Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA-A23.1-09 Concrete Materials and Methods of Concrete Construction
- .2 CAN/CSA-O86.1, Engineering Design in Wood (Limit States Design).
- .3 CSA O121, Douglas Fir Plywood.
- .4 CSA O151, Canadian Softwood Plywood.
- .5 CSA O437 Series 93(R2006), Standards for OSB and Waferboard.
- .6 CSA S269.1-[1975], Falsework for Construction Purposes.
- .7 CAN/CSA-S269.3-[M92], Concrete Formwork.
- .8 CAN/CSA-O325-07, Construction Sheathing

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings for formwork and falsework.

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

.3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. [Comply with CSA S269.1, for falsework drawings and comply with CAN/CSA-S269.3 for formwork drawings.

.4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

Part 2 Products

.1 Formwork materials:

- .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series and CSA-O153.
- .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.

.2 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.

- .1 Spiral pattern not to show in hardened concrete.

.3 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.

.2 For architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:

.1 Plywood: Douglas Fir to CSA O121, 19 mm thick.

.5 Form release agent: non-toxic, biodegradable, maximum VOC content: 350 g/L (less water)

.6 Concrete Sealant: to Section 07 92 00 – Joint Sealants.

.7 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Fabricate and erect falsework in accordance with CSA S269.1.

.2 Refer to drawings for concrete members requiring architectural exposed finishes.

.3 Do not place shores and mud sills on frozen ground.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 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 CSA-A23.1/A23.2.

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

.7 Use 1-inch chamfer strips on external corners and 1-inch fillets at interior corners, joints, unless specified otherwise.

.8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.9 Construct forms for architectural concrete, and place ties [as indicated] [and] [as directed].

.1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place until concrete has reached sufficient strength to carry dead loads and all possible construction loads liable to be imposed upon it.

.2 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.3 Space reshoring in each principal direction at not more than 8’ apart.

.4 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A82/A82M-[07], Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A143/A143M-[07], Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A185/A185M-[07], Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.4 ASTM A775/A775M-[07b], Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 CSA International

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

.2 CAN/CSA-A23.3, Design of Concrete Structures.

.3 CSA-G30.18, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186-[M1990(R2007)], Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.2 MEASUREMENT PROCEDURES

.1 Measure reinforcing steel in tonnes of steel incorporated into Work, computed from theoretical unit mass specified in CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Contract Administrator.

.1 These unit prices will only cover supplemental reinforcing steel in concrete repair areas or as designated by the Contract Administrator. All other reinforcing steel costs must be included in the fixed price portions of the work to which they correspond.

.2 Dowels will be measured individually and will include dowel drilling, cleaning, preparation, epoxy supply and placement, and bar insertion, but excluding steel costs which will be covered by the rate per kilogram unit prices. The Contract Administrator and the Contractor will count and agree upon the numbers and lengths of bars as well as the number of bar embedments. These agreed upon number will form the basis for payment.

.3 No measurement will be made under this Section.

.1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

1.3 SUBMITTALS

.1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba including placing of reinforcement in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba.

.1 Indicate placing of reinforcement and:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Contract Administrator, with identifying code marks to permit correct placement without reference to structural drawings.

.5 Indicate sizes, spacings and locations of chairs, spacers and hangers.

.4 Detail lap lengths and bar development lengths to CSA-A23.3, unless indicated otherwise.

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 off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

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

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18 M grade 400R deformed bars except column ties and beam stirrups which shall be grade 400W..

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M. All tie wires to be non-corroding or epoxy coated.

.5 Welded steel wire fabric: to ASTM A185/A185M. Provide in flat sheets only.

.6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

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

.8 Plain round bars: to CAN/CSA- G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

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

.3 Upon approval of the 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.

2.3 SOURCE QUALITY CONTROL

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

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 slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.

.3 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.4 When paint is dry, apply thick even film of mineral lubricating grease.

.5 Prior to placing concrete, obtain Contract Administrator's approval of reinforcing material and placement.

.6 Ensure cover to reinforcement is maintained during concrete pour.

3.3 DOWELING PROCEDURES

.1 For bars that are indicated as being dowelled, drill in and grout bars into slab as follows:

.1 10M bars, 6 inches

.2 15M bars, 8 inches

.3 20M bars, 12 inches

.2 Use only approved adhesive to manufacturer’s instructions. Acceptable product:

.1 Hilti HIT HY-200 by Hilti Canada.

.2 Sikadur AnchorFix 4CA by Sika Canada Inc.

.3 Clean hole thoroughly prior to application of adhesive. Use injection or caulking gun to ensure that the adhesive fills the bottom of the hole prior to embedment of bar.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)

.3 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.2 American Concrete Institute (ACI)

.1 ACI 309R-96, Guide for the Consolidation of Concrete.

.3 American Society for Testing and Materials International (ASTM)

.1 ASTM C260/C260M-10a, Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-07, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-10a Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C928/C928M-09, Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

1.2 MEASUREMENT PROCEDURES

.1 No measurement will be made under this section for cast-in-place concrete curbs and pavement.

.2 Include all costs for concrete required for concrete repairs in appropriate unit prices.

1.3 CERTIFICATES

.1 Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.

.2 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. Certification letter to be sealed by an engineer registered in the Province of Manitoba.

.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1. Certification letter to be sealed by an engineer registered in the Province of Manitoba.

1.4 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Contract Administrator on following items:

- .1 Falsework erection.
- .2 Hot weather concrete.
- .3 Cold weather concrete.
- .4 Curing.
- .5 Finishes.
- .6 Formwork removal.
- .7 Joints.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Carefully coordinate the specified concrete work with weather conditions.

.4 Ensure emptied containers are sealed and stored safely for disposal away from children.

.5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, provincial and national regulations.

.6 Choose least harmful, appropriate cleaning method which will perform adequately.

1.6 ABBREVIATIONS

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

- .1 Type GU or GUb - General use cement.
- .2 Type CI - with CaO content ranging from 8 to 20%.

.2 SCM – Supplemental cementing materials.

.3 SSD - Saturated surface dry.

.4 WRA – Water reducing agent.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

- .1 Modifications to maximum time limit must be agreed to by the Contract Administrator and concrete producer as described in CSA A23.1/A23.2.
- .2 Deviations to be submitted for review by the Contract Administrator.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

Part 2 Products

2.1 MATERIALS

.1 The concrete constituents shall comply with the following standards:

.1 Cement: to CAN/CSA-A3001.

.2 Blended Hydraulic cement: to CAN/CSA-A3001.

.3 Supplementary cementing materials: to CAN/CSA-A3001.

.4 Water: To CSA-A23.1.

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

.6 Air entraining admixture: ASTM C260.

.7 Chemical admixtures: ASTM C494/C494M. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather.

2.2 MIXES

.1 Concrete to be mixed, delivered and placed in accordance with CSA A23.1.

.2 Concrete to be batched and mixed at a ready mix plant and delivered to site in ready to place form.

.3 Control of slump on the job site to be in accordance with CSA-A23.1 except as otherwise specified below:

.1 The addition of water to increase slump is strictly prohibited unless prior written permission from concrete supplier is obtained.

.2 The use of WRA may be required to aid in placement of the concrete and obtain adequate consolidation in heavily reinforced sections.

.3 WRA addition shall occur at the batch plant or on site. For site addition, concrete supplier to provide written notice minimum 2 weeks prior to commencement of concrete work, indicating recommended dosages based on slump at point of discharge.

.4 Site addition WRA will be the responsibility of the concrete supplier.

.5 Slump and air must be measured both before and after addition of WRA.

2.3 BONDING SLURRY

.1 The bonding slurry shall consist of a cement/sand grout mixed in a 1:1 ratio by weight to a maximum water/cement ratio of 0.40 in accordance with CSA-A23.1 and as follows:

.1 1.0 kg Type GU to CSA A3001.

.2 1.0 kg SSD concrete sand to CSA A23.1.

.3 0.40 kg Water to CSA A23.1.

.4 High range water reducing agent to ASTM C494/C494M as required and approved by Contract Administrator.

.5 Volume batching will be permitted provided the volumes are calibrated by weight prior to batching. The measuring containers shall be clearly labelled, indicating material type, calibrated weight of material, and calibrated volume. The Contract Administrator reserves the right to randomly check batch weights.

.6 Shovel batching is strictly prohibited.

.2 Alternative Method: Plastic concrete from same mix utilized for overlying concrete. Scrub plastic concrete. Scrub plastic concrete into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8" over entire area. Collect and remove all coarse aggregate prior to placement of the overlay.

2.4 ACCESSORIES

.1 Evaporation retardant: Acceptable Product:

.1 MasterKure ER 50, formerly (Confilm) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.2 Cure and sealing compound: to ASTM C309, Type 1. Acceptable product(s):

.1 Florseal WB by Sika Canada Inc. at a minimum application rate of 4.9 m²/L.

.2 MasterKure CC, formerly (Kure-N-Seal) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.3 Vapour Barrier: 10 mil polyethylene film to CAN/CGSB-51.34.

2.5 GRANULAR BASE

.1 Comply with Section 31 05 16 - Aggregate Material.

Part 3 Execution

3.1 PREPARATION

.1 Obtain Contract Administrator's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.

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

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

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

.5 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and epoxy grout to anchor and hold dowels in positions as indicated. Refer to Section 03 20 00.

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

.7 Provide formwork and falsework to Section 03 10 00 - Concrete Forms and Accessories.

.8 Place reinforcing steel and install dowels to Section 03 20 00 - Concrete Reinforcement. Provide dowels at locations shown on the drawings.

.9 Obtain Contract Administrators approval before placing concrete. Provide 24 hours notice prior to placing of concrete.

.10 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather. Protection and curing must comply with the hot weather and cold weather requirements of CSA-A23.1.

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

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

.13 Provide temporary bridging as required to permit access to all areas during placement, finishing and curing.

.14 Do not place concrete until screed rails for hand operated strike-off devices are in place and firmly secured.

.1 Rails to be of type, and so installed, that no springing or deflection will occur due to weight of finishing equipment.

.2 Set rails or headers to elevations to produce deck true to required grade and cross section.

.3 Use polyethylene film or plastic coated tape if necessary to prevent concrete from bonding to rails.

.4 Do not treat rails with release agents or parting compounds.

.5 Subject to approval of the Contract Administrator, screed rail anchors which remain in the concrete may be used provided they are non-corroding and sit a minimum of 30 mm below the finished surface of the concrete.

3.2 INSTALLATION/APPLICATION

.1 Place concrete work in accordance with CSA-A23.1.

.2 Concrete shall be transported to placement location by pump or trolley. Note that regard to load limitations on the deck must be maintained to avoid overstressing the structural members.

.3 When concrete is placed by pump, the initial slurry used to prime the pump shall not be incorporated into the topping. The slurry shall be trapped and disposed off-site.

.4 Ensure high points and slopes to drains as shown on drawings are maintained.

.5 Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur. Install a construction dam or bulkhead in case of a delay longer than 60 minutes. During delays between 5 and 60 minutes, protect the end of the placement with damp burlap.

.6 Protect freshly placed concrete from exposure to dust, debris and precipitation.

.7 Sleeves and inserts.

.1 No sleeves, ducts, pipes or other openings shall pass through concrete members except where indicated or approved by Contract Administrator.

.2 Electrical conduits, junction and fixture boxes shall not be embedded within concrete members.

.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Contract Administrator.

.4 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.

.5 Check locations and sizes of sleeves and openings shown on drawings.

.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.8 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 100 mm diameter. Drilled holes to be to manufacturers' 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.

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

.10 Joint fillers.

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by The 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 expansion joints as indicated. Install joint filler.

.11 Cold Weather Concrete

.1 The following are 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, all ice, snow and frost shall be completely removed from all formwork, reinforcing and other surfaces shall be raised above 10°C for 24 hours minimum prior to concreting. 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 Concrete aggregates and water shall be heated to not over 80°C.

.4 Concrete shall not be less than nor more than 30°C in temperature when deposited.

.5 Concrete when placed during freezing weather (or if freezing is anticipated during curing period) shall be fully enclosed and the temperature of same maintained at 18°C for the first three days and 10°C for the next three days.

.6 Provide adequate heating to attain specified concrete strengths required prior to stripping, or provide concrete mix which will meet specified stripping strengths under reduced curing temperatures.

.7 Keep protecting covering clear of concrete and form surfaces to permit full circulation of air, and maintain intact for at least 24 hours after artificial heat is discontinued.

.8 Heating enclosures: strong and windproof, but well ventilated. Heating units located as to prevent local overheating, drying of concrete, and damage from combustion gases. Only Herman Nelson heat exchange, fuel oil type heaters will be acceptable for slabs and flat areas. Units must be vented outside the building. No direct fired units will be acceptable.

.12 Hot Weather Concrete

.1 All concreting operations during hot weather in accordance with CAN/CSA-23.1.

.2 Exercise particular care to prevent surface crazing of floor slabs due to combined high temperature and drying winds.

.3 Use of water reducing-retarding chemical admixture in the concrete mix may be required at the The Contract Administrator's discretion.

.13 Abrasive Nosings: Install abrasive nosings with anchors fully embedded in concrete. Centre nosings on tread width at exterior concrete stairs. Install before initial set of concrete fill unless noted otherwise.

3.3 FINISHING HORIZONTAL SURFACES

.1 Finish concrete in accordance with CAN/CSA-A23.1/A23.2.

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

.3 It is imperative that finishing be completed before surface of concrete dries, otherwise extensive cracking will result. Follow CPCA and CSA-A23.1 procedures and recommendations.

.4 Ensure uniform, level surface is obtained.

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

3.4 JOINTS

.1 Install control joints at locations shown on the drawings. Joints shall correspond to location of slip dowels.

.2 Location of control and construction joints:

.1 Concrete pavements: As shown on Drawings.

.2 Other flatwork not shown on drawings: not more than 15' on-centre and matching joints in adjacent work.

.3 Control joints in upstand walls and curbs to be formed matching joints in adjacent work (no more that 15' on-centre) and using a 1/2" x 1/2" form strip on each face. Tool in joints along top surface corresponding to form strips.

.3 Control joints and construction joints shall be formed or tooled at locations shown. Refer to Drawings for paving patterns and joint locations.

.1 All joints to be sawcut via specialized dry-process cutting.

.1 Sawcut to a minimum of one 1.5" or one-quarter of the depth of the slab, whichever is greater, following initial set of concrete.

.2 Timing of the saw cutting will vary with weather conditions however are typically completed within 1 to 4 hours after final finishing. Timing of the saw cutting will be the responsibility of the Contractor. Sawcutting 24 hours following placement will not be permitted.

.4 Where paving abuts curbs, walls and other vertical surfaces use 12 mm asphalt impregnated fibre board.

.5 Unless otherwise indicated, all control and construction joints to be filled with a flexible joint sealant in accordance with 07 92 00.

3.5 CURING

.1 Cure and protect concrete in accordance with requirements CSA A23.1.

.2 Concrete surfaces to be cured at a minimum temperature of 10°C for the entire curing period.

.3 Curing methods shall be in accordance with CSA A23.1 unless otherwise indicated.

.1 Basic curing methods shall consist of one of the following:

.1 polyethylene sheet;

.2 forms in contact with concrete surface; or

.3 curing compounds to ASTM C309 at manufacturer's specified applications rates, when approved by Contract Administrator.

.2 Requirements for wet-curing:

.1 Immediately after final finishing, protect exposed surface against plastic shrinkage by means of a fog spray and/or evaporation reducer, until the concrete has enough strength to support the placement of the wetted burlap. When an evaporation reducer is used, intermittent reapplication may be required if the film evaporates before initiation of the wet cure.

.2 Burlap to be thoroughly presoaked by immersing it in water for a period of at least 24 hours immediately prior to placement.

.3 Commence wet curing with burlap and water as soon as the surface will support the weight of the wetted burlap without deformation. Burlap to be applied in one layer with strips overlapping at least 75 mm and be securely held in place without marring the concrete surface.

.4 Wet curing with burlap and water must be maintained for the periods indicated. Periodic rewetting by means of a soaker hoses, sprinklers, or other suitable methods approved by the Contract Administrator may be necessary.

.4 Unless noted otherwise the curing regime shall be consistent with the Class of Exposure. Refer to related sections for curing of concrete repair materials.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CSA-A23.1 and Section 01450 - Quality Control and as described herein.

.1 Testing laboratory to be certified in accordance with CSA A283.

.2 The Contractor will pay for costs of tests via the testing cash allowance as per Section 01210 - Allowances.

.3 Frequency and Number of Tests:

.1 Not less than one strength test per 50 m^3 of concrete placed and not less than one test for each class of concrete placed on any one day.

.2 Slump and air measurements will be completed on each of the initial 3 loads of concrete per day of casting to ensure satisfactory control of the air content is established. If adequate control of air content is not established within the first 3 loads of concrete or if a test falls outside the specified limits, the testing frequency shall revert to one test per load until satisfactory control is re-established. Costs for additional testing will be the responsibility of the concrete supplier.

.4 Contract Administrator may take additional test cylinders during cold weather concreting or when concrete quality is suspect. Cure cylinders on job site under same conditions as concrete which they represent.

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

.6 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve contractual responsibility.

3.7 DEFECTIVE CONCRETE

.1 Defective concrete: cracking, spalling, scaling and concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.

.2 Repair or replacement of defective concrete will be determined by the Contract Administrator, based on the specifications and the above guidelines.

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

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

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

.6 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.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Concrete hardener and sealing compounds.

1.2 RELATED SECTIONS

.1 Structural Specifications

1.3 REFERENCES

.1 A23.1-09/A23.2-09 - Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on materials and application requirements.

.3 Submit Material Safety Data Sheet (MSDS) for products provided.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Manufacturer's Application Data: Indicate special procedures, conditions requiring special attention, and other details.

.3 Test Reports: Submit substantiating data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data prior to application of Work.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

.2 Applicator Qualifications: Company specializing in performing the work of this section with minimum two (2) years documented experience and approved by the manufacturer.

.3 Materials:

.1 As per Part 2 of this specification section

.2 Not to affect bonding capability of other materials applied to substrate.

.4 Provide materials of this section from single manufacturer.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Store containers to manufacturer's written instructions.

.3 Protect materials from freezing, at temperature recommended by manufacturer.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Maintain ambient temperatures to manufacturer's written instructions.

1.10 ENVIRONMENTAL CONTROL

.1 Refer to Material Safety Data Sheet for information related to product contact with skin and eyes.

Part 2 Products

2.1 MANUFACTURERS

.1 Hardener: Sika Coloplete Surface Hardener.

.2 Sealer: Sika FlorSeal WB 18.

.3 Substitutions: Approved Equal approved by Contract Administrator in writing.

2.2 MATERIALS

.1 Water: Potable.

.2 Hardener: Sika Colorplete, mineral surface hardener, pigmented to Contract Administrator's written instructions.

.1 Standard of Acceptance:

.1 CPD; Product: Floor Hardener Pre-Mix (premium).

.3 Sealant: clear, acrylic emulsion cure and seal.

.1 Standard of Acceptance:

.1 CPD; Product: Acrylic Cure and Seal WB.

Part 3 Execution

3.1 EXAMINATION

.1 Ensure surfaces are clean, dry and free of contaminants.

.2 Ensure new concrete has cured to details specified in manufacturer's written instructions.

.3 Ensure ambient temperature meets manufacturer's written requirements.

.4 Apply sealer only after the disappearance of all surface moisture.

.5 Do not apply material if rain is predicted within six (6) hours after application to exterior/exposed surfaces.

3.2 PREPARATION

.1 Surfaces must be clean, dry and free of all loose dirt, oil, wax, sealer, curing and parting compounds, and other foreign matter. Clean substrate surfaces to manufacturer's written instructions.

.2 Perform application on minimum 0.85 sq m (9 sq ft) test section; obtain approval of test section from Contract Administrator before proceeding with application.

.3 Stir sealer well prior to use, ensuring thorough agitation and distribution of any settled material throughout the liquid; prepare in accordance with manufacturer’s written instructions.

.4 Do not dilute or alter the product in any way.

3.3 INSTALLATION

.1 Install membrane and tape seal to manufacturer's written instructions.

.2 Protect adjacent work from spillage and overspray. Remove overspray on adjacent surfaces immediately before dry.

.3 Apply materials where indicated and allow to cure according to manufacturer's written instructions.

.4 Do not dilute or mix materials with other products.

.5 Apply products in even coats in accordance with manufacturer’s written instructions.

.6 Do not apply to surfaces that are restricted by product manufacturer.

.7 Clean substrate and equipment with potable water.

.8 Hardener:

.1 Apply in accordance with manufacturer's recommendations and technical instructions. It is critical that the hardener be provided at the appropriate time.

.2 Apply in 2 or 3 broadcasts, float each broadcast promptly using power equipment.

.3 If a coarse non-slip finish is specified by Contract Administrator, do not proceed with further floating or troweling operations after second floating, but allow the surface to cure.

.4 Avoid excessive floating.

.5 Ensure the broadcast application is completely wetted and incorporated into the base slab.

.9 Sealer:

.1 Apply Sealer as soon as final trowelling is completed and applicator and equipment cannot damage the surface, apply as per manufacturer's written instructions.

.2 Wait a minimum of 72 hours after concrete placement to apply sealer.

.3 Apply uniformly to form a continuous film.

.4 Protect the finished surface from damage by traffic or trades until sufficiently hardened.

3.4 SCHEDULE

.1 Supply and install hardener and sealer to concrete slab in all areas with a final floor finish of exposed concrete, unless noted otherwise on Room Finish Schedule.

.2 Refer to Room Finish Schedule

END OF SECTION