

**PART 1 General**

**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
  - .1 CSA A23.1-14 /A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CAN/CSA O86-14, Engineering Design in Wood.
  - .3 CSA O121-17, Douglas Fir Plywood.
  - .4 CSA O151-17, Canadian Softwood Plywood.
  - .5 CSA O153-19, Poplar Plywood.
  - .6 CAN/CSA O325.0-16, Construction Sheathing.
  - .7 CSA O437 Series-93 (R2011), Standards for OSB and Waferboard.
  - .8 CSA S269.1-16, Falsework and Formwork.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit copies of WHMIS MSDS.
- .3 Shop Drawings:
  - .1 Submit drawings
    - .1 Submit drawings showing formwork and falsework design to: CSA A23.1/A23.2.

**1.3 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location off ground and in accordance with manufacturer s recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect formwork from damages.
  - .3 Replace defective or damaged materials with new.
- .4 Follow the Project Construction Waste Management Plan.

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**PART 2 Products**

**2.1 DESIGN REQUIREMENTS**

- .1 Design in accordance with CSA S269.1.
- .2 Departmental Representative accepts no responsibility for structural adequacy of formwork, falsework and re-shoring and will not review its accuracy or completeness of design. Shop Drawing review will be performed only for intent. It is the Contractor's responsibility for the design.

**2.2 MATERIALS**

- .1 Formwork materials: to CSA S269.1.
- .2 Form ties:
  - .1 For concrete not designated Architectural: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes minimum 25 mm diameter in concrete surface.
  - .2 For Architectural concrete; snap ties complete with plastic cones and light grey concrete plugs.
  - .3 Form ties to be designed to act as ties and spreaders and to have a minimum working strength of 13 kN (3000 pounds).
  - .4 Snap ties to snap cleanly at least 25 mm (1") from concrete surface without damage to the concrete.
  - .5 Snap ties in Architectural concrete, to be internally disconnecting type which snaps cleanly at least 38 mm (1½") from concrete surface without damage to the concrete.

**PART 3 Execution**

**3.1 FABRICATION AND ERECTION**

- .1 Conform to CSA A23.1.
- .2 Verify lines, levels, and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .3 Obtain Departmental Representative's approval for formed openings, slots and chases not indicated on Structural Drawings.
- .4 Make formwork tight and flush faced to prevent the leakage of mortar and the creation of unspecified fins or panel outlines.
- .5 Fabricate and erect falsework in accordance with CSA S269.1

**3.2 FIELD QUALITY CONTROL**

- .1 Refer to section 01 45 00 – Quality Control.
- .2 Obtain field review of falsework and re-shoring by the Professional Engineer responsible for that work prior to each pour. Departmental Representative will not field review the formwork, falsework or reshoring.

- .3      Inspect all features of formwork affecting appearance of finished architectural concrete surfaces for conformance with Contract documents.

**END OF SECTION**

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**PART 1 General**

**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
  - .1 CSA A23.1-14 /A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CAN/CSA A23.3-14, Design of Concrete Structures.
  - .3 CSA G30.18-09 (R2019), Carbon Steel Bars for Concrete Reinforcement.
  - .4 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .5 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .2 Reinforcing Steel Institute of Canada (RSIC)
  - .1 RSIC-2018, Reinforcing Steel Manual of Standard Practice.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings.
    - .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and necessary details of reinforcing.
- .4 Quality Assurance
  - .1 Submittals:
    - .1 Submit in accordance with Section 01 45 00 – Quality Control and as described in Part 2 – Source Quality Control.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturers written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials off ground in dry location and in accordance with manufacturers recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

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**PART 2        Products**

**2.1            MATERIALS**

- .1     Reinforcing steel: carbon steel, deformed bars to CSA G30.18., unless indicated otherwise.
- .2     Weldable Reinforcing steel: weldable low alloy steel deformed bars to CSA G30.18.
- .3     Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M.
- .4     Welded steel wire fabric: to ASTM A1064/A1064M. Provide in flat sheets only.
- .5     Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

**2.2            FABRICATION**

- .1     Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice.
- .2     Substitute different size bars only if permitted in writing by Departmental Representative.

**2.3            SOURCE QUALITY CONTROL**

- .1     Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

**PART 3        Execution**

**3.1            FIELD BENDING**

- .1     Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2     Replace bars which develop cracks or splits.

**3.2            PLACING REINFORCEMENT**

- .1     Place reinforcing steel in accordance with contract documents and CSA A23.1 / A23.2.
- .2     Use only placing drawings as approved by Departmental Representative.
- .3     Remove all loose scale, dirt, oil or other coatings which would reduce bond.
- .4     Ensure cover to reinforcement is maintained during concrete pour.
- .5     Turn ends of tie wire towards the interior of concrete.
- .6     Support bars, chairs and spacers:
  - .1     Provide sufficient support bars, chairs, carriers and side form spacers as necessary to secure against displacement of reinforcement and maintain concrete cover before and during concrete placement. Support devices contacting surfaces exposed to the exterior to be non-corroding. Bars which are not shown on Structural Drawings and whose only function is supporting other reinforcing in lieu of other supporting devices to be considered accessories.

- .7 Do not splice reinforcing at locations other than shown on placing or structural drawings without Departmental Representative written approval.
- .8 Do not cut reinforcement without Departmental Representative written approval.
- .9 Obtain Departmental Representative field review of all reinforcing materials and placement before pouring concrete.

### **3.3 FIELD QUALITY CONTROL**

- .1 Inspection by Departmental Representative not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

### **3.4 CLEANING**

- .1 Clean in accordance with Section 01 74 00 – Cleaning.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1    ASTM International (ASTM)
  - .1        ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .2        ASTM C494/C494M-17, Standard Specification for Chemical Admixtures for Concrete.
  - .3        ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .4        ASTM E1155M-14 Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Number (Metric)
- .2    CSA Group (CSA)
  - .1        CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2        CSA A283-19, Qualification Code for Concrete Testing Laboratories.
  - .3        CSA A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005),

**1.2                ADMINISTRATIVE REQUIREMENTS**

- .1    Pre-installation Meeting: convene pre-installation meeting one week prior to beginning concrete works. Ensure key personnel to attend.
- .2    Batch Logs: keep record of each batch delivered to site.
- .3    Concrete Delivery Slips: Keep all concrete delivery slips ("driver's tickets") on site until building is completed. Record on delivery slip where concrete was placed, including time and date.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Minimum 2 weeks prior to starting concrete work, submit all concrete mix designs, and indicate where each concrete mix is to be used.
- .3    Provide composite sleeving drawings showing sleeves required by all trades.
- .4    Provide composite layout drawings showing all cast in place pipes and conduits.
- .5    Minimum submission requirements for each concrete mix design shall include the following:
  - .1        Minimum specified compressive strength at 28 days (or at the time specified on drawings).
  - .2        Maximum aggregate size.
  - .3        Aggregate type (if not normal density).
  - .4        Concrete density range, wet and dry (if not normal density).
  - .5        CSA exposure class.

- .6 Cement type (if not type GU).
- .7 Percentage and type of supplemental cementing materials.
- .8 Maximum water/cementitious materials ratio.
- .9 Slump at point of discharge.
- .10 Assumed method of placement of concrete.
- .11 Maximum time from batching to placing concrete (if retarding admixtures are used).
- .6 For High Volumes of Supplementary Cementing Materials (HVSCM) concrete, submit trial mixes data.
- .7 Concrete pours: provide accurate records of all concrete pours marked on a set of Structural Drawings.
- .8 Flatness and levelness: when requested, submit measurements of slab tolerances for each concrete pour.
- .9 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.
- .10 Site Quality Control Submittals:
  - .1 Provide testing/inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters found.
  - .2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in Part 3 – Field Quality Control.
  - .3 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete delivered to site and discharged after batching.

#### **1.4 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Qualifications: Concrete supplier to be certified by the Saskatchewan Ready Mixed Concrete Association and have a valid "Certificate of Ready Mixed Concrete Production Facilities" issued by the Saskatchewan Ready Mixed Concrete Association.
- .3 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
  - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture meet specified requirements. Strength gain over time curves are to be submitted for each concrete type.
- .4 At least 4 weeks prior to beginning Work, inform Departmental Representative of source of fly ash.



- .1 Changing source of fly ash without written approval of Departmental Representative is prohibited.
- .5 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in Part 2 – Products.

## **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
    - .1 Modifying maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2. is prohibited.
  - .2 Deviations submitted for review by Departmental Representative.
  - .3 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

## **1.6 SITE CONDITIONS**

- .1 Placing concrete during rain or weather events that could damage concrete is prohibited.
- .2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2. Cold and hot weather protection in accordance with A23.1/A23.2
- .3 Protect from drying.

## **Part 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in Mixes of Part 2 - Products.

### **2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in Part 1 – Quality Assurance.

### **2.3 MATERIALS**

- .1 Portland Cement: to CSA A3001
- .2 Blended hydraulic cement: Type GUB to CSA A3001
- .3 Cementitious hydraulic slag: to CSA A3000.
- .4 Supplementary cementing materials: with minimum 20 % CI fly ash replacement, by mass of total cementitious materials to CSA A3001.
- .5 Water: to CSA A23.1.

- .6 Aggregates: to CSA A23.1/A23.2. Do not use recycled concrete as aggregate. Nominal maximum coarse aggregate size to be 20 (3/4") unless noted otherwise.
- .7 Admixtures: not to contain chlorides.
- .8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
  - .1 Compressive strength: 40MPa at 28 days
- .9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 40 MPa at 28 days
- .10 Curing compound: to CSA A23.1/A23.2 and ASTM C309, Type 1, Class B, water based acrylic, compatible with surface hardener where hardener is used.
- .11 Floor surface hardener: non-metallic, natural grey colour (unless other colour is requested by on Departmental Representative drawings for specifications), premixed, Mohs Hardness 7 or better.

## 2.4 CONCRETE MIXES

- .1 Use ready-mix concrete. Proportion concrete in accordance with CSA A23.1, Alternative 1 - Performance Method for Specifying Concrete.
- .2 Set performance characteristics of concrete in plastic state in coordination with all trades involved.
- .3 Meet performance criteria of concrete in hardened state as shown on Structural Drawings and provide verification of compliance as in Quality Control Plan. Provide strength gain over time curves as part of submittal process.
- .4 Do not use admixtures containing chlorides.
- .5 Supplementary cementing materials (SCM):
  - .1 Conform to CSA A23.1.
  - .2 Concrete containing SCM must be accompanied with strength gain over time curves as part of submittal requirements.
  - .3 Follow slag and fly ash manufacturers' directions for proportioning and mixing of concrete.
  - .4 Avoid using SCM in architecturally exposed concrete. If necessary to achieve the required exposure classification, SCM not to affect colour and texture of finished concrete.
  - .5 Limit SCM content for floors with special finishes (such as Retroplate), to be compatible with the finish.
  - .6 Do not use concrete with more than 40% of SCM when ambient temperature is forecast to be below +10°C at the time of concrete pour and during the seven days after the pour, except for footings, walls and columns.
  - .7 Reduce W/C ratio to 0.45 where using more than 40% of SCM in concrete for slabs and other horizontal finished surfaces, in order to reduce bleed water and to increase rate or strength gain.

- .8 For HVSCM concrete, reduce W/C ratio and comply with additional curing and protection requirements specified in CSA A23.1, including Annex K.

### **Part 3 Execution**

#### **3.1 PREPARATION**

- .1 Provide advanced notice (minimum 48 hours) to allow Departmental Representative field review of reinforcing prior to placing of concrete/closing of wall forms.
- .2 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitate placing with minimum of re-handling, and without damage to existing structure or Work.
- .3 Disturbing reinforcement and inserts during concrete placement is prohibited.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .5 Protect previous Work from staining.
- .6 Clean and remove stains prior to application for concrete finishes.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, workability, air content, temperature and test samples taken.

#### **3.2 INSTALLATION/APPLICATION**

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Placing Concrete
  - .1 Place concrete in accordance with CSA A23.1.
  - .2 Delivery and place concrete with minimum re-handling.
  - .3 If concrete is pumped or placed pneumatically, control discharge velocity to prevent separation or scattering of concrete mix ingredients.
  - .4 Place concrete in a continuous operation without cold joints. If cold joints develop inadvertently, notify Departmental Representative to obtain instructions for required remedial work.
  - .5 Do not overload forms.
  - .6 Cast slabs with a top surface that is level or sloping as required by the Drawings.
  - .7 Concrete exposed to view:
    - .1 Exposed surfaces to be dense, even, uniform in colour, texture and distribution of exposed aggregate.
    - .2 Defects such as honeycombing, voids, loss of fines, visible flow lines, cold joints or excessive bug holes may be cause for rejection at the discretion of the Departmental Representative.
  - .8 Maintain accurate records of all poured concrete including extent, date and location of each pour, concrete mix used with strength gain over time curves,

- ambient air temperature, test samples taken and falsework removal date and mark on a set of Structural Drawings.
- .9 Protect concrete from excessive heat and drying. Use hot weather concreting methods in accordance with csa-a23.1.
- .3 Sleeves and inserts:
- .1 Set sleeves, conduits, pipe hangers, weep hole tubes, drains and other inserts and openings as indicated or specified elsewhere.
- .2 Refer to Typical Details and Drawing Notes for placing guidelines, maximum size and minimum spacing of sleeves, embedded pipes and conduits.
- .3 Check locations and sizes of sleeves and openings shown on Structural Drawings with Architectural, Mechanical and Electrical Drawings. Notify Departmental Representative of any discrepancies.
- .4 Grouting Under Base Plates and Bearing Plates
- .1 Grout under base plates and bearing plates using procedures in accordance with manufacturer's recommendations.
- .2 Provide 100% contact over grouted area.
- .3 Grout column base plates and beam bearing plates as soon as steelwork is completed.
- .4 Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.
- .5 Finishing Concrete
- .1 Finish concrete to CSA A23.1/A23.2.
- .2 Cooperate with any trade applying finishes to concrete surfaces and provide surfaces which will ensure adequate bond. Provide chases and reglets where required.
- .3 Finishing Flatwork:
- .1 Protect concrete during finishing process. Use evaporation reducer during severe drying conditions.
- .2 Provide final finish in accordance with proposed use and as follows:
- .1 Powered steel trowel finish for: interior exposed slabs, slabs which receive resilient flooring, carpet, epoxy-based finishes, thin-set tiles, etc. and future floors. Do not trowel air entrained concrete.
- .2 Steel trowel exposed interior concrete floors at least twice. Provide final spin troweling when non-slip finish is required.
- .3 Surface hardeners:
- .1 Provide where hardened concrete is required by Architectural Drawings or Specifications.
- .2 Use only liquid hardeners (or integral hardeners) on air entrained concrete; do not use dry-shake applied surface hardeners.
- .3 Incorporate hardener into the surface of the concrete while concrete is still plastic.

- .4 Follow manufacturer's recommendations for dosage and application procedure.
    - .5 Where coloured hardeners are required, colour will be selected from available colours by the Architect.
  - .4 Surface Tolerances (flatness and levelness):
    - .1 Concrete tolerance to CSA A23.1
    - .2 Unless otherwise noted, conform to finish tolerance Class A or as required by mechanical and electrical equipment.
    - .3 Measure surface tolerances using the F-Number method in accordance with ASTM E1155M within 72h of each concrete pour.
    - .4 Deviations from these surface tolerances that are determined to be a result of erroneous placement or finishing of concrete shall be repaired in a manner suitable to the Departmental Representative and the Construction Contractor.
- .4 Finishing Formed Surfaces:
  - .1 Completely fill holes left by through-bolts with grout.
  - .2 Do not patch surfaces until instructed in writing by Departmental Representative.
  - .3 Concrete exposed to view:
    - .1 Provide smooth-form finish.
    - .2 Rub exposed sharp edges with carborundum to produce 3 mm (1/8") radius edges unless otherwise indicated.
- .6 Concrete Curing and Protection:
  - .1 At a minimum cure and protect concrete in accordance with CSA A23.1
  - .2 Extend curing and protection period until concrete has reached following strength levels for structural safety:
    - .1 Framed slabs and beams: 75% of specified 28 day strength.
  - .3 For concrete containing supplementary cementing materials, curing and protection times may need to be extended beyond those outlined by CSA A23.1 to achieve the required structural properties.
  - .4 Cure slab surfaces immediately after finishing is completed.
  - .5 Slabs on grade and structural slabs receiving resilient floor or other moisture sensitive finishes:
    - .1 Apply 24 hours of continuous sprinkling with water. Start immediately after finishing slab.
    - .2 Cover slab for at least the following 72 hours using plastic sheets with joints taped and free edges covered.
    - .3 Refer to Architectural Specifications for required testing methods prior to placing floor finishes.
  - .6 Concrete exposed to view:
    - .1 Protect during construction period from wear, damage, marking, discolouration, staining and becoming coated with concrete leakage.

- .2 Unless rejected, repair damage and remove marks and stains to the approval of the Architect.
- .7 Do not load concrete until sufficient strength is developed
- .7 Existing Structure
  - .1 Take precautions to protect the existing structure from damage.
  - .2 Remove portions of existing concrete structure as required.
  - .3 Provide temporary shoring and bracing as required.
  - .4 Retain a Professional Engineer to design the temporary shoring and bracing and to review this work on site.
  - .5 Obtain approval from Departmental Representative before coring or cutting existing slabs, beams or walls.
  - .6 Retain an independent testing company to locate existing reinforcement and conduit in the areas of proposed openings and to mark locations on the surfaces of slabs and walls on which the cores and cuts are to be started using a non destructive method.
  - .7 Remove toppings prior to locating reinforcement and conduit.
  - .8 Mark locations and sizes of cores and openings and locations of reinforcement and conduit using indelible markers as follows:
    - .1 Red for top bars
    - .2 Green for bottom bars
    - .3 Black for cores, openings and conduit.
  - .9 Relocate proposed openings and repeat process at no extra cost to the Contract if proposed locations are not acceptable to Departmental Representative.
  - .10 Save the complete length of all cores. Label each core with location taken. Make all cores available for review by Departmental Representative. Dispose of cores only with approval of Departmental Representative. See details on structural drawings for sawcutting procedure.
  - .11 If new reinforcement is required at an opening, install reinforcement before cutting opening or shore up structure until new reinforcement is installed.
  - .12 Roughening existing surfaces:
    - .1 Where drawings call for a roughened surface, bush hammer entire surface to a full amplitude of at least 5 mm.
  - .13 Patching:
    - .1 Patch existing concrete where necessary to provide required smooth, flat surfaces for reinforcement and for other trades.

### **3.3 FIELD QUALITY CONTROL**

- .1 Contractor to retain an independent, third party Inspection and Testing Agency (certified under CSA A283 with category to suit testing provided) to carry out inspection and testing of concrete and concrete materials and check conformance with applicable Standards and Contract documents.
- .2 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required. Provide concrete samples.

- .3 The Agency will submit reports covering the work inspected and the testing performed. The reports will include the Supplier's mix design numbers, locations in structure to which the tests relate and comments on abnormal results and conditions. The reports will be provided not later than five working days after the testing is completed. Forward all reports to Departmental Representative.
- .4 Sampling, storing, curing and testing of concrete will be in accordance with CSA A23.1/A23.2.
- .5 The Agency will review all submittals pertaining to concrete mix designs and certification of plant, equipment and materials.
- .6 Compressive Strength Testing:
  - .1 One test is required for each 100 cubic meters of placed concrete, but not less than one test for each concrete mix placed each day. At least 3 tests are required for each class of concrete used.
  - .2 A group of three cylinders for each test will be provided, Location of concrete placement will be recorded for each cylinder set. One specimens will be tested at 7 and two at 28 days.
  - .3 If standard on site cured cylinders are used to determine concrete strength prior to removal of formwork, they will be kept adjacent to and under the same conditions as the work they represent.
- .7 Slump testing:
  - .1 A minimum of one standard slump test will be conducted for every compressive strength test taken.
- .8 Inspection and testing by the Agency will not augment or replace the Contractor's quality control nor relieve the Contractor of any contractual responsibility.

**END OF SECTION**