PART 1 – GENERAL

1.1 Related Sections	.1	Section 03100 - Concrete Formwork
	.2	Section 03200 - Concrete Reinforcement.
1.2 Measurement Procedures	.1	Cast-in-place concrete will not be measured but will be paid for as part of the overall fixed price contract.
1.3 References	.1	CAN/CSA-A23.1-M90, Concrete Materials and Methods of Concrete Construction.
	.2	CAN/CSA-A23.2-M90, Methods of Test for Concrete.
1.4 Samples	.1	At least 2 weeks prior to commencing work, inform Engineer of proposed concrete supplier.
1.5 Certificates	.1	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.
	.2	Provide certification that plant, equipment, and materials to be used in concrete, comply with requirements of CAN/CSA-A23.1.
1.6 Quality Assurance	.1	Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures for Engineer's approval for following items: .1 Cold weather concrete (if applicable) .2 Curing .3 Finishes .4 Formwork removal .5 Joints

PART 2 – PRODUCTS

2.1 Materials	.1	Portland cement Type 10 normal: to CAN/ CSA-A5.
	.2	Supplementary cementing materials: to CAN/CSA-A23.5.
	.3	Water: to CAN/CSA-A23.1.

.4 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.

.5 Air entraining admixture: to CAN3-A266.1.

.6 Chemical admixtures: to CAN3-A266.2. Engineer to approve accelerating or set retarding admixtures during cold and hot weather placing.

.7 Polyethylene film: 0.15 mm thickness to CAN/CGSB-51.34.

.8 Control Joint Filler: Epoxy-urethane, self levelling sealant. Acceptable product: Loadflex as manufactured by Sika.

.9 Concrete Hardener: Acceptable product: HARD CHEM, Integral Concrete Hardener as manufactured by Cementec Industries Ltd. Recommended addition rate to concrete mix: 40 kg/cu.m.

.10 Concrete Sealer: Acceptable Product: HYDROZO SILANE 40 VOC, clear, solvent based, VOC-compliant silane penetrating sealer as manufactured by Hydozo.

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, to give a compressive strength of 30 MPa at 28 days for the slab. Maximum slump 80 mm (3 in.) with air entrainment at 5-7%.

.2 Ensure that air entrainment will not compromise hardening methods, materials or procedures. If so, air entrainment may have to be adjusted as approved by the Engineer.

PART 3 – EXECUTION

3.1 Preparation

.1 Obtain Engineer's approval before placing concrete. Provide 48 h 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.

.4 Prior to placing of concrete obtain Engineer's approval of proposed method for protection of concrete during placing and curing in adverse weather.

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

.6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

.7 Do not place load upon new concrete until authorized by Engineer.

3.2 Construction

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

.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 Engineer.
- .2 Where approved by Engineer, 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 Engineer.
- .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Engineer before placing of concrete.
- .4 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 Finishing.
- .1 Finish concrete to a smooth trowel finish in accordance with CAN/CSA-A23.1.

.5 Control Joints.
- .1 Saw cuts shall be made in the concrete at the earliest opportunity after final finishing and once the concrete can be cut without dislodging embedded aggregate or ravelling the joint edges. The saw cuts shall be ‘T’/4 deep. Saw cuts shall be made at a maximum spacing of 4.0 m unless otherwise indicated or directed.

.6 Floor Hardener.
- .1 Add concrete hardener to concrete mix prior to pour, at the recommended addition rate.
- .2 Apply in accordance with manufacturers instructions.

.7 Floor Sealer.
- .1 Apply sealer in accordance with manufacturers instructions.
- .2 The coverage may be 3.1 – 5.5 sq.m./L, depending on the porosity of the concrete.

.8 Joint Filler.
- .1 All joints shall be filled with sealant to product a water tight, flexible joint resistant to salt.
- .2 Allow at least 60 days after pouring concrete before applying the sealant to allow time for the majority of concrete shrinkage to occur and for the control joints to be static.
- .3 Apply sealant in accordance with manufacturers instructions.

3.3 Field Quality Control

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Engineer in accordance with CAN/CSA-A23.1.

.2 Owner will pay for costs of tests.

.3 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

3.4 Cold Weather Concreting

.1 Temperature not below 2°C (36°F):
- .1 Mixing water to be heated to maintain concrete temperature of 10°C (50°F) at point of pour.
- .2 Concrete shall not be placed on or against any surface which is at a temperature of less than 5°C (40°F).
- .3 Contractor shall be prepared to cover concrete if air temperature should fall below 2°C (36°F) within 48 hours of pour.

.2 Temperature between -4°C (25°F) and 2°C (36°F):
- .1 Forms and steel to be free of ice and snow.
- .2 Mixing water to be heated to maintain concrete temperature of 10°C (50°F) at point of pour.
- .3 Concrete shall not be placed on or against any surface which is at a temperature of less than 10°C (50°F).
- .4 Concrete to be covered with canvas which must be kept 2" above surface of concrete.
- .5 Protection to be maintained for a minimum of 72 hours (3 days).

.3 Temperature below -4°C (25°F):
- .1 All items of .1 and .2 above plus:
- .2 All concrete to be enclosed and artificial heat provided and maintained for a minimum of 72 hours (3 days) after pour. Heat to commence 1 hour prior to pour.

.3 Surface temperature of all concrete to be kept at 20°C (68°F) for 72 hours (3 days) or 10°C (50°F) for 120 hours (5 days). All concrete to be kept above freezing for 168 hours (7 days).

.4 Hoarding to be constructed so that air can circulate outside the outer edges and members.

.4 Stripping:

.1 No column or wall forms shall be removed before concrete has reached 10 Mpa (1500 psi).

.2 No slab or beam forms shall be removed before concrete has reached 17 Mpa (2500 psi).

.3 Concrete strength to be determined by break-testing field cured test cylinders.

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