Part 1 General

1.1 RELATED WORK

.1 Concrete reinforcement: Section 03 20 00.

.2 Cast-in-place concrete: Section 03 30 00.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-O86.1, Engineering Design in Wood (Limit States Design).
- .3 CAN3-O86S1/O86.1S1, Supplement No. 1 and CAN/CSA-O86.1 Engineering Design in Wood (Limit States Design).
- .4 CSA O121, Douglas Fir Plywood.
- .5 CSA O151, Canadian Softwood Plywood.
- .6 CSA O153, Poplar Plywood.
- .7 CAN3-O188.0, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
- .8 CSA S269.1, Falsework for Construction Purposes.
- .9 CSA S269.3, Concrete Formwork.

.2 Underwriters Laboratory Canada (ULC)
- .1 CAN/ULC-S701 - Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework in accordance with Section E4.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Comply with CAN/CSA-S269.3 for formwork drawings and CSA S269.1 for falsework drawings.

.5 Indicate sequence of erection and removal of formwork/falsework to Contract Administrator.

.6 Shop drawing shall bear the stamp of qualified Professional Engineer registered in Manitoba.

.7 Formwork, falsework, and reshoring are to be reviewed by the same Professional Engineer prior to each concrete pour.

Part 2 Products

2.1 FORMWORK MATERIAL

.1 Formwork materials:
- .1 For concrete without special architectural features: plywood and wood formwork materials to CSA-0121, CAN3-O86S1/O86.1S1, and CSA-O153.
- .2 For concrete with special architectural features: formwork materials to CAN/CSA-A23.1.

.2 Form liner:
- .1 Plywood: high density overlay, Douglas Fir to CSA O121, T & G edge, 16mm thick. Sound, undamaged sheets with clean, smooth, true edges.

.3 Steel forms: tight fitting and adequately stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.

.4 Form ties:
- .1 For concrete not designated 'Architectural' use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface. Depth of snap-off 38 mm.
- .2 For concrete designated 'Architectural' use snap ties complete with plastic cones and light grey concrete plugs.

.5 Nails, spikes, lag bolts, anchorages: sizes as required, of sufficient strength and character to maintain formwork in place while pouring concrete.

.6 Falsework materials: to CSA S269.1.

2.2 ACCESSORIES

.1 Fillets for chamfered corners: unless otherwise indicated 25 x 25 mm. Special sizes, shapes and profiles as indicated on drawings. Styrofoam should not be used.

.2 Void forms:
- .1 Paper forms: corrugated paper forms with cellular core, 200 mm thickness, minimum compressive strength to resist wet weight of concrete and construction loads. Protected all four sides by wax coated moisture protection. Shearmat or VF VoidForm or equal.

Location: As indicated on the drawings.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels, and centres before proceeding with formwork and falsework. Ensure dimensions agree with drawings.

.2 Obtain Contract Administrator's permission for use of earth forms. Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.3 Construct falsework in accordance with CSA S269.1.

.4 Do not place shores and mudsills on frozen ground.

.5 Provide site drainage to prevent washout of soil supporting mudsills and shores.

.6 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.

.7 Arrange and assemble formwork to permit easy dismantling and stripping, so that concrete is not damaged during its removal.

.8 Arrange forms to allow stripping without removal of principle shores, where these are required to remain in place.

.9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.10 Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close temporary ports or openings with tight-fitting panels, flush with inside face to forms, neatly fitted so those joints will not be apparent in exposed concrete surfaces.

.11 Form weep holes and drainage holes in formwork as indicated. If wood forms are used, remove after concrete has set.

.12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated. Obtain Contract Administrator's permission before framing openings not indicated on Structural Drawings.

.13 Camber slabs and beams 6 mm in 3000 mm of span unless otherwise indicated. Maintain beam depth and slab thickness from cambered surface.

.14 Use chamfer strips on external corners of columns, beams, slabs where exposed in final assembly, and elsewhere indicated. Use chamfer strips at interior corners of concrete members, joints, and elsewhere indicated. Form special chamfer or bullnose corners to details indicated on drawings.

.15 Align form joints and make watertight. Keep form joints to minimum.

.16 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.

.17 Construct forms for architectural concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.18 Clean formwork in accordance with CAN/CSA-A23.1 before placing concrete.

.19 Slip forming and flying forms may be acceptable, subject to submittal of details of equipment and procedures for Contract Administrator's review and acceptance.

.20 Inspect completed formwork, falsework, shoring and bracing to ensure that work is in accordance with formwork and falsework design and that supports, wedges, fastenings, ties and embedded parts are secure.

.21 Inform Contract Administrator when formwork is complete and has been cleaned to allow for inspection. Obtain approval prior to placing concrete.

3.2 VOID FORM INSTALLATION

.1 Install void form where indicated, level, and to proper elevation.

.2 Use paper type void form in the locations shown on the drawings.

.3 Where void form is to be placed in areas that will be above existing grade elevations the placement, leveling and compaction of backfill materials to be completed before void form is placed.

.4 Wrap paper type void form with polyethylene film to protect from moisture. Cover paper type void form with 6 mm thick hardboard.

.5 Provide minimum 300 x 300 mm sections of hardboard at bolster and chair locations.

.6 Protect from damage until concrete placement. Replace crushed, damaged, or wet void form before placing concrete.

3.3 REMOVAL AND RESHORING

.1 Do not remove forms and bracing until concrete has gained sufficient strength to carry its own weight, construction loads, design loads that are liable to be imposed upon it. Verify strength of concrete by compressive test results.

.2 Notify Contract Administrator 48 hours in advance prior to removing formwork.

.3 Leave formwork in place for following minimum periods of time after placing concrete:

LOCATION	TEMPERATURE IN °C		
	21-35	15-21	10-15
Walls	2 days	3 days	4 days
Grade Beams	2 days	3 days	4 days
Side Forms	2 days	3 days	4 days
Slabs	14 days	17 days	21 days
Beams	14 days	17 days	21 days
Structural Shoring	14 days	17 days	21 days

.4 Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.

.5 Re-shore structural members where required due to design requirements or construction conditions and as required to permit progressive construction. Remove forms supporting loads only when concrete has attained 75% of required 28-day compressive strength, provided construction is re-shored.

.6 Remove formwork progressively and in accordance with Building and Safety Code requirements and so that no shock loads or unbalanced loads are imposed on structure.

.7 Store removed forms, for exposed concrete, so surfaces in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.

.8 Tubular column forms:

.1 For concrete columns strip off laminated fibre from tubular column forms to expose concrete.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Concrete formwork: Section 03 10 00.

.2 Cast-in-place concrete: Section 03 30 00.

1.2 REFERENCES

.1 American Concrete Institute (ACI)
- .1 ACI 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
- .1 ANSI/ACI 315 - Details and Detailing of Concrete Reinforcement.

.3 American Society for Testing and Materials (ASTM)
- .1 ASTM A 775/A 775M - Specification for Epoxy-Coated Reinforcing Steel Bars.

.4 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1 - Concrete Materials and Methods of Concrete Construction.
- .2 CAN3-A23.3 - Design of Concrete Structures for Buildings.
- .3 CSA G30.3 - Cold Drawn Steel Wire for Concrete Reinforcement.
- .4 CSA G30.5 - Welded Steel Wire Fabric for Concrete Reinforcement.
- .5 CAN/CSA-G30.18 - Billet-Steel Bars for Concrete Reinforcement.
- .6 CAN/CSA-G40.21 - Structural Quality Steels.
- .7 CSA G164 - Hot Dip Galvanizing of Irregularly Shaped Articles.
- .8 CSA W186 - Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Contract Administrator with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.

.2 Upon request, inform Contract Administrator of proposed source of material to be supplied.

1.4 SHOP DRAWINGS

.1 Submit shop drawings consisting of bar bending details, lists, and placing of reinforcement in accordance with Section E4.

.2 Indicate bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement and mechanical splices if approved by Contract Administrator, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and location of chairs, spacers and hangers.

.3 Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada , ANSI/ACI 315, ACI 315R, Manual Engineering and Placing Drawings for Reinforced Concrete Structures.

.4 Design and detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide type B tension lap splices unless otherwise indicated.

1.5 SUBSTITUTES

.1 Substitute different size bars only if approved by the Contract Administrator in writing.

1.6 DELIVERY, STORAGE, HANDLING

.1 Store materials carefully, clear from ground and protect from rust, soiling, distortion and other damage.

Part 2 Products

2.1 MATERIALS

.1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.2 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.

.3 Cold-drawn annealed steel wire ties: to CSA G30.3.

.4 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.

.5 Epoxy coating of non-prestressed reinforcement: to ASTM A 775/A 775M.

.6 Galvanizing of non-prestressed reinforcement: to CSA G164, minimum zinc coating 600 g/m².

.7 Corrosion resistant chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

.8 Mechanical splices: subject to approval of Contract Administrator.

.9 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1, ANSI/ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.

.2 Obtain Contract Administrator's approval for locations of reinforcement splices other than shown on placing drawings.

.3 Upon approval of Contract Administrator, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Contract Administrator.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars that develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.

.2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of lead or asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.

.3 Keep reinforcing steel 65 mm back from construction joints and non-doweled joints.

.4 Use chairs, bolsters, bar supports, spacers acceptable to Contract Administrator.

.5 Use continuous 3 legged high chairs to support top bars in slabs.

.6 Use corrosion resistant chairs, bolsters, bar support, spacers, in areas where concrete is to be left exposed and where directed by Contract Administrator.

.7 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

.8 Securely tie reinforcing in place with No.16 gauge wire.

.9 Do not use reinforcement having kinks or bends not indicated or detailed on drawings.

.10 Obtain Contract Administrator’s approval before welding or cutting reinforcing bars.

.11 Splice reinforcement where indicated on drawings.

.12 Prior to placing concrete, obtain Contract Administrator’s acceptance of reinforcing steel and position.

.13 Ensure cover to reinforcement is maintained during concrete pour as per structural general notes drawing.

3.3 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated and galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Concrete forms and accessories: Section 03 10 00

.2 Concrete reinforcement: Section 03 20 00

.3 Reinforced masonry lintels and bond beams: Section 04 05 00.

.4 Work specified in respective trade sections requiring inserts and openings in concrete.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM C109, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm Cube Specimens).
- .2 ASTM C260, Specification for Air-Entrained Admixtures for Concrete.
- .3 ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .4 ASTM C494, Specification for Chemical Admixtures for Concrete.
- .5 ASTM C939, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
- .6 ASTM C1017, Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .7 ASTM D1751, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .8 ASTM D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .9 ASTM E1155, Test Method for Determining Floor Flatness and Levelness Using the F-Number System.

.2 Canadian Standards Association (CSA)

- .1 CAN/CSA-A5, Portland Cement.
- .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .3 CAN/CSA-A23.2, Methods of Test for Concrete.
- .4 CAN/CSA-A3000, Cementitious Materials Compendium.
- .5 CAN3-A362, Blended Hydraulic Cement.

.3 Canadian Government Standards Board (CGSB)

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

.4 American National Standards Institute (ANSI)

- .1 ANSI/ACI 117, Tolerances for Concrete Construction and Materials.

1.3 SAMPLES

.1 Submit samples as instructed by the Contract Administrator.

.2 At least 4 weeks prior to commencing work inform Contract Administrator of proposed source of aggregates and provide access for sampling.

1.4 CERTIFICATES

.1 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA-A23.1, and that mix design is adjusted to prevent alkali aggregate reactivity problems.

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

1.5 QUALITY ASSURANCE

.1 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures for Contract Administrator's review 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 Portland cement: to CAN/CSA-A5, normal Type GU or sulfate resistant Type HS where indicated on drawings or in mix design.

.2 Blended hydraulic cement: to CAN3-A362.

.3 Supplementary cementing materials: to CAN/CSA-A3000.

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

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

.6 Air entraining admixture: to ASTM C 260.

.7 Chemical admixtures: to ASTM C 494. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing of concrete.

.8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents. Of pouring consistency, capable of developing compressive strength of 50 MPa after 28 day cure.

.9 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.

.10 Curing compound: to CAN/CSA-A23.1 white and to ASTM C 309.

.11 Cushion pads: tough, resilient, weather, moisture, and oil resistant material that will not corrode or cause corrosion, consisting of either layers of approved cotton duck saturated and bound together by approved rubber or synthetic compounds, or made from specially compounded synthetic materials.

.12 Ribbed waterstops: extruded PVC of sizes indicated with shop welded corners and intersecting pieces with legs not less than 600 mm long.

.1 Tensile strength: to ASTM D412, method A, Die "C".
.2 Elongation: to ASTM D412, method A, Die "C", minimum 275%.
.3 Tear resistance: to ASTM D624, method A, Die "B".

.13 Premoulded joint fillers:
.1 Bituminous impregnated fiber board to ASTM D1751, thickness indicated.

.14 Weep hole tubes: plastic.

.15 Dovetail anchor slots: minimum 0.6 mm thick (24 gauge) galvanized steel with insulation filled slots.

.16 Dampproof membrane:
.1 Polyethylene film to CAN/CGSB-51.34, minimum 0.15 mm (6 mil) thick.

2.2 CONCRETE MIXES

.1 All concrete work shall be in accordance with CAN/CSA-A23.1-04, Alternative 1 Performance Specifications.

.2 General Contractor to provide proprietary mix design performance record as required by the Manitoba Redi-Mix Association.

.3 Provide concrete mix-design as per the structural General Notes drawing, Table D1.

2.3 PREPARATION

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

.2 Pumping of concrete is permitted only after review of equipment and mix by Contract Administrator.

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

.4 Prior to placing 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 doweled 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 position.

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

2.4 CONSTRUCTION

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

.2 Maintain concrete cover around reinforcing as indicated.

.3 Place concrete in its final position as soon as possible after mixing and within 1.5 hours after the water has been added to the dry materials. Do not use any concrete more than 1.5 hours old.

.4 Pour concrete continuously between predetermined construction and control joints. Do not "break" or interrupt successive pours such that "cold" joints occur.

.5 Sleeves and inserts:

.1 No sleeves, ducts, pipes or other openings shall pass through beams, column capitals or columns, except where expressly detailed on Structural drawings 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. Sleeves and openings greater than 100 x 100 mm not indicated on drawings must be approved by Contract Administrator.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as indicated, obtain approval of all modifications from Contract Administrator before placing of concrete.

.4 Check locations and sizes of sleeves and openings indicated on Structural drawings with Architectural, Mechanical, Electrical and other drawings. Report any discrepancies to the Contract Administrator and await remedial measures.

.5 Set special inserts for strength testing as indicated and as required by Non-Destructive Method of Testing Concrete. CSA or ASTM.

.6 Drainage holes and weep holes: form weep holes and drainage holes in accordance with Section 031000. Install weep hole tubes and drains as indicated.

.7 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 600 mm on centre where concrete walls are masonry faced.

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

.9 Waterstops:

.1 Install waterstops to provide continuous water seal. Do not distort or pierce waterstop in such a way as to hamper performance. Do not displace reinforcement when installing waterstops. Use equipment to manufacturer's requirements to field splice waterstops. Tie waterstops rigidly in place.

.10 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 isolation 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.

.11 Dampproof Membrane

.1 Install dampproof membrane as per Section 07 11 13 and Section 07 13 52.

2.5 COLD WEATHER CONCRETE PLACING

.1 Maintain following minimum requirements for protecting concrete during and after placement in freezing weather. Except as noted below, concrete curing and protection to be in accordance with CAN/CSA-A23.1.

.2 Before any concrete is placed, remove ice, snow, and frost completely from all formwork, reinforcing and other surfaces. Raise temperature of formwork, reinforcing, and other surfaces above 10°C for 24 hours minimum prior to concrete placing. Where concrete work is to come in contact with the earth, the surfaces of the earth shall be completely free of frost when the concrete is placed thereon.

.3 Heat concrete aggregates and water to a temperature not over 80°C. Concrete shall not be less that 10°C nor more than 30°C in temperature when deposited. Concrete when placed during freezing weather (or if freezing is anticipated during curing period) shall be fully enclosed and the temperature of the concrete maintained at not less than 20°C for 5 days and not less than 5°C for an additional 5 days. Provide adequate heating to attain the specified concrete strengths required prior to stripping or provide a concrete mix that will meet the specified stripping strengths under reduced curing temperatures.

.4 Keep protective covering clear of concrete and form surfaces to permit full circulation of air. Maintain intact for at least 24 hours after the artificial heat is discontinued.

.5 Construct heating enclosures/hoarding to be strong and windproof, and well ventilated. Locate heating units to prevent local damage to concrete due to local overheating, over drying, or combustion gases.

.6 Use only Herman Nelson heat exchange fuel oil type heaters for slabs and flat areas. Vent units to outside the building/hoarding. Direct-fired units are not acceptable.

2.6 FINISHING

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

.2 Use procedures acceptable to Contract Administrator and as noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.

.3 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.

.4 Saw cut crack-control joints to CAN/CSA-A23.1.

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

.6 Fill and patch honeycomb areas, rub form joint lines from all exposed concrete.

.7 Fill and patch form tie holes on exposed concrete.

.8 Where floor drains occur, finish floor slabs level around walls and pitched to drains minimum 6 mm in 3 metres.

.9 Provide steel trowelled, smooth, burnished finish where slabs to be left exposed or to receive carpeting, resilient flooring, floor paint or other applied floor finishes. Burnish to smooth, even finish without ridges, trowel marks, voids, or other imperfections that may transmit through flooring material.

.10 Provide screed, swirl-trowelled, or scratch finish where bonded topping, terrazzo, ceramic floor tile or other hard surface or bonded topping is to be applied. Provide depressions to accommodate bonded topping, terrazzo, etc.

.11 Provide broomed non-slip surface to exterior concrete paving, sidewalks, curbs, ramps, and stairs.

2.7 SURFACE TOLERANCE FOR HORIZONTAL SURFACES

.1 Concrete tolerances in accordance with CAN/CSA-A23.1 straight edge method. Measured within 72 hours of concrete placement, the gap at any point between a 3 metre long straight edge and the concrete surface shall not exceed requirements of the following classifications for areas specified:

.1 Conventional 12 mm: exterior slabs, sidewalks, and concrete paving.

.2 Moderately flat 8 mm: interior slabs and toppings.

2.8 CURING AND SEALING

.1 Cure concrete in accordance with CAN3-A23.1.

.2 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

.3 Do not use curing and sealing compounds on surfaces where bond is required for additional concrete, floor finishes or other surface coatings.

2.9 SIDEWALKS, CURBS AND PAVING

.1 Saw cut crack control joints where indicated but at no more than the following for:

.1 Sidewalks: 1.5 m on centre in both directions.

.2 Curbs: 4.5 m on centre.

.3 Paving: 4.5 m on centre in both directions.

.2 Provide expansion control joints where indicated but at not more than:

.1 Sidewalks: 9 m on centre in both directions.

.2 Curbs: 9 m on centre.

.3 Paving: 9 m on centre in both directions.

.3 Fill expansion control joints with premoulded joint filler and sealants in accordance with Section 07 90 00.

2.10 HOUSEKEEPING PADS

.1 Supply and install housekeeping pads for mechanical/electrical and other equipment as indicated on drawings.

.2 Refer to Mechanical and Electrical Drawings and Specifications and coordinate with respective trades for housekeeping pad sizes and locations.

.3 Refer to Structural Drawings for reinforcing for large pads.

.4 Provide tooled, slightly rounded edges around perimeter of all housekeeping pads.

2.11 DEFECTIVE CONCRETE

.1 Modify or replace concrete not conforming to lines, detail and elevations indicated on drawings.

.2 Repair or replace concrete not properly placed, resulting in excessive honeycombing and other defects in critical areas of stress.

.3 Do not patch, fill, touch-up, repair or replace exposed architectural concrete except upon expressed direction of the Contract Administrator for each individual area.

.4 Notify Contract Administrator of proposed methods of repairing or replacing defective concrete. Methods of repairing or replacing defective concrete shall be acceptable to the Contract Administrator.

2.12 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by an Independent Testing Laboratory appointed by the Contract Administrator. Refer to commercial specification for cost of testing.

.2 Inspection and testing of concrete and concrete materials shall be done in accordance with CAN/CSA-A23.1, and as specified below.

.3 Take three test cylinders from each 50 cubic metres of each class of concrete placed or for each day of concrete placement if the latter is less than 50 cubic metres. Testing shall be as follows:

.1 One (1) 7 day laboratory cured test.

.2 Two (2) 28 day laboratory cured tests.

.4 Take one additional test cylinder during cold weather concreting or if Sulphate resistance cement has been used. Cure cylinder on job site under same conditions as concrete that it represents.

.5 Make at least one slump test for each set of test cylinders taken.

.6 Cure concrete test cylinders in location designated by testing agency for a minimum of 48 hours prior to transporting to laboratory.

.7 Additional testing required due to low, inaccurate or otherwise questionable results shall be paid by the Contractor.

.8 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-25.20, Surface Sealer for Floors.

1.2 SUBMITTALS

.1 Submit drawings in accordance with E4.

.2 Product data: manufacture's product data sheets identifying material, performance characteristics, surface preparation, installation instructions.

.3 Submit WHMIS MSDS - Material Safety Data Sheets. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Temporary lighting: Minimum one 200 W light source, placed 2.5 m above floor surface, for each 40 m^2 of floor being treated.

.2 Work area: make the work area water tight protected against rain and detrimental weather conditions

.3 Temperature: maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.4 Moisture: Ensure substrate is within moisture limits prescribed by flooring material manufacturer.

.5 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.6 Ventilation:
- .1 Ventilate area of work by use of approved portable supply and exhaust fans.
- .2 Provide continuous ventilation during and after coating application.

Part 2 Products

2.1 MATERIALS

.1 Surface sealer: acrylic polymer water emulsion type, clear, to CAN/CGSB-25.20, Type 2 or ASTM-C309, Type 1.
- .1 Acceptable material: CPD Acrylic Floor Sealer (Water Emulsion); W.R. Meadows Sealtight Vocomp-20 Acrylic Curing & Sealing Compound; Sonneborne Kure-N-Seal WB; Sika Florseal WB.

.2 Surface sealers may not be manufactured or formulated with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead ,cadmium, hexavelant chromium and their compounds.

2.2 MIXES

.1 Mix sealers in accordance with manufacturer's instructions.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that slab substrate surfaces are ready to receive work.

3.2 PREPARATION OF EXISTING SLAB

.1 Remove surface materials before application of floor treatment (dust, dirt, curing compounds, dirt, grease, oil, etc.)

.2 Use mechanical stripping to remove chlorinated rubber or existing surface coatings.

.3 Use protective clothing, eye protection and respiratory equipment during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

.1 Ensure compatibility of floor treatment materials with adhesives of finished flooring materials and other bonded toppings or coatings prior to application.

.2 Do not apply floor sealer on floors scheduled for painting.

.3 Apply floor treatment in accordance with manufacturer's written instructions at recommended rates of application ensuring full coverage.

.4 Clean overspray. Clean sealer from adjacent surfaces.

3.4 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

3.5 SCHEDULE

.1 Apply floor sealer to concrete floors, except on floors to receive paint or finish flooring.

.2 Apply sealer to concrete housekeeping and equipment pads occurring within rooms receiving floor sealer.

END OF SECTION