

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 – Cast-in-Place Concrete.
- .3 Section 03 30 01 – Site Works CIP Concrete.
- .4 Section 03 35 00 – Concrete Finishing.
- .5 Section 03 48 16 – Precast Concrete Splash Blocks

1.2 REFERENCES

- .1 All references to be the latest edition as of the date indicated on the specifications.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86, Engineering Design in Wood.
 - .3 CSA O121, Douglas Fir Plywood.
 - .4 CSA O151, Canadian Softwood Plywood.
 - .5 CSA O153, Poplar Plywood.
 - .6 CAN/CSA-O325.0, Construction Sheathing.
 - .7 CSA O437 Series, Standards for OSB and Waferboard.
 - .8 CSA S269.1, Falsework for Construction Purposes.
 - .9 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 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 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 20 - LEED Sustainable Requirements and Section 01 74 19 - Waste Management and Disposal.
- .4 Co-ordinate submittal requirements and provide submittals required by Section 01 35 20 - LEED Sustainable Requirements.
- .5 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 with CAN/CSA-S269.3 for formwork drawings.
- .6 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

- .7 Indicate sequence of erection and removal of formwork/falsework as directed by the Contract Administrator.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 35 20 – LEED Sustainable Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate wood materials, plastic materials and waste materials for reuse and/or recycling in accordance with Section 01 35 20 - LEED Sustainable Requirements and Section 01 74 19 - Waste Management and Disposal.
 - .2 Place materials defined as hazardous or toxic in designated containers.
 - .3 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Contract Administrator.

Part 2 Products

2.1 MATERIALS

- .1 Materials and resources in accordance with Section 01 35 20 - LEED Sustainable Requirements.
- .2 Do verification requirements in accordance Section 01 35 20 - LEED Sustainable Requirements.
- .3 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.
 - .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
 - .3 Rigid insulation board: to CAN/ULC-S701.
- .4 Void Form: Cardboard type by SureVoid or approved equal in accordance with B7:
 - .1 Structural Slab: SlabVoid by SureVoid or approved equal in accordance with B7.
 - .2 Grade Beams and Walls: WallVoid by SureVoid or approved equal in accordance with B7.
- .5 Pan forms: steel as indicated on the drawings.
- .6 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.
 - .1 Spiral pattern to show in hardened concrete.
- .7 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.
- .8 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121.
 - .2 Waferboard: to CAN/CSA-O325.0.

- .9 Form release agent: non-toxic, biodegradable, low VOC.
- .10 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC.
- .11 Falsework materials: to CSA-S269.1.
- .12 Sealant: to Section 07 92 00 - Joint Sealants.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Contract Administrator's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1.
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 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.
- .9 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .10 Use 25 mm chamfer strips on external corners unless specified otherwise.
- .11 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .12 Construct forms for architectural concrete, and place ties as directed.
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .13 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.
- .14 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Remove formwork when concrete has reached 75% of its design compressive strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .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 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Formwork and Accessories.
- .2 Section 03 30 00 – Cast-in-Place Concrete.
- .3 Section 03 30 01 – Site Works CIP Concrete
- .4 Section 03 35 00 – Concrete Finishing.
- .5 Section 03 48 16 – Precast Concrete Splash Blocks

1.2 REFERENCES

- .1 All references to be the latest edition as of the date indicated on the specifications.
- .2 American Concrete Institute (ACI)
 - .1 SP-66, ACI Detailing Manual 2004.
- .3 ASTM International
 - .1 ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - .3 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .4 ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4 CSA International
 - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .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, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .5 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC, Reinforcing Steel Manual of Standard Practice.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.
- .3 Shop Drawings:

- .1 Submit drawings stamped and signed by Professional Engineer registered or licensed in Province of Manitoba, Canada.
 - .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.
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

1.4 QUALITY ASSURANCE

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
 - .1 Mill Test Report: provide Contract Administrator with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Submit in writing to Contract Administrator proposed source of reinforcement material to be supplied.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .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 the ground, in dry a location and in accordance with manufacturer's written instruction.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan and Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 35 20 LEED Sustainable Requirements.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Contract Administrator.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
- .4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .5 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.

- .6 Welded steel wire fabric: to ASTM A185/A185M.
 - .1 Provide in flat sheets only.
- .7 Welded deformed steel wire fabric: to ASTM A82/A82M.
 - .1 Provide in flat sheets only.
- .8 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .9 Mechanical splices: subject to approval of Contract Administrator.
- .10 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Contract Administrator's written approval for locations of reinforcement splices other than those 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.

2.3 SOURCE QUALITY CONTROL

- .1 Provide Contract Administrator with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .2 Inform 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 reviewed placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Use plain round bars as slip dowels in concrete.
 - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
 - .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 Prior to placing concrete, obtain Contract Administrator approval of reinforcing material and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Separate wood materials, plastic materials and waste materials for reuse and/or recycling in accordance with Section 01 35 20 - LEED Sustainable Requirements and Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 – Concrete Formwork and Accessories.
- .2 Section 03 20 00 – Concrete Reinforcing.
- .3 Section 03 30 01 – Site Works CIP Concrete
- .4 Section 03 35 00 – Concrete Finishing
- .5 Section 03 48 16 – Precast Concrete Splash Blocks

1.2 REFERENCES

- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
 - .1 Type GU, GUb and GUL - General use cement.
 - .2 Type MS and MSb - Moderate sulphate-resistant cement.
 - .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
 - .4 Type HE, HEb and HEL - High early-strength cement.
 - .5 Type LH, LHb and LHL - Low heat of hydration cement.
 - .6 Type HS and HSb - High sulphate-resistant cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 15%.
 - .2 Type CI - with CaO content ranging from 15 to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.
- .2 All references to be the latest edition as of the date indicated on the specifications.
- .3 Reference Standards:
 - .1 ASTM International
 - .1 ASTM C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .5 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .6 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .7 ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

- .8 ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum).
- .4 CSA International
 - .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings: in accordance with Section 01 32 16 - Construction Progress Schedules, convene pre-installation meeting one week prior to beginning concrete works.
 - .1 Ensure key personnel, site supervisor, Contract Administrator, speciality contractor - finishing, forming, concrete producer and testing laboratories attend.
 - .1 Verify project requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, provide Contract Administrator with Product Data Sheets (PDS) of materials proposed for use as follows:
 - .1 curing compound.
 - .2 each type of joint filler.
 - .3 each type of waterstops.
 - .4 each type of supplementary cementing material.
 - .5 each type of blended hydraulic cement.
 - .6 each admixture.
 - .7 each fine and coarse aggregate.
- .3 Provide testing, inspection results and reports for review by Contract Administrator and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .5 Concrete hauling time: provide for review by Contract Administrator deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

- .6 Sustainable Design Submittals:
 - .1 Submittals: in accordance with Section 01 35 20 - LEED Sustainable Requirements.
- .7 Provide two copies of WHMIS MSDS in accordance with Section 01 35 20 - LEED Sustainable Requirements and Section 01 74 19 - Waste Management and Disposal.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Provide Contract Administrator, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Minimum 4 weeks prior to starting concrete work, provide 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.
- .4 Quality Control Plan: provide written report to Contract Administrator verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.
- .5 Sustainability Standards Certification:
- .6 Construction Waste Management: Develop Construction Waste Management Plan and Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 35 20 LEED Sustainable Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
 - .1 Do not modify maximum time limit without receipt of prior written agreement from Contract Administrator and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Contract Administrator.
 - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 35 20 - LEED Sustainable Requirements and Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Contract Administrator and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

- .1 Portland Cement: to CSA A3001, Type GU or HS as specified on the drawings.
 - .1 Recycled content: in accordance with Section 01 35 20 – LEED Sustainable Requirements.
- .2 Supplementary cementing materials: to CSA A3001.
- .3 Water: to CSA A23.1.
- .4 Aggregates: to CSA A23.1/A23.2.
- .5 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494 and ASTM C1017. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .6 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 56 MPa at 28 days.
- .7 Non premixed dry pack grout: composition of non metallic aggregate, Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 56 MPa at 28 days.
- .8 Curing compound: to CSA A23.1/A23.2.
- .9 Mechanical waterstops: ribbed extruded PVC of sizes indicated with prewelded corner and intersecting pieces:
 - .1 Tensile strength: to ASTM D412.
 - .2 Elongation: to ASTM D412.
 - .3 Tear resistance: to ASTM D624.
- .10 Premoulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D1751.
- .11 Weep hole tubes: galvanized steel.
- .12 Polyethylene film: 0.15 mm thickness to CAN/CGSB-51.34.

2.4 MIXES

- .1 Performance Method for specifying concrete: to meet Contract Administrator performance criteria to CSA A23.1/A23.2.

- .1 Ensure concrete supplier meets performance criteria for the concrete mixes specified on the drawings and provide verification of compliance as in Quality Control Plan.
- .2 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .3 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Contract Administrator's written approval before placing concrete.
 - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after approval of equipment, mix and placing procedures.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 Do not place load upon new concrete until authorized by Contract Administrator.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to 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.
 - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Contract Administrator.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Contract Administrator before placing of concrete.
 - .5 Confirm 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.
- .3 Anchor bolts:
 - .1 Set anchor bolts to templates in co-ordination with appropriate trade and reviewed shop drawings prior to placing concrete.
 - .2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
- .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 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .6 Finishing and curing:
 - .1 Finish concrete to CSA A23.1/A23.2.
 - .2 Use procedures as reviewed by Contract Administrator or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
 - .4 Finish concrete floor to CSA A23.1/A23.2. Class A.
 - .5 Provide swirl-trowelled finish unless otherwise indicated.
 - .6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.
- .7 Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Do not displace reinforcement when installing waterstops.
 - .4 Use equipment to manufacturer's requirements to field splice waterstops.
 - .5 Tie waterstops rigidly in place.
 - .6 Use only straight heat sealed butt joints in field.
 - .7 Use factory welded corners and intersections unless otherwise approved by Contract Administrator.
- .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.
 - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction and expansion joints as indicated.
 - .4 Install joint filler.
 - .5 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.
- .4 Use patching material at least 150 mm larger than puncture and seal.

3.3 SURFACE TOLERANCE

- .1 Concrete tolerance to CSA A23.1 Straightedge Method for Class A floor finish.

3.4 FIELD QUALITY CONTROL

- .1 Site tests: conduct tests as follows and in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .1 Concrete pours.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at (7 and 28) or (7 and 56) days as specified in the mix design.
 - .5 Air and concrete temperature.
- .2 Inspection and testing of concrete and concrete materials will be carried out by an independent testing laboratory approved by Contract Administrator.
 - .1 Ensure testing laboratory is certified to CSA A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Contract Administrator.
- .4 Pay for costs of tests as specified in Section 01 29 83 - Payment Procedures and Laboratory Testing.
- .5 Contractor to take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .6 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
- .7 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.
- .8 Type, quantity and frequency of testing to be in accordance with CAN/CSA A23.1/A23.2.

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: Separate wood materials, plastic materials and waste materials for reuse and/or recycling in accordance with Section 01 35 20 - LEED Sustainable Requirements and Section 01 74 19 - Waste Management and Disposal.
 - .1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Contract Administrator.
 - .2 Provide appropriate area on job site where concrete trucks and be safely washed.
 - .3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Contract Administrator.

- .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .5 Prevent admixtures and additive materials from entering drinking water supplies or streams.
- .6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.
- .7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

PART 1 General

1.1 WORK COVERED BY THIS SECTION

- .1 This section covers the manufacture, transport, placement, finishing, curing, and all related aspects of the supply and installation of exterior site works cast-in-place concrete.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
 - .2 CSA-A23.2-04, Methods of Test for Concrete.
 - .3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.
 - .4 CSA G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel.
- .2 American Concrete Institute (ACI)
 - .1 ACI 302.1R-04, Guide for Concrete Floor and Slab Construction.
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A775/A775M-07b, Specification for Epoxy-Coated Reinforcing Steel Bars.
 - .3 ASTM C309-07, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C920-05 Standard Specification for Elastomeric Joint Sealants.
 - .5 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft lbf/ft³) (600kN m/m³).

1.3 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.
- .2 Modifications to maximum time limit must be agreed to Contract Administrator and concrete producer as described in CSA A23.1/A23.2.
- .3 Deviations to be submitted for review by Contract Administrator.
- .4 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 Hydraulic 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. The use of chloride containing admixtures is strictly forbidden.
- .7 Admixtures: to CSA-A23.1.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA G30.18, unless indicated otherwise.
- .3 Epoxy coating of non pre-stressed reinforcement: to ASTM A775/A775M.
- .4 Cold drawn annealed steel wire ties: to ASTM A82.
- .5 Plain round bars: to CSA G40.21.

2.2 CONCRETE MIX

- .1 Proportion normal density concrete in accordance with CSA-A23.1, Table 5, Alternative 1 to give following properties for all concrete.
 - .1 Concrete Headers, Curbing, Retaining Walls and Site Lighting Foundations.
 - .1 Class of exposure: C-2
 - .2 Minimum compressive strength at 28 days: 32 MPa.
 - .3 Air category: 1 (5% to 8%)
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Water-to-cementing materials ratio: 0.45 max.
 - .6 Proportion of SCMs: maximum 20% replacement.
 - .7 Cement: Type HS or HSb

2.3 ACCESSORIES

- .1 Evaporation retardant: Acceptable Product:
 - .1 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 Kure-N-Seal by BASF Building Systems at a minimum application rate of 4.9 m²/L.

2.4 GRANULAR BASE

- .1 Base Course Material: to CW3110-Sub-Grade, Sub-Base and Base Course Construction.
 - .1 Base course material will consist of sound, hard, crushed rock or crushed gravel and will be free from organic or soft material that would disintegrate through decay or weathering.

2.5 JOINT SEALANTS

- .1 One-component silicone joint sealant to ASTM C920, Type S, Grade NS, Class 100/25, Use T, A, M, and O.

- .1 Acceptable product: NS Parking Structure Sealant by Dow Corning Inc. Colour to match natural concrete.

PART 3 Execution

3.1 REINFORCEMENT

- .1 Field Bending: Do not field bend reinforcement.
- .2 Placing Reinforcement:
 - .1 Place reinforcing steel as indicated on drawings and in accordance with CAN/CSA A23.1.
 - .2 Use epoxy-coated round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
 - .3 Ensure cover to reinforcement is maintained during concrete pour.
- .3 Touch up damaged and cut ends of epoxy coated reinforcing steel with compatible finish to provide continuous coating.
- .4 For bars that are indicated as being dowelled in, drill in and epoxy grout bars into slab using epoxy gel to manufacturer's instructions.
 - .1 Acceptable product: Sikadur AnchorFix 3CA/4CA by Sika Canada Inc.
 - .2 Dowel embedment lengths as follows:
 - .1 10M bars – 150 mm.
 - .2 15M bars – 200 mm.
 - .3 Clean hole thoroughly prior to application of epoxy. Use injection or caulking gun to ensure that the epoxy fills the bottom of the hole prior to embedment of bar.

3.2 PREPARATION

- .1 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .2 Obtain Contract Administrator's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .3 Protection and curing must comply with the hot weather and cold weather requirements of CSA-A23.1.
- .4 Maintain accurate records of poured concrete items to indicate date, time and location of pour.

3.3 MIX PRODUCTION

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

3.4 PLACEMENT

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

3.5 FINISHING

- .1 Finish concrete in accordance with CSA-A23.1/A23.2.
- .2 Immediately after final finishing, apply evaporation retardant at indicated coverage rate. Evaporation retardant is not to be applied during finishing operations nor should it be worked into the surface.
- .3 Unless otherwise indicated, round edges of formed joints in pavements with a 10 mm (3/8") radius edging tool.
- .4 Continuously consolidate and finish to specified elevations, ensuring thickness and required elevations are maintained.
- .5 Immediately after concrete has been placed and consolidated, bull-float slab surface to a smooth, uniform surface.
- .6 Finished surface should be free of all trowel marks and ridges. Provide a non-slip, broomed finish perpendicular to the direction of traffic.

3.6 JOINTS

- .1 Install control joints at locations shown on the drawings. Joints shall correspond to location of slip dowels.
- .2 Unless otherwise indicated on drawings, space control joints in concrete headers and curbing at not more than 3 m on-centre. Joint locations to match adjacent work.
- .3 Control joints and construction joints shall be formed or tooled at locations shown. Alternatively, joints may be sawcut via specialized dry-process cutting (ie. Soff Cut).
 - .1 Sawcut to a minimum of 38 mm (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.
 - .3 Sawcutting 24 hours following placement will not be permitted.
- .4 Where paving abuts curbs, walls and other vertical surfaces use 12 mm (1/2") asphalt impregnated fibre board.
- .5 Unless otherwise indicated, all control and construction joints to be filled with a flexible joint sealant.
- .6 Upon minimum 28 day cure, re-cut joints to 10 mm (3/8") wide by 6 mm (1/4") mm deep. Prepare surface and infill with sealant as follows.

3.7 CURING

- .1 Cure and protect concrete in accordance with requirements CSA A23.1.
- .2 Curing methods shall be in accordance with CSA A23.1 unless otherwise indicated apply curing and sealing compound to ASTM C309 at indicated applications rates.
 - .1 7d at $\geq 10^{\circ}\text{C}$ and for time necessary to attain 70% of the specified.
 - .2 During cold temperatures, provide insulated tarps as required to maintain concrete at required temperature throughout curing period.

3.8 JOINT SEALANT

- .1 Upon minimum 28 day cure, re-cut control joints to minimum 10 mm (3/8") wide by 6 mm (1/4") deep. Re-cut construction joints to 12 mm (1/2") wide.

- .2 Thoroughly clean all joint and crack reglets. Ensure that surfaces to be sealed are sound, dry, free from dirt, water, frost, loose scale, oil, grease, curing compound, or other contaminants which may adversely affect the performance of the sealing materials.
- .3 Installation of a bond breaker will be required in all joints.
 - .1 Bond Breaker Tape: Install bond-breaker tape (ie, Teflon tape, filament tape, etc.) in joint to be sealed to prevent three-sided adhesion of sealant. The tape shall be installed continuously with no skips or voids. The use of aggregate bond breakers will be strictly prohibited.
 - .2 Backing Rod: Where joint configuration and/or size does not permit the use of a bond breaker pack joints continuously with closed cell backer rod recessed to receive sealant. Backer rod diameter to be 25% greater than the joint width. Install backer rod without stretching. Under no circumstances should backer rod that is too small for the joint be doubled up or braided together to fit the opening.
- .4 Priming of all substrates is mandatory. Prime substrates as recommended by the sealant manufacturer. Primer to be installed prior to installation of the sealant backing. Allow primer to dry until all the solvent evaporates. This typically takes 5 to 30 minutes, depending on temperature and humidity. Prime only those surfaces that will be sealed with sealant the same day. If a previously primed surface that was performed the day before is encountered it must be re-primed.
- .5 Do not install sealants on wet or damp substrates.
- .6 Do not install sealants under conditions of precipitation or temperatures below 4°C.
- .7 Sealant to be installed in a manner that will completely fill the cavity formed in the joint opening by the substrates and sealant backing or bond breaker.
- .8 Immediately after applying the sealant, tool the bead to provide a concave-shaped surface.
- .9 Sealant installation shall be a full bead free from air pockets and embedded impurities and free from ridges, wrinkles and sags.
- .10 Use anti-tack solutions only with the approval and directions of the sealant manufacturer.

3.9 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.
- .2 The Contractor will pay for costs of tests via the testing cash allowance.
- .3 Frequency and Number of Tests: Not less than one strength test per 50 m³ of concrete placed and not less than one test for each class of concrete placed on any one day.
- .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 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve their contractual responsibility.

3.10 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.

3.11 BACKFILLING

- .1 Placing: Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.
- .2 Backfill areas to grades, contours and levels required to meet new and existing elevations, and specified overhead clearances.
- .3 Perform backfilling operations systematically and as early as possible to allow maximum time for natural settlement and compaction.
- .4 Compaction: compact each layer of material to following densities for material to ASTM D698: 100% Standard Proctor Density.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20- [95], Surface Sealer for Floors.
- .2 Canadian Standards Association (CSA)
 - .1 CSA-A23.1- [94], Concrete Materials and Methods of Concrete Construction.
- .3 Canada Green Building Council (CaGBC)
 - .1 LEED Canada Reference Guide for Green Building Design and Construction 2009

1.2 PERFORMANCE REQUIREMENTS

- .1 Product quality and quality of Work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.3 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include application instructions for concrete floor treatment.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.
- .6 Dispose of waste from stripping of floors in a manner that will not have unfavourable effects on the environment.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Temporary lighting:
 - .1 Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.

- .2 Electrical power:
 - .1 Provide sufficient electrical power to operate equipment normally used during construction.
- .3 Work area:
 - .1 Make the Work area water tight protected against rain and detrimental weather conditions.
- .4 Temperature:
 - .1 Maintain ambient temperature of not less than [10] EC 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.
- .5 Moisture:
 - .1 Ensure concrete substrate is within moisture limits prescribed by [flooring] manufacturer.
- .6 Safety:
 - .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .7 Ventilation:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .2 Provide continuous ventilation during and after coating application.

Part 2 Products

2.1 CHEMICAL HARDENERS

- .1 Type 1- Sodium silicate.
- .2 Water: potable.

2.2 SEALING COMPOUNDS

- .1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based.
- .2 Surface sealers may not be manufactured or formulated with aromatic solvents formaldehyde halogenated solvents mercury lead cadmium hexavalent chromium and their compounds.

2.3 WET CURE

- .1 Clear polyethylene film to ASTM C171, minimum thickness 0.15 mm.

2.4 MIXES

- .1 Mixing, ratios and application in accordance with manufacturer's instructions.

2.5 JOINT SEALANT

- .1 Joint sealants to Section 07 92 00 – Joint Sealants.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that surfaces are ready to receive Work and elevations are as indicated on drawings.

3.2 PREPARATION OF SLAB

- .1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges [unless otherwise indicated].
- .2 Saw cut control joints to CSA-A23.1, 24 hours maximum after placing of concrete.

3.3 APPLICATION

- .1 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with sealant.
- .2 Apply floor treatment in accordance with Sealer manufacturer's written instructions.
- .3 Clean overspray. Clean sealant from adjacent surfaces.
- .4 Finish concrete floor surfaces in accordance with CAN3-A23.1M.
- .5 Uniformly spread, screed, and float concrete. Do not use grate tampers or mesh rollers. Do not spread concrete by vibration.
- .6 Steel trowel surfaces that will receive carpeting, resilient flooring.
- .7 Steel trowel all surfaces left exposed to view.
- .8 Apply hardener on concrete floor surfaces that do not receive additional flooring material. Apply in accordance with manufacturer's recommendations.
- .9 Apply sealer on floor surfaces to receive hardener. Apply in accordance with manufacturer's recommendations.
- .10 Saw cut control joints as called for to CAN3-A23.3-M94.

3.4 TOLERANCES

- .1 Maintain surface flatness, with maximum variation of 3 mm in 3 m.
- .2 In areas with floor drains, maintain floor level at walls and pitch surfaces uniformly to drains at 20 mm per meter nominal as indicate on drawings.

3.5 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA A23.4-00/A251-00 Precast Concrete - Materials and Construction/Qualification Code for Architectural and Structural Precast Concrete Products
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada Reference Guide for Green Building Design and Construction 2009

1.2 SCOPE OF WORK

- .1 Provide precast splash pads where required and shown on drawings to ensure positive drainage away from building at downspout or drain outlet locations.

1.3 DRAINAGE STANDARD

- .1 Install splash pads to guarantee a minimum slope of 3% away from building without settlement for a minimum distance of 3 meters.

1.4 PROTECTION

- .1 Protect bench marks and existing structures, lawns, roads, sidewalks, paving and curbs against damage from vehicular or foot traffic.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.
- .6 Dispose of waste from stripping of floors in a manner that will not have unfavourable effects on the environment.

1.6 WARRANTY

- .1 Make good any settlement of splash/pads fill and topsoil for a period of one year from Substantial Completion of the project. Pay all costs in making good paving, lawns, etc., damaged by such settlement, at no cost to The City or Contract Administrator.

Part 2 Products

2.1 PRECAST CONCRETE SPLASH PADS

- .1 Precast Concrete Rain Natural Splash pad: to be Barkman Concrete Ltd. 1'-0" (305 mm) wide x 8'-0" (2438 mm) long; Model #: 105612. Locate at all scupper locations and all sump pit discharges.
 - .1 Mounting Brackets for splash pads shall be Barkman Concrete Mounting Bracket, Model #: 105610.
- .2 Levelling course: shall be 6 mm dia. crushed limestone down
- .3 Contact for Splash Pads and Mounting Brackets:
 - Barkman Concrete
 - 909 Gateway Road
 - Winnipeg. MB R2K 3L1
 - Telephone No. (204) 667-3310

2.2 SUBSTITUTIONS

- .1 Refer to Section B7 – Substitutes of Bid Opportunity 748-2013.

2.3 FILL MATERIALS

- .1 Sub-surface gravel: Pit-run, crushed natural stone, free from shale, clay, friable materials and debris.
- .2 Surface Gravel (exposed): Clean natural stone, free from clay, shale and organic matter, 19mm to 38mm (5/8" to 1 1/2") size.
- .3 Sand: Clean natural river or bank sand, free from silt, clay, loam friable or soluble materials, and organic matter.
- .4 Crushed Stone: Angular crushed natural limestone, free from shale, organic matter and debris, maximum stone size 12mm (1/2") (75% passing).
- .5 Sub-soil: Free from roots, rock larger than 76mm (3") in size and building debris.

2.4 TOPSOIL

- .1 In accordance with Section 32 91 19 – Topsoil and Finish Grading.

2.5 SOD

- .1 In accordance with Section 32 92 20 – Sodding.

Part 3 Execution

3.1 PREPARATION

- .1 Determine extent of modification required to existing surface conditions to accommodate new splash pads.

- .2 Locate splash pads to ensure best drainage away from building and the least interference with landscape or building elements such as shrubs, walkways, windows etc.
- .3 Perform minor excavations as required to sub-surface for final grades.
- .4 Carefully remove existing sod and retain for replacement as required.
- .5 Firmly compact sub-soil to receive any required fill.

3.2 BACKFILLING AND TOPSOIL

- .1 In accordance with Sections 31 23 10 – Excavation, Trenching and Backfilling and 32 91 19 – Topsoil and Finish Grading.
- .2 Backfill areas to grades, levels and elevations as required with appropriate fill and topsoil materials to ensure positive drainage away from the building.
- .3 Perform backfilling and topsoil operations systematically and as early as possible to allow maximum time for natural settlement and required compaction.
- .4 Firmly compact fill to receive finished surface material.

3.3 GRAVEL BED

- .1 In accordance with Section 32 11 23 – Aggregate Base Courses.
- .2 Provide a compacted gravel bed of minimum 100 mm (4") depth beneath new splash pads.
- .3 Gravel levelling base to extend min. 75 mm (3") past splash pads.

3.4 PLACING OF SOD

- .1 In accordance with Section 32 92 20 – Sodding.

3.5 SPLASH PADS PLACEMENT

- .1 Place splash pads on compacted material to fully support concrete with no hollows or bows below.
- .2 Ensure required 3% slope.
- .1 Install Barkman Concrete Natural Splash Pads as per manufacturer's specifications.
- .2 Install Barkman Concrete Mounting Brackets as per manufacturer's specifications

3.6 CLEAN-UP

- .1 Remove all excess materials and leave the Site finished and in clean condition in accordance with Section 01 74 19 – Cleaning and Waste Management.

END OF SECTION