1. PART 1 – GENERAL

1.1 References

.1 CSA A23.1/A23.2-04, Concrete materials and methods of concrete construction/ methods of test and standard practices for concrete.

1.2 Quality Control

.1 The Contractor shall be fully responsible for quality control of all aspects of production, pre-placement, placement, and post-placement of concrete and related testing.

.2 Cast-in-place concrete shall conform to the CSA-A23.1. Concrete shall be delivered under the Performance alternative as outlined in CSA-A23.1, Table 5.

.3 Testing of cast-in-place concrete shall be preformed by a CSA-A23.1 certified Third Party Testing Agency. Third Party testing shall be paid for by the Contractor.

.4 Distribute the Third Party Testing Agency test data to the Contract Administrator immediately upon receiving.

1.3 Quality Assurance

.1 Notify the Contract Administrator at least twenty four (24) hours before complete formwork, embedded items and concrete reinforcement is ready for review.

.2 Allow ample time for review, and corrective Work, if required, before scheduling concrete placement.

2. PART 2 – PRODUCTS

2.1 General

.1 All materials in concrete mixes shall be compatible.

2.2 Concrete Mixes

.1 Portland Cement: Type GU conforming to CSA-A3000.

.2 Fine aggregate: Conforming to Normal-Density Fine Aggregate, CSA-23.1, Table 10 and Table 12.

.3 Coarse aggregate: Conforming to Normal-Density Coarse Aggregate, CSA-23.1, Table 11, Group I, 20.5 mm. Group II may be used for special requirements such as gap grading, pumping, or for blending two (2) or more sizes to produce Group I gradings.

.4 Ensure that no aggregates are used that may undergo volume change due to alkali reactivity, moisture retention, or other causes. Confirm suitability of aggregate with a petrographic analysis.

.5 Water: Potable, clean, and free from injurious amounts of oil, alkali, organic matter, or other deleterious matter, meeting requirements of CSA-A23.1, Table 9.

.6 Materials are to be obtained from the same source of supply or Manufacturer for the duration of the project.

.7 Supplementary cementing materials: Conforming to CSA-A3000.

2.3 Admixtures

.1 Air entrainment: Conforming to ASTM C260/260M.

.2 Chemical admixtures, water-reducing agent, and superplasticizer: conforming to ASTM C494/C494M.

.3 Admixtures containing chloride will not be permitted.

2.4 Concrete Mixes

.1 Provide concrete mixed in accordance with requirements of CSA-A23.1 and this Specification Section. Pay all costs for the mix design.

.2 Concrete design compressive strength and class of exposure as indicated in attached Table at the end of this Section.

.3 Use accelerating admixtures in cold weather only when accepted by the Contract Administrator. If accepted, the use of admixtures will not relax cold weather placement requirements. Do not use calcium chloride.

.4 Use set-retarding admixtures during hot weather only when accepted by the Contract Administrator.

.5 All admixtures are subject to acceptance by the Contract Administrator. List all proposed admixtures in mix design statement submission. Do not change or add admixtures to accepted design mixes without the Contract Administrator's review and acceptance.

.6 Concrete delivered to Site must be accompanied by a delivery slip in accordance with CSA-A23.1.

.7 Self consolidating concrete mixes will not be permitted for use on this Project.

3. PART 3 – EXECUTION

3.1 Placing Concrete

.1 Place concrete in accordance with requirements of CSA-A23.1 and as indicated on the Drawings. Layout of the Work and accuracy of same is the Contractor's sole responsibility.

.2 Notify the Contract Administrator a minimum of twenty four (24) hours prior to placing concrete. Under no circumstances shall concrete be placed without notifying Contract Administrator.

.3 The concrete shall be placed rapidly and evenly as near to its final position as possible to reduce the risk of segregation, flowlines, and cold joints.

.4 Ensure items to be cast into concrete are securely placed and will not interfere with concrete placement or displace during casting.

.5 All equipment for transporting the concrete shall be cleaned of hardened concrete and foreign materials before placing concrete.

.6 Immediately before concrete is placed, Contractor shall carefully inspect all forms to ensure that they are properly placed, sufficiently rigid and tight, and that all reinforcing steel and embedded parts are in the correct position and secured against movement during the placing operation. All forms shall be thoroughly cleaned and material removed.

.7 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods, which will prevent the separation or loss of the ingredients. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid re-handling or flowing. Vibrators shall not be used to move concrete. Under no circumstances shall the concrete, which has partially hardened, be deposited in the forms.

.8 Concrete shall be thoroughly compacted by mechanical vibrators during placing operations. Concrete shall be thoroughly worked around the reinforcement, embedded fixtures, and into the corners of the forms.

.9 Vibrate concrete using the appropriate size equipment as placing proceeds, in accordance with CSA-A23.1. Check frequency and amplitude of vibrations prior to use. Provide additional standby vibrators in the event of equipment failure.

.10 Where placing operations would involve dropping the concrete more than 1,500 mm, it shall be placed through canvas hoses or galvanized iron chutes. Concrete shall not be raised at a rate greater than that for which proper vibration may be affected.

.11 Do not place concrete if carbon dioxide producing equipment has been in operation in the building or in the enclosure during the twelve (12) hours preceding the pour. This equipment shall not be used during placing or for twenty four (24) hours after placing. During placing and curing concrete, surfaces shall be protected by formwork or an impermeable membrane from direct exposure to carbon dioxide, combustion gases, or drying from heaters.

.12 Honeycomb or embedded debris is not acceptable.

.13 Remove and replace defective concrete.

.14 Maintain accurate records of cast-in-place concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

.15 Prepare set or existing concrete by removing all laitance and loose or unsound materials and apply bonding agent in accordance with Manufacturer’s recommendations.

3.2 Hot and Cold Weather Concreting

.1 Deliver, place and cure concrete in hot or cold weather in accordance with the requirements in CSA-A23.1.

3.3 Construction Tolerance

.1 The Work shall be carefully and accurately set out; true to the positioning, levels, slopes, and dimensions shown on the Drawings and conforming to Section 03 10 00 – Concrete Forming and Accessories and Section 03 20 00 – Concrete Reinforcement.

.1 Sizes of member or thickness of slabs: plus or minus 6 mm.

.2 Cover of concrete over reinforcement: plus or minus 3 mm.

.2 If these tolerances are exceeded the Contractor may, at the discretion of the Contract Administrator, be required to remove and replace or to modify the placed concrete before acceptance. The costs incurred by the Contract Administrator for such investigation, testing, or review of reconstruction and the cost of reconstruction shall be borne by the Contractor.

3.4 Finishing Slab Surfaces

.1 Screeding, bull floating or darbying, floating, and trowelling of slab surfaces shall conform to CSA-A23.1, Clause 7.5.

3.5 Finishing Formed Concrete

.1 Broom finish exterior slab surfaces to achieve nonslip surface conforming to CSA-A23.1, Clause 7.5.6.1.

3.6 Construction Joints

.1 Joints not indicated on the Drawings shall be located so as to least impair the strength of the structure. The location of these joints shall be subject to prior review and acceptance by the Contract Administrator. Submit location and detail of joints to Contract Administrator a minimum of one (1) day prior to scheduled concrete casting. Joints shall be in accordance with CSA-A23.1, or as indicated on the Drawings.

3.7 Curing and Protection

.1 Cure and protect freshly placed concrete in accordance with CSA-A23.1.

.2 No concreting will be allowed until all materials required for the curing phase are on Site and ready for use.

.3 At the end of the curing and protection period, the temperature of the concrete shall be reduced gradually at a rate not exceeding 10°C/day until the outside air temperature has been reached.

.4 Concrete that is allowed to freeze or attain insufficient curing conditions shall be subject to all necessary investigations and testing as deemed necessary by the Contract Administrator and all such concrete shall be removed and the portion reconstructed as directed by the Contract Administrator, at the Contractor's cost.

3.8 Defective Concrete

.1 Concrete not meeting the requirements of the Specifications and Drawings will be considered defective concrete.

.2 Concrete not conforming to the lines, details, and grades specified herein or as shown on the Drawings shall be modified or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator. Finished lines, dimensions, and surfaces shall be correct and true within tolerances specified herein and in Section 03 10 00 – Concrete Forming and Accessories.

.3 Concrete not properly placed resulting in honeycombing and other defects shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator.

3.9 Repair

.1 Remove all exposed metal form ties, nails and wires, break off fins, and remove all loose concrete.

.2 Any imperfect joints, voids, stone pockets, or other defective areas and tie holes, shall be patched before the concrete is thoroughly dry. Defective areas shall be chipped away to a depth of not less than 40 mm with the edges perpendicular to the surface. The area to be repaired and a space at least 150 mm wide entirely surrounding it shall be wetted to prevent absorption of water from the repair mortar.

.3 Cure all repairs thoroughly in accordance to Manufacturer’s instructions.

Mix Type	Intended Application	Minimum Compressive Strength (MPa)	Class of Exposure
1	Non-Structural interior concrete for housekeeping pads	30 at 28 days	C-3

END OF SECTION