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 MEASUREMENT PROCEDURES

.1 Cast-in-place concrete will not be measured but will be paid for as a fixed price item.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .5 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
- .6 ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA)

- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CAN/CSA-A23.2, Methods of Test for Concrete.
- .3 CAN3-A266.4, Guidelines for the Use of Admixtures in concrete.
- .4 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .5 CSA-A3001, Cementitious Materials for Use in Concrete.

1.4 ACRONYMS AND TYPES

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

.1 Type GU or GUb - General use cement.

1.5 SUBMITTALS

.1 At least 4 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.

.2 Submit testing results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.3 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 Portland cement.
.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Grout.
.5 Admixtures.
.6 Aggregates.
.7 Water.
.8 Waterstops.
.9 Waterstop joints.
.10 Joint filler.

.2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA-A23.1/A23.2.

.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1/A23.2.

1.6 SOURCE QUALITY CONTROL

.1 Have all concrete produced and delivered by a ready-mix plant that is a member of the Atlantic Provinces Ready Mixed Concrete Association (APRMCA) and holds a current “Certificate of Ready Mixed Concrete Production Facilities” issued by the

Association. Submit a copy of this certificate to the Departmental Representative for approval.

1.7 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Section 01 45 00 - Quality Control for Departmental Representative approval for following items:

- .1 Falsework erection.
- .2 Hot weather concrete.
- .3 Cold weather concrete.
- .4 Curing.
- .5 Finishes.
- .6 Formwork removal.
- .7 Joints.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

- .1 Modifications to maximum time limit must be agreed to Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
- .2 Deviations to be submitted for review by Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Waste Management and Disposal:

- .1 Divert unused concrete materials from landfill to local facility approved by Departmental Representative.
- .2 Provide an appropriate area on the job site where concrete trucks can be safely washed.
- .3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Departmental Representative.
- .4 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .5 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.

Dispose of waste in accordance with applicable local, Provincial and National regulations.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Portland cement: to CAN/CSA-A3001, Type GU.

.2 Water: to CAN/CSA-A23.1.

.3 Aggregates: to CSA-A23.1.

.4 Coarse aggregates to be normal density to CSA-A23.1/A23.2.

.5 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixtures: to ASTM C494, Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.7 Premoulded joint fillers:

.1 Bituminous impregnated fiber board: to ASTM D1751.

.8 Polyethylene film: minimum mm thickness to ASTM C171.

.9 Bonding adhesive: as approved by Departmental Representative.

2.2 MIXES

.1 Proportion normal density concrete in accordance with CSA-A23.1/A23.2, Alternative 1 to give following quality and yield for all concrete.

.1 Cement:

.1 Type GU Portland cement.

.2 Minimum compressive strength at 28 days:

.1 Foundation Walls and Footings – 25 mpa

.2 Interior Slabs – 20 mpa

.3 Exterior curbs, landings and walks – 32 mpa

.3 Minimum cement content: 300 kg/m^3 of concrete.

.4 Class of exposure:

.1 Exterior Foundation Walls and Footings – F-2

.2 Interior Slabs – N

.3 Exterior curbs, landings and walks – C-2

.5 Nominal size of coarse aggregate: 20 mm.

.6 Slump at time and point of discharge: 75 to 100 mm.

.7 Air content: 5 to 8 %.

.8 Chemical admixtures: admixtures in accordance with ASTM C494.

PART 3 EXECUTION

3.1 PREPARATION

.1 Obtain Departmental Representative approval before placing concrete. Provide 24 h notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

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

.6 Prior to placing of concrete obtain Departmental Representative approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.10 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

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

.2 Sleeves and inserts.

.1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.

.2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers 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 of concrete.

.4 Check locations and sizes of sleeves and openings shown on drawings.

.5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.3 Anchor bolts.

.1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

.2 With approval of Departmental Representative, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be manufacturers's recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.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 ambient temperature at time of erection.

.4 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.5 Finishing.

.1 Finish concrete in accordance with CSA-A23.1/A23.2.

.2 Use procedures acceptable to Departmental Representative or those noted in CSA-A23.1/A23.2, to remove excess bleed water. Ensure surface is not damaged.

.3 Wet cure using polyethylene sheets placed over sufficiently hardened concrete to prevent damage. Overlap adjacent edges 150 mm and tightly seal with sand on wood planks. Weigh sheets down to maintain close contact with concrete during the entire curing period.

.4 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.5 Finish concrete floor to meet requirements of CSA-A23.1/A23.2.

.6 Concrete floor to have finish hardness equal or greater than Mohs hardness in accordance with CSA-A23.1/A23.2.

.7 Provide swirl-trowelled finish for exterior walks, ramps, pads.

.8 Provide float finish for interior floor slabs.

.9 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

.6 Waterstops.

.1 Install waterstops to provide continuous water seal.

.2 Do not distort or pierce waterstop in such a way as to hamper performance.

.3 Do not displace reinforcement when installing waterstops.

.4 Use equipment to manufacturer's requirements to field splice waterstops.

.5 Tie waterstops rigidly in place.

.6 Use only straight heat sealed butt joints in field.

.7 Use factory welded corners and intersections unless otherwise approved by Departmental Representative.

.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.

.2 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 Locate and form, isolation, construction and expansion joints as indicated. Install joint filler.

.4 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.8 Dampproof membrane.

.1 Install dampproof membrane 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. Use patching material at least 150 mm larger than puncture and seal.

3.3 SITE TOLERANCE

.1 Concrete slab tolerances in accordance with CSA-A23.1/A23.2, F-number Method, F_F =25, F_L = 20.

3.4 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Departmental Representative in accordance with CSA-A23.1/A23.2, and Section 01 45 00 - Quality Control.

.2 Departmental Representative will pay for initial costs of testing as required. Costs of retesting due to deficient work will be paid for by contractor, by credit change order.

.3 Departmental Representative 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 shall be in accordance with CSA-A23.1/A23.2.

.5 Provide Certificate of Field Quality Inspection and Testing to Departmental Representative for inclusion in Commissioning Manual.

.6 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve the Contractor of his contractual responsibility.

END OF SECTION