2 Minimum compressive strength at 28 days: 32 MPa.
 - .3 Nominal size of coarse aggregate: 19mm.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Consultant approval before placing concrete.
 - .1 Provide 48 hours notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 Pumping of concrete is permitted only after approval of equipment and mix.
- .4 Ensure reinforcement and inserts are not disturbed during concrete placement.

- .5 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .6 Protect previous Work from staining.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .8 Do not place load upon new concrete until authorized by Consultant.

3.2 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.
- .2 Anchor bolts:
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Consultant.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with epoxy grout.
- .3 Finishing and curing:
 - .1 Finish concrete in accordance with CSA-A23.1/A23.2.
 - .2 Use procedures as reviewed by Consultant or those noted in CSA-A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Rub exposed sharp edges of concrete with carborundum to produce 3mm radius edges unless otherwise indicated.
- .4 Joint fillers:
 - .1 Use 13 mm thick Deck-O-Foam (or approved equivalent) joint filler with Sonneborn Premium Adhesive (or approved equivalent) to separate slabs-on-grade from vertical surfaces (through-out at isolation joints, perimeter joints and penetrations) and extend joint filler from bottom of slab to within 6 to 10 mm of finished slab surface unless indicated otherwise. Apply a self-leveling polyurethane sealant such as Sonolastic SL1 by BASF, Pecora Corporation NR-201 (or approved equivalent) a minimum of 30 days after pour of slab.

.5 Dampproof membrane:

- .1 Install a 10 mil dampproof membrane such as Perminator and Vapor Block 10 (or approved equivalent) under concrete slabs-on-grade inside building.
- .2 Lap dampproof membrane minimum 150 mm at joints and seal.
- .3 Seal punctures in dampproof membrane before placing concrete.
- .4 Use patching material at least 150 mm larger than puncture and seal.

3.3 SURFACE TOLERANCE

- .1 Concrete tolerance to CSA-A23.1 Straightedge Method.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory for review in accordance with CSA-A23.1/A23.2.
- .2 Owner will pay for costs of tests.
- .3 Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.
- .5 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 The work under this section includes the supply and fabrication of the precast reinforced concrete counter, complete with transportation to the site, storage and installation.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for concrete Reinforcing.
 - .2 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C494/C494-13, Standard Specification for Chemical Admixtures for Concrete.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Tests Methods and Standard Practices for Concrete.
 - .2 CSA-A23.4-09, Precast Concrete – Materials and Construction.
 - .3 CSA-A3000-08, Cementitious Materials Compendium
 - .4 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

1.3 CERTIFICATES

- .1 Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide certification indicating the concrete supplier is certified in accordance with the Atlantic Provinces Ready Mix Concrete Association Program or equivalent.
 - .1 Only concrete supplied from such certified plants shall be acceptable to the Departmental Representative.
 - .2 Plant certification shall be maintained for the duration of the fabrication and erection until the warranty period expires.
- .3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1.
- .4 Provide mix design in compliance with CSA-A23.1 to provide concrete of quality, yield and strength as specified under 2.2 Mix Design. Mix design to be

prepared by and stamped by an engineer licensed to practice in the Province of New Brunswick.

1.4 PERFORMANCE REQUIREMENTS

- .1 Tolerance of precast elements to CSA A23.4, Section 12.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 033 00 Submittal Procedures, and in accordance with CSA-A23.4.
- .2 Include the following items:
 - .1 Details of members, reinforcement and their connections.
 - .2 Finish.

1.6 QUALIFICATIONS

- .1 Precast concrete elements to be fabricated and erected by Contractor who has proven experience in work of this nature and shall be in strict accordance with the requirements of CSA-A23.4.
- .2 All precast fabrication, curing and protection shall be done within an enclosed, heated building, to the approval of the Departmental Representative.

1.7 WARRANTY

- .1 Contractor hereby warrants that precast elements will not spall or show visible evidence of cracking, except for normal hairline shrinkage cracks.

Part 2 Products

2.1 MATERIALS

- .1 Cement, aggregates, water, admixtures: to CSA-A23.1 and CSA-A23.4.
- .2 Reinforcing steel: to CSA-G30.18.
- .3 Portland Cement and Supplementary Cementing Materials (SCM's) to CSA-A3000.
- .4 Aggregates: to CSA-A23.1.
- .5 Air Entraining Admixture: to ASTM C260.
- .6 Chemical Admixture: to ASTM C494/C494M.
- .7 Hardware and miscellaneous materials: to CSA-A23.1
- .8 Forms: to CSA-A23.4.

2.2 MIX DESIGN

- .1 The Contractor shall be responsible for the concrete mix design.
- .2 It shall be the responsibility of the contractor to ensure that the mixture proportions shall be properly batched, mixed, placed and cured such that the concrete conforms to the specifications.
- .3 Concrete.
 - .1 Minimum compressive strength at 28 days: 25 MPa.
 - .2 Class of exposure: N.

2.3 FINISHES

- .1 Finish surface of all panels to Finish Grade A to CSA-A23.4, Clause 26.2.5.
- .2 Top of counter to be polished smooth.
 - .1 Apply a Beeswax Finish / Countertop Wax as per Manufacturer's Instructions. Submit Product Data Sheet for approval.

2.4 CURING

- .1 Curing and protection shall be in accordance with CSA-A23.4.
- .2 Panels shall be wet cured.

Part 3 Execution

3.1 ERECTION

- .1 Do precast concrete work in accordance with CSA-A23.3 and CSA-A23.4.
- .2 Install precast elements as specified and as indicated on plans.

END OF SECTION