

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 CAN/CSA-A23.1-04/A23.2-09, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-A3000-08, Cementitious Materials Compendium.
 - .3 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.
 - .4 ASTM C109/C 109M-2012, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).
 - .5 ASTM C260-2010, Specification for Air-Entraining Admixtures for Concrete.
 - .6 ASTM C305-2012, Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency.
 - .7 ASTM C494/C 494M-2012, Specification for Chemical Admixtures for Concrete.
 - .8 ASTM C827-2010, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .9 ASTM C 939-2010, Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - .10 CSA O86-09, Engineering Design in Wood.
 - .11 CAN/CSA S269.3-M92(R2008), Concrete Formwork.
 - .12 CSA O153-M1980(R2008), Poplar Plywood.
 - .13 CSA G40.20/G40.21-04 (R2009), Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- 1.2 CERTIFICATION AND MEMBERSHIP
- .1 Ready Mixed Concrete Suppliers to have up to date plant certification from the Atlantic Provinces Ready Mixed Concrete Association.
- 1.3 CERTIFICATES
- .1 Minimum three (3) weeks prior to starting concrete Work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing
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- 1.3 CERTIFICATES
(Cont'd)
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laboratory that following materials will meet specified requirements:
.1 Portland cement.
.2 Supplementary cementing materials.
.3 Admixtures.
.4 Aggregates.
.5 Water.
- .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.
- 1.4 SAMPLES
- .1 At least three (3) weeks prior to commencing Work, inform the Departmental Representative of proposed source of aggregates and provide access for sampling.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Formwork:
.1 Forms: plywood and wood formwork materials to CSA-O86 and CSA-O153.
.2 Form release agent: water based.
- .2 Reinforcement:
.1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
.2 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
- .3 Portland cement: to CSA A3000.
- .4 Supplementary cementing materials: to CSA A3000.
- .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 ASTM C260.
- .8 Chemical admixtures: to ASTM C494.
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2.1 MATERIALS
(Cont'd)

- .9 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 50 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 s.
 - .2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portion) 125 to 145%.
 - .3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.
 - .4 Dry pack to manufacturer's requirements.
- .10 Curing compound: to CAN/CSA-A23.1 and to ASTM C305.
- .11 Bar screen: fabricate from steel to CAN/CSA-G40.21 to details indicated, hot-dip galvanized after fabrication. Bolt to structure as indicated.

2.2 MIXES

- .1 Mix 1 - Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1, to give the following properties for concrete pads, manhole benching, light tower bases and electrical equipment bases:
 - .1 Cement Type: GU
 - .2 Minimum compressive strength at 28 days: 40 MPa.
 - .3 Class of exposure: C-1.
 - .4 Nominal size of coarse aggregate: 38 mm.
 - .5 Slump at point of discharge: 50 mm.
 - .6 Air content (Category 1): 4 to 7%.
 - .7 Chemical admixtures: as approved by the Departmental Representative and in accordance with ASTM C494.
 - .8 Maximum water-cement ratio: 0.40.
 - .2 Mix 2 - Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1, to give the following properties for concrete thrust blocks and electrical duct banks:
 - .1 Cement Type: GU.
 - .2 Minimum compressive strength at 28 days: 35 MPa.
 - .3 Class of exposure: C-2.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at point of discharge: 80 mm.
 - .6 Air content (Category 1): 5-8%.
 - .7 Chemical admixtures: as approved by the Departmental Representative and in accordance with ASTM C494.
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PART 3 - EXECUTION

- 3.1 GENERAL .1 Verify lines, levels and centres before proceeding and ensure dimensions agree with drawings.
- 3.2 FORMWORK .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 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.
- .3 Align form joints and make watertight. Keep form joints to a minimum.
- .4 Provide for keyways as indicated.
- .5 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
- .6 Leave formwork in place until concrete has attained sufficient strength to sustain all loadings.
- .7 Provide all 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.
- .8 Re-use formwork subject to requirements of CAN/CSA-A23.1.
- .9 Coat forms with approved water based form release agent.
- 3.3 PLACING REINFORCEMENT .1 Clean reinforcing of rust buildup, mill scale or other coatings that prevent or reduce bond.
- .2 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .3 Protect epoxy coated portions of bars with covering during transportation and handling.
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<u>3.3 PLACING REINFORCEMENT (Cont'd)</u>	.4	Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
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<u>3.4 PREPARATION</u>	.1	Obtain Departmental Representative's approval of reinforcement before placing concrete. Provide 24 hours notice prior to placing of concrete.
	.2	Pumping of concrete is permitted only after approval of equipment and mix.
	.3	Do not disturb reinforcement and inserts during concrete placement.
	.4	Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
	.5	Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
	.6	Do not place load upon new concrete until concrete has attained sufficient strength to sustain loads without damage.
	.7	In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels and pack solidly with shrinkage compensating grout to anchor and hold dowels in positions as indicated.

<u>3.5 CONSTRUCTION</u>	.1	Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
	.2	Where approved by Departmental Representative, set sleeves, ties, and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Departmental Representative.
	.3	Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Departmental Representative before placing concrete.
	.4	Check locations and sizes of sleeves and openings shown on drawings.

- 3.5 CONSTRUCTION (Cont'd)
- .5 Inform Departmental Representative at least 24 hours before each concrete placing operation.
 - .6 Anchor bolts:
 - .1 Place anchor bolts to templates under supervision of trade supplying anchors prior to placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set as approved by Departmental Representative. Formed holes to be 100 mm in least dimension. Drilled holes to be minimum 25 mm larger in diameter than bolts used and to manufacturer's recommendations.
 - .3 Protect anchor bolt holes from water accumulations.
 - .4 Set bolts and fill holes with shrinkage compensating grout.
 - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to temperature at time of erection.
 - .7 Use tools and handling equipment that are clear of rust or other harmful and foreign material to avoid efflorescence and staining of slabs or hardened concrete.
 - .8 Use concrete pumps to place concrete only with approval of methods, equipment and mix design.
 - .9 Provide continuous supervision during placement of concrete including concrete grout to confirm reinforcing steel is maintained in correct position.
- 3.6 SAW CUTTING
- .1 Commence sawing as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing. Do not delay saw cutting. See Section 20.2.1 of CSA A23.1. Locate and complete all sawcuts as indicated on the drawings only.
- 3.7 PLACING GROUT
- .1 Grout where indicated using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- 3.8 JOINT FILLERS
- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative. When more than one piece is required for a joint, fasten
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