

PART 1 - GENERAL

- 1.1 RELATED WORK .1 Section 31 23 10 - Excavating, Trenching and Backfilling.
- .2 Section 32 98 00 - Reinstatement
- .2 Section 33 32 13 - Suction Lift Pump Station
- 1.2 REFERENCES .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-A3000, Cementitious Materials Compendium.
- .3 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
- .4 ASTM A775, Epoxy-Coated Steel Reinforcing Bars.
- .5 ASTM C260 Specification for Air-Entraining Admixtures for Concrete.
- .6 ASTM C305, Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency.
- .7 ASTM C494/C 494M, Specification for Chemical Admixtures for Concrete.
- .8 CSA O86-09, Engineering Design in Wood.
- .9 CAN/CSA S269.3-M92, Concrete Formwork.
- .10 CSA O153-M1980, Poplar Plywood.
- .11 CSA G40.20-13/G40.21-13, Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- 1.3 CERTIFICATION AND MEMBERSHIP .1 Ready Mixed Concrete Suppliers shall have up to date plant certification from the Atlantic Provinces Ready Mixed Concrete Association.
- 1.4 CERTIFICATES .1 Minimum 4 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

- 1.4 CERTIFICATES .1 (Cont'd)  
(Cont'd)
- .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.
- 1.5 SAMPLES .1 At least 4 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-086 and CSA-0153.
  - .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 Epoxy coating of non-prestressed reinforcement: to ASTM A 775/A 775M.
- .4 Portland cement: to CSA A3000.
- .5 Supplementary cementing materials: to CSA A3000.
- .6 Water: to CAN/CSA-A23.1.
- .7 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .8 Air entraining admixture: to ASTM C260.
- .9 Chemical admixtures: to ASTM C494.

- 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 thrust blocks, and manhole benching:
    - .1 Cement Type: GU.
    - .2 Minimum compressive strength at 28 days: 40 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: 5-8%.
    - .7 Chemical admixtures: as approved by the Departmental Representative and in accordance with ASTM C494.
  - .2 Proportion normal density concrete in accordance with CSA-A23.1, Alternative 1 to give following properties for concrete in all elements of the structures, except where noted otherwise, also for concrete in exterior pads, chemical spill area, fence posts, light posts, curbs, walks, entrance slabs, and exterior topping slabs, and tank walls and base slab:
    - .1 Cement: Type GU/GUb.
    - .2 Minimum compressive strength at 28 days: 35 MPa.
    - .3 Class of exposure: C-1.
    - .4 Nominal size of coarse aggregate: 20 mm.
    - .5 Slump at time and point of discharge: 80 mm ± 30 mm.
    - .6 Air content: 5 to 8%. 3% in areas of floors subject to floor hardener.
    - .7 Chemical admixtures: type as approved by Departmental Representative, and in accordance with ASTM C494.
    - .8 Maximum water cement ratio: 0.40.

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

3.2 FORMWORK  
(Cont'd)

- .2 (Cont'd)  
indicated within tolerances required by  
CAN/CSA-A23.1.
- .3 Align form joints and make watertight. Keep form  
joints to a minimum.
- .4 Build in anchors, sleeves, and other inserts  
required to accommodate Work specified in other  
sections.
- .5 Leave formwork in place until concrete has attained  
sufficient strength to sustain all loadings.
- .6 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.
- .7 Re-use formwork subject to requirements of  
CAN/CSA-A23.1.
- .8 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.
- .4 Prior to placing concrete, obtain Departmental  
Representative's approval of reinforcing material and  
placement.

3.4 PREPARATION

- .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 Ensure reinforcement and inserts are not disturbed  
during concrete placement.

3.4 PREPARATION  
(Cont'd)

- .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.

3.5 CONSTRUCTION

- .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.
- .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.

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- 3.5 CONSTRUCTION (Cont'd) .6 Anchor bolts:(Cont'd)  
.5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to temperature at time of erection.
- .7 Use only 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 ensure reinforcing steel is maintained in correct position.
- 3.6 PLACING GROUT .1 Grout where indicated using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- 3.7 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 abutting ends and hold securely to shape by stapling or other positive fastening.
- 3.8 TOLERANCES .1 Concrete tolerance in accordance with CAN/CSA-A23.1, straight edge method.  
.1 Provide steel trowel finish surfaces to floor in accordance with CSA-A23.1, Classification A.
- 3.9 FINISHING .1 Finish concrete in accordance with CAN/CSA-A23.1.  
.2 Use smooth form finish for all concrete surface. Use form facing material that will produce a smooth, hard, uniform texture on the concrete. Do not use material with raised grain, torn surfaces, worn edges, patches, dents or other defects that will impair the texture of the concrete surface. Patch the holes and defects. Remove fins exceeding 5 mm in height.
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3.9 FINISHING  
(Cont'd)

- .3 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
- .4 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.