PART 1 GENERAL

1.1 Related Sections

.1	Cast in Place Concrete	Section 03 30 00
.2	Concrete Reinforcing	Section 03 20 00

1.2 Work Included

.1 Provide all labour, materials, equipment and services necessary to supply, erect, and strip all formwork and falsework for poured-in-place concrete shown or indicated on the Contract drawings and specifications.

1.3 Quality Assurance

.1 Do concrete formwork and falsework to:

.1 Provincial Building Code - current edition.

.2 CSA Standard CSA-A23.1-04(Concrete Materials And Methods Of Concrete Construction).

.3 CSA Standard CSA-A23.2-04 (Methods Of Test And Standard Practices For Concrete).

CSA Standards S269.1 – 1975 (R2003) (Falsework For Construction Purposes).

.4 ACI SP4 Chapter 5 (Formwork For Concrete).

.5 ACI Standard 347 (Recommended Practice For Concrete Formwork).

1.4 Tolerances

.1 The tolerances for all concrete work shall conform to the requirements of CSA Standard CSA-A23.1-04.

1.5 Product Handling

.1 Protect formwork materials before, during and after installation and protect installed work and materials of other trades.

.2 In the event of damage, immediately make required repairs or replacements necessary to the approval of the Contract Administrator at no extra cost to the City.

PART 2 PRODUCTS

2.1 Formwork Materials

.1 Form Material:

.1 Exposed surfaces - metal, plywood or plywood lined. Plywood to CSA Standard O121-M1978 (R2003) or CSA Standard O153-M1980 (R2003).

.2 Unexposed surfaces - metal, plywood to CSA Standard O121-M1978 or CSA Standard O153-M1980 (R2001), or wood lumber to CSA Standard CAN/CSA O86-01 (Engineering Design In Wood - Limit States Design).

.3 Plywood and wood formwork materials shall conform to CSA Standard S269.1, be free from warp and sawn straight so that lines and shapes will be accurately retained.

.4 Unlined forms for unexposed surfaces shall be made with a good grade of lumber or plywood and fitted so that there will be no leakage of mortar.

.5 Use metal forms, plywood lined forms or plywood forms of sufficient structural strength for exposed surfaces. Plywood for lining shall be GIS exterior grade fir plywood with a waterproof glue.

.2 Ties and Spreaders:

.1 Use metal form ties which are adjustable in length to permit tightening of forms. Use only the snap-off type of form which will permit no metal within [1"] [25mm] of the concrete surface after removal. Twisted wire form ties will not be accepted.

.3 Form Release Agent:

.1 Form release agent shall be a pre-approved chemical agent, not an oil.

.4 Void Form:

.1 Void form shall be of a deteriorating material that will result in a total void thickness as noted on the drawings. If a non-biodegradable material is used the thickness must be adjusted to insure the required void volume is achieved. Contractor to submit technical data on void material for approval by the Contract Administrator.

PART 3 EXECUTION

3.1 Formwork

.1 Lines and Levels:

.1 Verify lines, levels and column centres before proceeding with work and ensure that dimensions agree with drawings.

.2 Coordinate and cooperate with all other trades in forming and setting of recesses, chases, sleeves, inserts, bolts and hangers.

.2 Design:

.1 Build forms sufficiently strong and rigid to sustain the weight or fluid pressure of the concrete without noticeable deflection. Ensure forms are sufficiently tight to prevent leakage or mortar.

.2 The Contractor shall be responsible for design and construction of falsework. The method and scheduling of reshoring shall be submitted to the Structural Consultant for review prior to fabrication.

.3 Construction:

.1 Construct forms so that the finished concrete will conform to the shape and dimensions specified.

.2 Construct forms so that they may be dismantled and removed without damaging the concrete.

.3 Set shores on wedges or use adjustable shores so they may be removed without causing undue strains in the concrete.

.4 Provide temporary openings at the bottom of column and wall forms to facilitate cleaning and inspection. Use water to flush out debris and close the openings with patch, flush on the inside.

.4 Treatment of Forms:

.1 Use a non-staining form release agent free from volatile constituents for treating forms.

.2 Place form release agent prior to placing metal reinforcement.

.3 Untreated forms shall be kept wetted down to prevent shrinkage prior to placing

concrete and shall be surface wetted at time of placing.

.5 Alignment:

.1 Provide suitable means for checking the alignment and elevation of forms during placing. Check these items frequently during placing.

.2 Carry out corrective wedging as required until concrete is in place.

.3 The Contract Administrator shall have the right to order concrete removed which has become misaligned during placing.

.4 Align forms to ensure that movements and deflections of the finished product are confined within the following specifications and tolerances.

.1 The tolerances for all concrete work shall conform to the requirements of CSA Standard CSA-A23.1-04.

.2 Variation in sizes and locations of sleeves, floor openings and wall openings -- 10mm.

.3 Variation for steps in a flight of stairs - rise 4mm, tread 8mm in consecutive steps - rise 2mm, tread 4mm.

.5 Formwork for slabs and beams shall be cambered as shown on the drawings. For calculation of such cambers, allowance for settlement, closure of form joints, elastic shortening of forms and shoring, must be made and added to camber requirements.

.6 Stripping:

.1 Formwork shall not be removed until the concrete has gained sufficient strength to carry dead loads and all possible construction loads liable to be imposed upon it. Notify the Contract Administrator before removing any formwork.

.2 Remove forms in a manner to prevent spalling and other damage to the concrete surface. Forms shall be removed without hammering or prying against the concrete. Completely remove the forms from under steps and similar spaces, through temporary openings if necessary.

.3 Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.

.7 Re-use of Formwork:

.1 Forms may be re-used after adequate cleaning, providing the faces have not cracked or become roughened. Such formwork shall be trimmed and properly patched.

3.2 Inserts

.1 All sleeves, openings, etc., shown on structural drawings must be checked with the Architectural, Mechanical and Electrical drawings. Sleeves, openings, etc., not shown on the structural drawings must be approved by the Contract Administrator.

.2 Set ties, anchor bolts, pipe hangers and other inserts, openings and sleeves, in concrete floors and walls, as required by other trades.

.3 No sleeves, ducts, pipes or other openings shall pass through beams or columns, except where detailed on the structural drawings.

PART 1 GENERAL

1.1 Related Sections

.1	Concrete Forming and Accessories	Section 03 10 00
.2	Concrete Reinforcing	Section 03 20 00
.3	Cast in Place Concrete	Section 03 30 00

1.2 Reference Standards

.1 Testing of concrete shall conform to the requirements of the following standards unless otherwise required by this specification:

.1 Current Edition of Provincial Building Code

.2 CSA-A23.1-04 Concrete Materials and Methods of Concrete Construction

.3 CSA-A23.2-04 Methods of Test for Concrete

.2 Where the standard is referred to in this specification it shall mean the documents specified in this clause.

PART 2 PRODUCTS

2.1 Appointment Of Testing Agency

.1 The City shall hire a CSA approved testing agency who shall test all concrete and grout as per this specification.

.1 Testing paid for by the City:

.1 Review of initial mix designs.

.2 Testing paid for by the Contractor:

.1 Review of Contractor requested mix design changes.

.2 Any waiting time incurred by the testing agency in excess of ½ hour.

.3 Any additional costs due to overtime, shift work, holiday or weekend work, except that holiday or weekend pickup will be paid for by the City when the concrete was placed on a regular workday.

.4 Costs for testing required by the Contractor for stripping.

.5 Cost for retesting or additional testing of concrete whose tests have failed to meet the specified requirements.

PART 3 EXECUTION

3.1 Responsibility Of The Contractor

.1 The Contractor shall co-operate fully with the testing agency.

.2 The Contractor shall give the testing agency at least 4 hours prior notice of a concrete placement.

.3 It is the Contractor's responsibility to provide a finished product that meets the specification. If initial tests indicate that the concrete failed to meet the specification, the Contract Administrator shall decide if any additional testing is necessary. This testing shall be done by a CSA approved testing agency, but need not be the City's agency. The proposed additional testing shall have prior approval of the Contract Administrator. Core strengths must equal specified strength if tested dry or 85% specified if tested wet, with wet or dry tests as per the standard.

3.2 Responsibility Of The Testing Agency

.4 The testing agency has the authority to, and is expected to reject any concrete not meeting the specifications.

.5 If the testing agency becomes aware that concrete is being placed without their being notified, or if insufficient notice is received, then the testing agency shall notify the Contract Administrator immediately.

.6 Low 7 day and 28 day strength tests shall be brought immediately to the attention of the Contract Administrator and the Contractor.

.7 All tests shall be numbered consecutively and the cylinders marked as follows: 7 day = A, two 28 days marked B and C.

.8 All field cured cylinders shall be marked "F".

3.3 Regular Testing

.9 Shall conform to the standard, except each test shall consist of 3 cylinders. One for 7 day strength and two for 28 day strengths. The tests shall record concrete temperature, air temperature, slump, air content, location of pour, mix number, specified strength, and element type.

3.4 Field Cured Cylinders

.10 Shall conform to the standard, except the cylinder shall be stored adjacent to the element it represents. The cylinder is to be left undisturbed at this location until picked up by the testing agency.

PART 1 GENERAL

1.1 Related Work

.1	Concrete Formwork	Section 03 10 00
.2	Cast-in-Place Concrete	Section 03 30 00
.3	Concrete Unit Masonry	Section 04 22 00

1.2 Quality Assurance

.1 Reinforcement work shall conform to the following standards:

.1 Provincial Building Code - current edition

.2 CSA Standard CSA-A23.1-04. (Concrete Materials And Methods Of Concrete Construction).

.3 CSA Standard CSA-A23.2-04 (Methods Of Test For Concrete).

CSA Standard A23.3-04 (Design Of Concrete Structures For Buildings).

ASTM A775-86 (Standard Specification For Epoxy Coated Reinforcing Concrete Construction).

.4 CSA Standard W186-M1990 (R2 002) (Welding Of Reinforcing Bars In Reinforced Concrete Construction).

.5 Reinforcing Steel Institute of Ontario (RSIO) Manual and Standard Practice.

1.3 Qualification Of Workers

.1 Welding of concrete reinforcement shall be performed by workers who are approved by the Canadian Welding Bureau in accordance with CSA Standard W47.1-03 (Certification Of Companies For Fusion Welding Of Steel Structures).

1.4 Submittals

.1 Mill Tests:

.1 Upon request, provide the Contract Administrator with a certified copy of mill tests of steel supplied, showing physical and chemical analysis.

.2 The City may engage a CSA certified laboratory to test all reinforcing as detailed in this specification.

1.5 Shop Drawings:

.1 Prepare shop drawings for concrete reinforcement, bar support and accessories in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada, ANSI/ACI 315-80 and ACI 315R-80, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 Upon request submit shop drawings in accordance with the General Requirements.

.3 Clearly indicate bar sizes, grades, spacing, location and quantities of reinforcing mesh, bar supports and accessories and identifying code marks to permit correct placement without reference to structural drawings.

.4 Placing drawings and bar lists will be reviewed for number and size of bars only and this review shall in no way relieve the Contractor of his responsibility for carrying out the Work in accordance with the drawings.

.5 Substitution of imperial reinforcing sizes and grades will only be accepted if placing drawings showing imperial sizes are submitted to the Contract Administrator for review. Approval must be obtained before any work is commenced.

1.6 Product Delivery, Storage And Handling

.1 Store reinforcement in a manner to prevent excessive rusting and fouling with dirt, grease, form-oil and other bond-breaking coatings.

.2 Reinforcement at the time concrete is placed shall be free from excessive rusting, mud, oil or other coatings that adversely affect its bonding capacity.

PART 2 PRODUCTS

2.1 Concrete Reinforcement

.1 All concrete reinforcement shall conform to the following standards:

.1 Deformed bars to CSA Standard G30.18-M92 (R2002) (Billet-Steel Bars For Concrete Reinforcement).

.2 Reinforcement that will be welded to CSA Standard CSA W186-M 1990 (R2002).

.3 Welded wire mesh to CSA Standard G30.18.

.4 Wire for reinforcement to CSA Standard G30.18.

.2 Bar supports shall conform to ACI 316 (Manual Of Standard Practice For Detailed Reinforced Concrete Structures) unless approved by the Contract Administrator.

2.2 Fabrication

.1 Fabricate reinforcing to CSA Standard CSA-A23.1-04 and reviewed shop drawings.

.2 Fabricate reinforcing steel within the following tolerances:

.1 Sheared length plus or minus 25mm.

.2 Depth of truss bar plus or minus 10mm.

.3 Outside dimension of stirrups, ties and spirals, plus or minus 10mm.

.4 Other bends plus or minus 25mm.

.3 Colour code each bar to correspond with code mark appearing on bar list.

.4 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.

PART 3 EXECUTION

3.1 Installation

.1 Reinforcement shall be accurately placed and supported by bar supports and side form spacers to assure proper concrete cover and spacing within allowable tolerances before and during placing of concrete.

.2 Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before and during concreting. They shall be spaced so that any sagging between supports will not intrude on the specified concrete cover, or as required by the Contract Administrator.

.3 Use concrete blocks for bar support in slab-on-grade. Lifting of reinforcing or welded wire mesh into specified position during the concrete pour will not be allowed.

.4 Bars shall be placed on the following tolerances unless noted otherwise:

.1 Clear concrete protection of reinforcement, 5mm plus or minus.

.2 Where the depth of a flexural member, thickness of a wall or smallest dimension of a column is:

.1 200mm or less, 5mm plus or minus.

.2 Larger than 200mm, but less than 600mm, 10mm plus or minus.

.3 600mm or larger, 20mm plus or minus.

.4 Lateral spacing of these bars shall be within 30mm plus or minus of the specified spacing.

.3 For longitudinal location of bends and ends of bars 50mm plus or minus.

.4 As Item 3 at discontinuous ends of members 20mm plus or minus.

.5 Specified spacing between bars 10mm.

.5 Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the specified tolerances, the resulting arrangement of bars shall be subject to approval of the Contract Administrator.

.6 Bar support devices contacting surfaces exposed to the exterior, or to view, shall be non-corroding.

3.2 Minimum Reinforcement Where Not Shown Or Indicated

.1 Concrete walls, 10M at 300mm each way, centered.

.2 Slab-on-grade, 10M at 400mm each way, centered.

.3 Sidewalk, 10M at 500mm each way, centered.

.4 Edges of slabs and walls, 2-15M continuous, lap 400mm.

.5 Opening in slab and wall over 300mm sq. 2-15m parallel to all edges, extending 600mm beyond corners.

3.3 Construction Review

.1 No concrete shall be placed until the Contract Administrator has completed his review of reinforcing in place. The Contractor shall provide a minimum of 24 hours notice of the time when the reinforcement will be substantially in place and ready for the Contract Administrator's review.

3.4 Epoxy Coated Steel

.1 Where noted on structural drawings, reinforcing shall be coated with a fusion bonded epoxy coating in accordance to ASTM A775-86.

.2 With each batch of coating material, provide a written certification properly identifying batch number, material, quantity represented, date of manufacture, name and address of manufacturer and a statement that supplied coating material is the same composition as that prequalified. A batch is defined as quality of coating material designated by the manufacturer in his production quality control program.

.3 Coat cut ends of bars of epoxy coated reinforcing with epoxy patching material.

.4 Use epoxy coated and/or plastic accessories and tie wire with epoxy coated reinforcement.

3.5 Damage And Repair To Epoxy Coated Reinforcing

.1 Repair coating damage with patching material if damaged area per 300mm is greater than nominal cross-sectional area of the bar. Damaged areas per 300mm, which are smaller than the nominal cross-section area of the bar, need not be repaired.

.2 Limit repair of coating damage to bars on which total of damaged coating area does not exceed 5% of surface area of the bar within each bent area, or 3% of surface area of the bar within the total straight portion of coated bar.

.3 Coated bars which do not meet the requirements of this specification shall be rejected. At coating applicators option, coated bars having defects shall be replaced or alternately, stripped of coating, re-cleaned, and recoated in accordance with the requirements of this specification.

PART 1 GENERAL

1.1 Related Sections

.1	Concrete Formwork	Section 03 10 00
.2	Concrete Reinforcing	Section 03 20 00
.3	Masonry Procedures	Section 04 05 10

1.2 Measurement Procedures

.1 Cast-in-place concrete will be measured in cubic metres calculated from neat dimensions indicated or authorized in writing by Contract Administrator. Concrete placed beyond dimensions indicated will not be measured.

.2 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.

.3 No deductions will be made for volume of concrete less than $0.1m^3$ in volume displaced by individual drainage openings.

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

.5 Heating of water and aggregates and providing cold weather protection will not be measured but considered incidental to work.

.6 Cooling of concrete and providing hot weather protection will not be measured but considered incidental to work.

.7 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.

.8 Supply and installation of waterstops will be measured in lineal metres installed.

1.3 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C109/C109M-02 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).

.2 ASTM C260-01, Specification for Air-Entraining Admixtures for Concrete.

.3 ASTM C309-03 , Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.4 ASTM C494- 04, Specification for Chemical Admixtures for Concrete.

.5 ASTM C939-02 Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

.6 ASTM D412-92, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

.7 ASTM D624-91, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.8 ASTM D1751-83 (1991), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.9 ASTM D1752-84(1992), Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 CGSB 81-GP-1M-77, Flooring, Conductive and Spark Resistant.

.3 Canadian Standards Association (CSA)

.1 CSA A3000-03 Cementitious Materials Compendium

.2 CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

.3 CSA-A23.2-04, Methods of Test and Standard Practices for Concrete.

.4 CAN/CSA-A23.5-M86(R1992), Supplementary Cementing Materials. CSA A3000-03 Cementitious Materials Compendium

.5 CAN/CSA A363-M88(R1996), Cementitious Hydraulic Slag. CSA A3000-03 Cementitious Materials Compendium

1.4 Certificates

.1 Submit certificates in accordance with Section 01 33 00 - submittal procedures.

.2 Minimum 4 weeks prior to starting concrete work submit to Contract Administrator 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.

.3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA-A23.1-04.

.4 All concrete must be produced by a plant certified by the Manitoba Ready Mix Concrete Association and a copy of a valid MRMCA Certification of Compliance submitted.

1.5 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 Contract Administrator's approval for following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

PART 2 PRODUCTS

2.1 Materials

.1 All concrete materials must satisfy requirements of CSA A23.1-04 except where noted.

2.2 Mixes

.1 Proportion normal density concrete in accordance with CSA-A23.1-04, Alternative 1 to give the performance characteristics noted on the drawings.

PART 3 EXECUTION

3.1 Preparation

.1 Obtain Contract Administrator's approval before placing concrete. Provide minimum 48 hours notice prior to placing of concrete.

.2 Pumping of concrete will not be permitted.

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

.4 Prior to placing of concrete obtain Contract Administrator'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 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 Contract Administrator.

3.2 Construction

.1 Do cast-in-place concrete work in accordance with CSA-A23.1-04.

.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 Contract Administrator.

.2 Where approved by Contract Administrator, 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 Contract Administrator.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Contract Administrator 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 Contract Administrator, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100mm diameter. Drilled holes to be to manufacturer's recommendations.

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

.4 Set bolts and fill holes with epoxy 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 Drainage holes and weep holes:

.1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.

.2 Install weep hole tubes and drains as indicated.

.5 Dovetail anchor slots:

.1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.

.2 Install continuous vertical anchor slots at 800 mm o/c where concrete walls are masonry faced.

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

.7 Finishing.

.1 Finish concrete in accordance with CSA-A23.1-04.

.8 Joint fillers.

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

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

.3 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.

.9 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 tolerance in accordance with CSA-A23.1-04 straight edge method.

3.4 Field Quality Control

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory certified by CSA A283 and designated by the City in accordance with CSA-A23.1-04 and Section 01 45 00 - Quality Control.

.2 The City will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

.3 Additional test cylinders required 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-A23.2-04.

.5 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.