

PART 1 GENERAL

1.1 REFERENCES

- .1 CSA Group (CSA)
 - .1 CSA A23.1/A23.2-14, Concrete materials and methods of concrete construction / Test methods and standard practices for concrete, Includes Update No. 1 (2015).
- .2 International Concrete Repair Institute (ICRI)
 - .1 ICRI Technical Guideline No. 310.2R-2013, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.2 QUALITY ASSURANCE

- .1 Concrete work shall conform to CSA A23.1/CSA A23.2.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.
- .2 Provide manufacturer's printed recommendations for general maintenance, including cleaning instructions and submit a complete list of floor care products that will be required for on-going maintenance.

1.4 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 watertight protected against rain and detrimental weather conditions.
- .4 Temperature:
 - .1 Maintain ambient temperature of not less than 10-degree 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.
- .5 Moisture:
 - .1 Ensure concrete substrate is within moisture limits prescribed by roofing membrane manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Concrete Repair Mortar - Vertical and Overhead Locations: polymer-modified, cementitious, two-component, fast-setting mortar with migrating corrosion inhibitor added. Formulated for trowel application, designed especially for repair of overhead and vertical surfaces at temperatures between -5 and 10°C (23 and 50°F).
 - .1 Minimum bond strength at 28 days shall be 17 MPa; minimum compressive strength at 28 days shall be 50 MPa; minimum tensile splitting strength at 21 days shall be 5 MPa.
- .2 Concrete Repair Mortar - Vertical and Horizontal Locations: polymer-modified, cementitious, two-component, fast-setting mortar with migrating corrosion inhibitor added. Formulated for trowel application, designed for use as structural repair material at parking structures at vertical and horizontal surfaces at temperatures between -5 and 10°C (23 and 50°F).
 - .1 Minimum bond strength at 28 days shall be 19 MPa; minimum compressive strength at 28 days shall be 50 MPa; minimum tensile splitting strength at 21 days shall be 5.5 MPa.
- .3 Featheredging Materials: polymer-modified, with migrating corrosion inhibitor added, cementitious, two-component, fast-setting, trowel or rub applied, thin-coat mortar for concrete repairs, for skin coats, filling bugholes, honeycombing and for feather edging.
 - .1 Minimum bond strength at 28 days shall be greater than concrete; minimum compressive strength at 28 days shall be 35 MPa.
- .4 Structural Grout: high-performance, non-shrink, fluid, cementitious grout with silica fume and two-stage shrinkage mechanism; compensating for shrinkage in both the plastic and the hardened states. It shall be non-metallic, contain no chlorides and able to be placed at various consistencies ranging from flowable to fluid by adjusting quantity of mix water.
 - .1 Minimum compressive strength at 28 days shall be 62 MPa; Rapid Chloride Permeability AASHTO T277 at 28 days shall not exceed 2760 Coulombs.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verify that slab surfaces are ready to receive work of this Section.

3.2 GENERAL

- .1 Work shall comply with manufacturers' printed installation instructions and illustrations, technical datasheets, and specifications.
- .2 Perform GPR or other approved scanning procedure to determine locations of existing reinforcing prior to cutting, coring or drilling.

- .3 Apply repair materials as required to result in a solid, uniform, smooth, flat concrete surface, with cracks, grooves and other damage repaired. Fill in hollows, low spots, and grooves, and grind high spots, bumps and peaks to produce smooth, level floors. Smooth out rough areas. Finish floor patches and repairs to a magnesium trowel finish.
- .4 Floor level tolerances:
 - .1 Apply repair materials as required to achieve a smooth, level floor having a straightedge value of ± 3 mm over 3050 mm. Straight edge testing on site will be performed by Departmental Representative to verify compliance.
- .5 Prepare concrete in compliance with ICRI Technical Guideline No. 310.2R recommendations.

3.3 REPAIRS

- .1 Inspect surfaces for defects immediately after removal of forms. Repair or patch defects within 48 hours of removal of forms with cure repairs same as new concrete with Departmental Representative's permission.
- .2 Defective Areas: where patches are allowed, repair and patch areas to match surrounding areas in texture and colour.

3.4 FORMED CONCRETE

- .1 The basic treatment of all formed concrete surfaces, exposed or unexposed, shall be to CSA A23.1/A23.2.
- .2 Do not repair honeycomb areas until inspected by Departmental Representative. Fill honeycomb in non-structural elements with mortar; repair honeycomb in structural elements in accordance with CSA Standard.

3.5 FILLING

- .1 Apply thick bed mortar or self-levelling and smoothing underlayment (Contractor's discretion at approval of Departmental Representative) working into all nooks, cracks and spaces to fill flush with top of floor slab. Trowel to a smooth polished surface.
- .2 Use featheredging method to fill and level depressions up to 19 mm (5/8") in thickness, to fill cracks, holes, chips etc. where topping must be finished to a featheredge. Apply in strict accordance to manufacturer's instructions.
- .3 At juncture of resilient flooring and exposed concrete to provide feather edging for a distance of 150 mm (6") from + 3 mm to 0 mm (+ 1/8" to 0"), as indicated.
- .4 Prepare substrate and install as per manufacturers recommendations, smooth finish.

3.6 PATCHING

- .1 Patch all core holes, or chipped or gouged concrete surfaces using specified materials.
- .2 Mix and install materials in compliance with manufacturer's instruction.

3.7 ANCHORING IN EXISTING CONCRETE

- .1 Perform GPR or other approved scanning procedures to determine locations of existing reinforcing in existing concrete elements before installing anchor systems. Advise Departmental Representative of findings before proceeding with the Work, and revise penetration and anchor locations as required and directed by Departmental Representative.
- .2 Core holes and set anchors in structural grout as required. Install per grout manufacturer's specifications.

3.8 EXISTING SLAB CLEANING AND PREPARATION

- .1 Prepare concrete surfaces as recommended by ICRI Technical Guideline No. 310.2R.
- .2 Scarify concrete slab at areas to receive concrete repair materials and toppings.
- .3 Scarify concrete slab at areas as required to receive floor finishes.
- .4 Clean floors as required and specified by floor finish manufacturer.
- .5 Vacuum clean and remove all dust and debris. Leave slab clean, ready for new applications. Do not use power wash equipment.

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Division 01: Cleaning. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01: Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Manage and dispose of demolition and construction waste materials in accordance with Division 01: Construction/Demolition Waste Management and Disposal.

3.10 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

- .1 The Executed Agreement including General Conditions, Division 1, applicable Drawings and Amendments are part of and to be read in conjunction with this section.
- .2 This section of the Specifications complements the drawings in describing services, labour and materials necessary to complete supply, fabrication and erection of concrete formwork necessary to complete the Work summarized as but not necessarily limited to:
 - .1 Slabs on grade.
 - .2 Equipment base foundation.
 - .3 Miscellaneous formwork.

1.2 RELATED WORK

- .1 Concrete Reinforcement: Section 03 20 00.
- .2 Cast-in-Place Concrete: Section 03 30 00.

1.3 REFERENCE STANDARDS

- .1 Do concrete formwork in accordance with CSA-A23.1-14, except where specified otherwise.
- .2 Do falsework in accordance with CSA S269.1-16, except where specified otherwise.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Formwork lumber: plywood and wood formwork materials to CSA-A23.1-14, CSA-086-14, CSA-0121-17, and CSA-0153-13.
- .2 Falsework materials: to CSA S269.1-16.
- .3 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms. Release agent to be non-toxic, biodegradable and have zero or low VOC's. Petroleum based form release agents are not permitted on the project.
- .4 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 1 inch diameter in concrete surface.

PART 3 EXECUTION

3.1 ERECTION

- .1 Verify lines, levels and column centres before proceeding with formwork and ensure dimensions agree with drawings.
- .2 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1-14.
- .3 Construct falsework in accordance with CSA S269.1-16.

- .4 Hand-trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .5 Align form joints and make watertight. Keep form joints to minimum.
- .6 Use 25 mm chamfer strips on external corners.
- .7 Form chases, slots, openings, recesses, expansion and control joints as indicated.
- .8 Clean formwork in accordance with CSA-A23.1-14 before placing concrete.
- .9 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 3 days.
- .10 Re-use of formwork and falsework subject to requirements of CSA-A23.1-14.

END

PART 1 GENERAL

1.1 WORK INCLUDED

- .1 The Executed Agreement including General Conditions, Division 1, applicable Drawings and Amendments are part of and to be read in conjunction with this section.
- .2 This section of the Specifications complements the drawings in describing services, labour and materials necessary to complete supply, fabrication and placement of reinforcing steel necessary to complete the Work summarized as but not necessarily limited to:
 - .1 Slabs on grade.
 - .2 Equipment base foundation.
 - .3 Miscellaneous reinforcing steel.

1.2 RELATED WORK

- .1 Concrete Formwork and Falsework: Section 03 10 00
- .2 Cast-in-Place Concrete: Section 03 30 00.

1.3 REFERENCE STANDARDS

- .1 Do reinforcing work in accordance with CSA-A23.1-14 and welding of reinforcing in accordance with CSA W186-M1990, except where specified otherwise.

1.4 SUBSTITUTES

- .1 Substitution of different size bars permitted only upon written approval of the Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Reinforcing steel; billet steel, Grade 400, deformed bars to CAN/CSA-G30.18-09, unless indicated otherwise.
- .2 Reinforcing steel where welding required: weldable low alloy steel deformed bars to CAN/CSA-G30.18-09.
- .3 Cold-drawn annealed steel wire ties: to CSA G30.3-M1983.
- .4 Welded steel wire fabric: to CSA G30.15-M1983.
- .5 Chairs, bolsters, bar supports, spacers: to CSA-A23.1-14.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CSA-A23.1-14, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on steel placing drawings.
- .3 Weld reinforcement in accordance with CSA W186-M1990.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar list.

PART 3 EXECUTION

3.1 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on reviewed shop drawings and in accordance with CSA-A23.1-14, and as shown in landscape details.
- .2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of a thick even film of mineral lubricating grease.
- .3 Obtain Departmental Representative 's approval of reinforcing steel and position prior to placing concrete.
- .4 Ensure that appropriate cover to reinforcement is maintained during concrete pour.

END

PART 1 GENERAL

1.1 WORK INCLUDED

- .1 The Executed Agreement including General Conditions, Division 1, applicable Drawings and Amendments are part of and to be read in conjunction with this Section.
- .2 This section of the Specifications complements the drawings in describing services, labour and materials necessary to complete supply, placing and finishing of cast-in-place concrete necessary to complete the Work summarized as but not necessarily limited to:
 - .1 Slabs on grade.
 - .2 Equipment base foundation.
 - .3 Miscellaneous concrete.

1.2 RELATED WORK

- .1 Concrete Formwork and Falsework: Section 03 10 00.
- .2 Concrete Reinforcement: Section 03 20 00.
- .3 Structural Steel: Section 05 12 00.

1.3 REFERENCE STANDARDS

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1-14, and testing in accordance with CSA-A23.2-14, except where specified otherwise.
- .2 CAN/CSA-A23.5, Supplementary Cementing Materials.
- .3 CAN3-A266.1, Air-Entraining Admixtures for Concrete.
- .4 CAN3-A266.2, Chemical Admixtures for Concrete.
- .5 CAN3-A266.4, Guidelines for the Use of Admixtures in Concrete.

1.4 CERTIFICATE

- .1 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1-14. Concrete shall be produced and delivered by a ready-mix plant that is a member of the Atlantic Provinces Ready Mixed Concrete Association (APRMCA) and holds a current CSA Certificate of Ready Mixed Concrete Production Facilities as issued by the Association.
- .2 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA-A23.1-14.

1.5 QUALITY CONTROL

- .1 Submit proposed quality control procedures for Departmental Representative's approval.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Cementitious materials: to CSA A3000-13.
- .2 Water: to CSA-A23.1-14.

- .3 Aggregates: to CSA-A23.1-14. Coarse aggregates to be normal density. Nominal size of coarse aggregate: 20 mm. Use 10 mm maximum size aggregate in toppings that are less than or equal to 75 mm in thickness.
- .4 Air entraining admixture: to CSA-A266.1-M78.
- .5 Chemical admixtures: to CSA-A266.4-M78.
- .6 Non-shrink grout: premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, of pouring consistency, capable of developing compressive strength of 35 MPa at 7 days.
- .7 Dry pack: premixed or non premixed composition of non metallic aggregate, cement and sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compression strength of 35 MPa at 7 days.
- .8 Premoulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D1751-04.
- .9 Curing Compound:
 - .1 To CSA A23.1-14, and to ASTM C309 Type 1- Chlorinated Rubber.
 - .2 Clear curing compound equivalent for exterior concrete applications.
- .10 Anchor Bolts to ASTM A307, galvanized to CSA G164.

2.2 CONCRETE MIXES

- .1 Proportion normal density concrete in accordance with CSA-A23.1-14, Alternative 1, to give following properties: for concrete in exterior slabs on grade and exterior equipment bases.
 - .1 Use Type Gu cement or mixture of cement and supplementary cementing materials to CAN/CSA- A23.5-M03.
 - .2 Minimum compressive strength at 28 days: 32 MPa.
 - .3 Class of exposure: C-2.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at time and point of discharge: 75 mm.
 - .6 Air content: 5 to 8%.
 - .7 Chemical admixtures: to be in accordance with CSA-A266.4-M78.
- .2 Do not change concrete mix without prior approval of Departmental Representative. Should change in material source be proposed, new mix design to be approved by Departmental Representative.
- .3 The use of calcium chloride in the concrete is not permitted.

PART 3 EXECUTION

3.1 WORKMANSHIP

- .1 Obtain Departmental Representative's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.

- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 Tolerances: Dimensional tolerances to CAN/CSA-A23.1-14, straight edge method.
- .7 Ready mix plant shall conform to CSA and possess a current and active membership in the Atlantic Provinces Ready Mix Concrete Association.

3.2 PLACING

- .1 Place concrete to CSA A23.1.
- .2 Convey concrete from mixer to forms by methods that will maintain specified slump and prevent segregation.
- .3 Do not drop concrete more than 1.2 m vertically unless it can be shown that the concrete will not segregate. Deposit concrete in final position in forms to avoid lateral movement.
- .4 Place concrete in continuous operation, starting from lowest point in form, in lifts not greater than 500 mm.
- .5 Vibrate or tamp each layer to obtain dense homogeneous structure free of cold joints, fill planes, voids and honeycombing. For vertical installation vibrate at least 150 mm into previously placed layers. Concrete to be well bonded to all reinforcing steel, anchors, waters tops and other embedded parts.

3.3 CURING AND PROTECTION (FOR EXTERIOR EXPOSED WORK)

- .1 Provide curing and protection to CSA A23.1. The temperature of the concrete as placed to be within the limits of CSA A23.1. Use curing compound.
- .2 Do not place concrete on frozen base. Remove all snow, ice and frost from area prior to placing concrete. Do not place concrete on, or against, any surface that will lower the temperature of the concrete in place below the minimum concrete in place below the minimum value shown in CSA A23.1.
- .3 When air temperature may drop below 5°C or when there is a probability that it will drop below 5°C within 24 hours of placing, raise temperature of base, reinforcing steel, embedded parts and concrete. In addition, before placement have available all materials and curing.
- .4 When air temperature is at or above 27°C, or when there is a probability of it rising to 27°C during the placing period, provide facilities for protection of concrete in place from effects of hot and/or drying weather conditions. Under severe drying conditions, protect formwork reinforcement and concreting equipment from direct rays of sun, or cool by fogging.
- .5 After placing is completed, maintain minimum curing conditions for the concrete in accordance with CSA-A23.1.

3.4 FINISHING

- .1 Finish concrete in accordance with CSA-A23.1-14.
- .2 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise detailed.
- .3 Fill form tie holes with non-shrink mortar and finish to texture of adjacent concrete.

- .4 Finish slabs to CSA-A23.1-14. Provide a broom finish. In addition, ensure that minimum level of concrete is within 6 mm of established elevations in any 6 metre square area, and that surface is sufficiently even to contact a 3 metre long straight edge with a tolerance of 6 mm.

3.5 CURING

- .1 Cure all concrete in accordance with CSA-A23.1-14.

3.6 ANCHOR BOLTS

- .1 Place anchor bolts to template to match steel base plate layout.
- .2 Anchor bolts to be securely maintained in place during concrete placing.
- .3 Anchor bolt threads to be protected from damage during concrete placing. Cover threaded section of anchor bolt to prevent contamination from plastic concrete.

3.7 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory and in accordance with CSA-A23.1-14, using a certified concrete laboratory.
- .2 The Departmental Representative will pay for costs of tests.
- .3 Inspection or testing will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

3.8 DEFECTIVE WORK

- .1 Remediate defective concrete or remove and replace concrete not in accordance with these specifications, blemishes and embedded debris, and repair as directed.

END

PART 1 GENERAL

1.1 REFERENCES

- .1 American Concrete Institute (ACI):
 - .1 ACI 117M-10, Specification for Tolerances for Concrete Construction and Materials and Commentary METRIC.
 - .2 ACI 301-10, Specification for Structural Concrete.
 - .3 ACI 302.1R-15, Guide for Floor and Slab Construction.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 - .2 ASTM D1752-04a(2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- .4 Canadian Standards Association (CSA)
 - .1 CSA A23.1-14/A23.2-14 - Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
- .5 International Concrete Repair Institute (ICRI)
 - .1 ICRI 3102R13, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
- .6 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-11, Architectural Coatings.

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 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Division 01: Submittal Procedures.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.
 - .2 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.
 - .3 Include application instructions for concrete floor treatments.

- .2 Submit closeout data in accordance with Division 01: Closeout Submittals.
 - .1 Provide manufacturer's printed recommendations for general maintenance, including cleaning instructions and submit a complete list of floor care products that will be required for on-going maintenance.

1.4 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 degree 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.
- .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 Arrange for ventilation system to be operated during installation of concrete floor treatment materials by use of approved portable supply and exhaust fans.
 - .2 Ventilate enclosed spaces in accordance with Division 01: Temporary Utilities.
 - .3 Provide continuous ventilation during and after coating application.

PART 2 PRODUCTS

2.1 PERFORMANCE/DESIGN CRITERIA

- .1 F3-Finishing: Floors having a straightedge value of ± 5 mm over 3050 mm; similar to CSA A23.1 Class C Slab Finishing. Slope floors to drain as indicated.

2.2 LEVELLING MATERIALS

- .1 Thick bed mortar: Performance standard to ANSI A118.4. Latex additive mixed with Portland cement and sand in accordance with manufacturer's instructions, with the following minimum properties:

- .1 Bonding strength, 28 days: ≥ 1.2 MPa.
- .2 Compressive strength after 28 days: ≥ 40 MPa.
- .3 Flexural strength after 28 days: ≥ 7 MPa.
- .2 Self-levelling and smoothing underlayment: Performance standard to ANSI A118.4, ASTM C349 (and CGSB 71-GP-30M), Type 2, with the following minimum properties:
 - .1 Resistance to abrasion Taber Abrasimeter (abrading wheel – 500 g at 200 rpm), 28 days: ≥ 1.2 g weight loss.
 - .2 Compressive strength after 28 days: ≥ 35 N/mm².
 - .3 Flexural strength after 28 days: ≥ 8 N/mm².
 - .4 Brinell hardness after 28 days: 100 N/mm².
- .3 Featheredging Materials: Polymer-modified, cementitious, 2-component, fast-setting, trowel-applied, with the following minimum properties:
 - .1 Bond strength after 28 days: 14 MPa.
 - .2 Bond strength pull-out test after 28 days: ≥ 2 MPa
 - .3 Compressive strength after 28 days: ≥ 40 MPa.
 - .4 Flexural strength after 28 days: ≥ 14 MPa.
 - .5 Splitting tensile strength after 28 days: ≥ 5 MPa.
- .4 Grout for filling core holes, to ASTM C1107, with the following minimum properties:
 - .1 Bond strength after 28 days: 13 MPa.
 - .2 Compressive strength after 28 days: ≥ 40 MPa.
 - .3 Flexural strength after 28 days: ≥ 7 MPa.
 - .4 Splitting tensile strength after 28 days: ≥ 3 MPa.
- .5 Supply fast-set structural grout, including type 304 stainless steel drop-in anchors and threaded rod to anchor furniture and other fixed equipment. Confirm acceptability of selections prior to ordering and distribution.

2.3 SEALING COMPOUNDS

- .1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based, clear.
 - .1 Surface sealers manufactured or formulated with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, hexavalent chromium and their compounds are not acceptable.
 - .2 Surface sealer shall have less than 100g/l of VOC in accordance with SCAQMD Rule #1113.

2.4 CURING COMPOUNDS

- .1 Select low VOC, water-based curing compounds.
 - .1 Concrete Curing Compounds: maximum VOC limit 100 g/L in accordance with SCAQMD Rule #1113.

2.5 MIXES

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

2.6 ACCESSORIES

- .1 Water: potable.
- .2 Joint Filler Strips:
 - .1 Floor Isolation Joints: ASTM D1751, bituminous impregnated fibreboard, or ASTM D1752, cork or self-expanding cork, 13 mm thick minimum.
 - .2 Edge Joint Filler: ASTM D1751, bituminous impregnated fibreboard, 13 mm thick minimum.
- .3 Control Joint Filler:
 - .1 Construction-grade two-component, epoxy-urethane, load-bearing, self-levelling sealant.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Prepare floor surface in accordance with CSA A23.1.
- .2 Verify that slab surfaces are ready to receive work and elevations are as instructed by manufacturer.

3.2 GENERAL CONCRETING PROCEDURES

- .1 Comply with the requirements of Section 03 30 00 – Cast-in-Place Concrete, and as follows:
 - .1 Avoid over troweling.
 - .2 Do not finish concrete surfaces when bleed water is present.
 - .3 Keep concrete continuously moist for at least 24 hours.
 - .4 Never add water on site to plant-supplied concrete during placement or finishing.
 - .5 Maintain concrete above 10°C during and for three days after concrete placement.
 - .6 Protect fresh concrete from rapid drying, direct sun and wind.
 - .7 Supply and place layer of sand over vapour retarder to allow some moisture loss at bottom of slab.
 - .8 Never place concrete on frozen substrate.
 - .9 Locate mesh no more than 50 mm below surface of slab. Lap mesh at least one square. Use chairs to support mesh at the correct height during concrete placement (do not use the hook and pull method).
 - .10 Ensure the minimum concrete cover over reinforcing steel is at least 76 mm.
 - .11 Lap steel at least 24 bar diameters, but not less than 300 mm.
 - .12 Install insulation as indicated. Refer to Section 07 21 13 – Board Insulation for insulation specifications.

3.3 REPAIRS

- .1 Examine all concrete surfaces and clearly mark out defective areas to be repaired. Obtain the Departmental Representative's authorization of the delineated repair areas and the proposed method and equipment to be used for the repairs prior to commencing with the work.

- .2 Completely remove all damaged, deteriorated, loosened, or unbonded concrete down to sound concrete. Remove micro-fractured surfaces resulting from the initial concrete removal process.
- .3 Sawcut the perimeter of areas requiring concrete removal and replacement perpendicular to the surface to a minimum depth of 25 mm. Do not use any repair method that produces a featheredge.
- .4 Prior to filling, provide a repair area that is clean and saturated surface dry except where the repair technique requires a dry surface.
- .5 Use dry-pack mortar for filling holes left by the removal of form ties, for narrow grooves cut for repair of cracks, and for repair of small honeycombed areas where lateral restraint can be obtained. Pre-soak the repair area, allow the area to attain a saturated surface dry condition, and apply a cement paste bond coat prior to filling with mortar. Dry-pack mortar shall consist of 1-part Portland cement to 2.5 parts sand, by mass.
- .6 At exposed exterior walls, supply and install recessed grey plastic plugs at tie holes.
- .7 Mortar filling with a polymerized mortar placed under pressure by use of a mortar gun or head box may be used for repairing defects that are too wide for dry-pack filling, too shallow for concrete placement, and no deeper than the far side of the reinforcement that is nearest the surface. Treat the surface of the concrete to be repaired with a compatible acrylic bonding agent as authorized by the Departmental Representative prior to mortar filling.
- .8 Completely remove honeycombed areas down to sound concrete or to the required depth behind the reinforcing steel, whichever is greater. The depth required beyond the reinforcing steel is 1.5 times the maximum aggregate size of the replacement concrete or 25 mm, whichever is greater. Treat the surface of the concrete to be repaired with a high percentage solids epoxy bonding agent or acrylic bonding agent as authorized by the Departmental Representative prior to concrete replacement. Construct the repair area slightly proud of the general surface and then grind it to match within the specified tolerances.
- .9 Repair abrupt and gradual irregularities that exceed the specified tolerances by no more than 10 mm by grinding. Limit the depth of grinding such that no aggregate particles are exposed more than 3 mm in cross section at the finished surface.
- .10 Where surface grinding results or will result in exposure of aggregate particles that exceed the specified limits, or where the abrupt and gradual irregularities exceed the specified tolerances by more than 10 mm, repair the irregularities by removing the concrete to a depth below the reinforcing steel of 1.5 times the maximum aggregate size of the replacement concrete or 25 mm, whichever is greater. Treat and construct the repair area as specified for honeycombed areas.
- .11 Provide replacement concrete that has the same strength and durability characteristics as the adjacent specified concrete. Use cement that provides a finish colour that matches the surrounding concrete surfaces in areas that are permanently exposed.
- .12 Following repairs, promptly initiate curing. Provide completed repair areas that are tightly bonded.

3.4 FINISHING FORMED SURFACES

- .1 Requirements listed below apply to normal structural concrete; refer to Section 03 30 00 for additional requirements for formed exposed architectural concrete.
- .2 Unspecified Finish: Provide following finishes as applicable when finish of formed surfaces is not specifically indicated:
 - .1 Unexposed Surfaces:
 - .1 Smooth form finish.
 - .2 Exposed Surfaces:
 - .1 Smooth form finish.
- .3 Smooth Form Finish: Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces with number of seams kept to a minimum, uniformly spaced in an orderly pattern; patch tie holes and defects; completely remove fins.

3.5 FINISHING FLOORS AND SLABS

- .1 Slope floors to drain, 2% positive slope to drain or as otherwise indicated.
- .2 Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.
- .3 Float (Initial) Finishing:
 - .1 Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power driven floats.
 - .2 Re-straighten, cut down high spots, and fill low spots.
 - .3 Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 - .4 Apply float finishing to surfaces receiving trowel finishing and receiving sheet waterproofing and floor finishes.
- .4 Trowel (Final) Finishing:
 - .1 Commence trowel finishing after all bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface.
 - .2 Apply first trowelling and consolidate concrete by hand or power-driven trowel after applying float finishing; continue trowelling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance; repair or smooth any surface defects that would telegraph through applied coatings or floor covering.
 - .3 Apply a trowel finishing to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - .4 Finish surfaces to the tolerances indicated above.

3.6 CURING

- .1 Comply with the requirements of Division 03, structural specifications and drawings.

3.7 PATCHING

- .1 Patch all core holes, or chipped or gouged concrete surfaces using specified materials.
- .2 Mix and install materials in compliance with manufacturer's instruction.

3.8 ANCHORING AND CORING

- .1 Perform non-destructive, non-ionizing radio frequency scanning or other approved scanning procedures to determine locations of existing reinforcing or conduit in existing concrete elements before installing anchor systems or coring concrete. Advise Departmental Representative of findings before proceeding with the Work, and revise penetration and anchor locations as required and directed by Departmental Representative. Core holes and set anchors in fast-set grout as required. Install per grout manufacturer's specifications.

3.9 SEALANTS AND SEALERS

- .1 After floor treatment is dry, seal horizontal control joints and joints at junction of floor with vertical surfaces with Control Joint Filler.
- .2 Apply floor treatment in accordance with sealer manufacturer's written instructions, and as indicated.
- .3 Mask as required. Clean overspray. Clean sealant from adjacent surfaces.

3.10 CLEANING

- .1 Progress Cleaning: clean in accordance with Division 01: Cleaning. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01: Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Manage and dispose of demolition and construction waste materials in accordance with Division 01: Construction/Demolition Waste Management and Disposal.

3.11 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C109/C109M-16a, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
 - .2 ASTM C330/C330M-17a, Standard Specification for Lightweight Aggregates for Structural Concrete.
 - .3 ASTM C260/C260M-10a(2016), Standard Specification for Air-Entraining Admixtures for Concrete.
 - .4 ASTM C494/C494M-17, Standard Specification for Chemical Admixtures for Concrete.
 - .5 ASTM C827/C827M-16, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
 - .6 ASTM C939-16a, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
- .2 Canadian Standards Association (CSA) International
 - .1 CSA A3000-13, Cementitious materials compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014), Update No. 2 (2014), Update No. 3 (2014), Update No. 4 (2016), Update No. 5 (2017).
 - .2 CAN/CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete, Includes Updates through No. 3 August 2006.
 - .3 CSA A23.4-16, Precast Concrete - Materials and Construction.
 - .4 CAN/CSA-G30.18-09(2014), Carbon steel bars for concrete reinforcement, Includes Update No. 1 (2012).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit precast concrete cap manufacturer's product data, including specifications and technical datasheets.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Portland cement: to CAN/CSA-A5, Type GU.
- .2 Water: to CAN/CSA-A23.1/A23.2.
- .3 Aggregates: to CAN/CSA-A23.1/A23.2.
 - .1 Coarse aggregates to be normal density.
- .4 Air entraining admixture: to ASTM C260/C260M.
- .5 Chemical admixtures: to ASTM C494/C494M. Use of accelerating or set retarding admixtures for cold and hot weather placing to approval of Departmental Representative.
- .6 Supplementary cementing materials: to CAN/CSA-A23.5.

- .7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 50 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C827/C827M. Time of efflux through flow cone, under 30 seconds in accordance with ASTM C939.
 - .2 Flowable: to ASTM C827/C827M. Flow table, 5 drops in 3 seconds, to ASTM C109/C109M, applicable portion 125 to 145%.
 - .3 Plastic: to ASTM C827/C827M. Flow table, 5 drops in 3 seconds, to ASTM C109/C109M, applicable portions 100 to 125%.
 - .4 Dry pack: to manufacturer's requirements.
 - .3 Net shrinkage at 28 days: maximum 6%.
- .8 Reinforcing Steel: In accordance with CSA G30.18, 400 MPa yield grade deformed billet steel bars.

2.2 CONCRETE MIXES

- .1 Proportion concrete in accordance with CAN/CSA A23.1/A23.2, Alternative 1, to following requirements:
 - .1 Type GU cement.
 - .2 Minimum compressive strength at 28 days: 35 MPa.
 - .3 Class of exposure: C-1.
 - .4 Maximum Water/Cement Ratio: 0.45.
 - .5 Nominal size of coarse aggregate: 10 mm.
 - .6 Slump at time and point of discharge: 60 mm to 80 mm.
 - .7 Air content category: 1.

2.3 FABRICATION

- .1 Fabricate: to CSA A23.4, to sizes indicated on Drawings. Coordinate Work with mechanical trades.
 - .1 Provide precast chimney caps, wash surface sloped to drain away from chimney flus, with drip edge extending minimum 25 mm past vertical plane of brickwork beneath.
 - .2 Coordinate design with mechanical trades prior to fabrication.
- .2 Finish: steel form finish.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install chimney caps as indicated to Section 04 03 07 - Masonry Repointing and Mortar.
- .2 Coordinate Work with mechanical trades.
- .3 Replace damaged and defective units as directed by Departmental Representative.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Division 01: Cleaning. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01: Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Manage and dispose of demolition and construction waste materials in accordance with Division 01: Construction/Demolition Waste Management and Disposal.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION