

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 02 41 99 – Demolition.
- .2 Section 09 65 00 - Resilient Flooring.
- .3 Section 09 68 00 - Carpeting.
- .4 Section 09 91 00 - Painting.
- .5 Structural and Mechanical Drawings and Specifications.

1.2 REFERENCES

- .1 American Concrete Institute (ACI):
 - .1 ACI 117-10, ACI Manual of Practice: Specifications for Tolerances for Concrete Construction and Materials, and Commentary.
 - .2 ACI 301-10, Specification for Structural Concrete.
 - .4 ACI 302.1R-15, ACI Manual of Practice: Guide for Floor and Slab Construction.
- .2 American Society for Testing and Materials International (ASTM):
 - .1 ASTM D523-14, Standard Test Method for Specular Gloss.
 - .2 ASTM D638-14, Standard Test Method for Tensile Properties of Plastics.
 - .3 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 - .4 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - .5 ASTM D2240-15e1, Standard Test Method for Rubber Property—Durometer Hardness.
 - .6 ASTM D4060-14, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - .7 ASTM D4541-17, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- .3 Canadian Standards Association (CSA):
 - .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .4 International Concrete Repair Institute (ICRI)
 - .1 ICRI 3102R-13, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.3 SPECIAL CONSTRAINTS

- .1 Noise Generating Work: Section 01 10 00, item 11.1.1: "Work which results in significant noise, audible to areas outside the Work area or which transmits vibratory sounds through the building assemblies, or is being performed by an designated substances

subcontractor or involves asbestos work procedures, shall be performed only during hours approved in advance by the Owner.”

- .2 Contractor shall coordinate noise generating Work with Owner prior to commencement.
- .3 Work of this Section shall comply with requirements of Section 01 11 00 – Miscellaneous General Work and Section 01 35 13 – Special Project Procedures.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 30 00 – Administrative Requirements and Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.
- .3 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.
- .4 Submit for review the straight edge that will be used for site verification of level of floor flatness required.

1.5 QUALITY ASSURANCE

- .1 Concrete work shall conform to CSA A23.1/CSA A23.2, with the prepared concrete floor having a straightedge value of ± 3 mm over 3050 mm. Straight edge testing on site will be performed by Consultant to verify compliance; provide straight edge for testing and verification.
- .2 Produce good concrete underlayment throughout by correct and precise production methods on site; use skilled workmen experienced in this type of Work.
- .3 Work that is assessed by the Departmental Representative to be below an acceptable standard shall be demolished, removed and rebuilt as directed by the Departmental Representative.
- .4 Make necessary arrangements for initial installation of self-levelling material shall be supervised by the material manufacturer's representative.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Temporary lighting:
 - .1 Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 square meter 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 an 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 the same period.
- .5 Moisture:
 - .1 Ensure concrete substrate is within moisture limits prescribed by roofing membrane manufacturer.

1.7 WARRANTY

- .1 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

Part 2 Products

2.1 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 Feather Edging 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 drop-in anchors and threaded rod to anchor furniture and other fixed equipment. Confirm acceptability of selections prior to ordering and distribution.

Part 3 Execution

3.1 SAFETY

- .1 Comply with Occupational Health and Safety Act of Ontario, CSA S350, and NFPA 241.
- .2 Comply with the requirements of Section 02 07 50 – Cutting and Patching.
- .3 Saw cutting, if required at all, shall be carefully managed with strict location and depth control, in consultation with structural engineer (P.Eng.). Use non-destructive means to locate structural members, reinforcement bars, conduits and pipe before considering or planning any saw cutting or coring operations. Do not saw cut near columns and beams. Confirm cutting locations with structural engineer (P.Eng.) before cutting (provide minimum 72 hours for engineer's review).

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Work shall comply with product manufacturer's printed preparation, mixing and application instructions and illustrations, technical datasheets, and specifications.

3.3 EXAMINATION

- .1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
- .2 Check and verify that no irregularities exist that would affect quality of execution of work specified.
- .3 Inform Consultant of unacceptable conditions immediately upon discovery.
- .4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.4 AIR QUALITY MANAGEMENT

- .1 Indoor Air Quality Control Requirements: Perform work in accordance with IAQ requirements specified in Section 01 11 00 – Miscellaneous General Work, Section 01 35 13 – Special Project Procedures, and as follows:
 - .1 Protect building materials from damage by:
 - .1 fully covering stored materials,
 - .2 elevating stored materials off ground, and
 - .3 disposing of materials with evidence of moisture damage.

3.5 GENERAL

- .1 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.
- .2 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 Consultant to verify compliance.
- .3 Prepare concrete in compliance with ICRI Technical Guideline No. 310.2R recommendations.
- .4 Prepare substrates according to manufacturer's printed instructions as required to meet warranty requirements.
 - .1 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - .2 Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - .3 Mechanically remove contamination on the substrate that may cause damage to flooring materials. Permanent and non-permanent markers, pens, crayons, paint, etc., shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
 - .4 Prepare substrates according to ASTM F710 including the following:
 - .1 .1 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - .2 Perform anhydrous calcium chloride test, ASTM F1869. Results shall not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24-hours.

- or -

 - .3 Perform relative humidity test using in situ probes, ASTM F2170. Shall not exceed 80%.
 - .4 A pH test for alkalinity shall be conducted. Results shall range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation shall not proceed until the problem has been corrected.
 - .5 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
- .5 Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement-based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- .6 Floor covering shall not be installed over expansion joints; install expansion joint at locations of expansion joints in substrate.
- .7 Do not install flooring products until they are same temperature as the space where they are to be installed.
- .8 Move floor covering materials and products and installation materials into spaces where they will be installed at least 48-hours in advance of installation.
- .9 Sweep and vacuum clean substrates to be covered by products immediately before installation.

3.6 MEASURING

- .1 Classification of Surface Irregularities:
 - .1 Local surface irregularities are classified as abrupt or gradual.
 - .2 Abrupt irregularities mean offsets or fins caused by displaced or misplaced form sheeting, lining, or form sections or by defective form lumber, or improper screeding or trowelling. Abrupt irregularities also include any isolated irregularity in which the maximum dimension of the irregularity perpendicular to the surface is greater than the maximum dimension of the irregularity in the plane of the surface.
 - .3 Gradual irregularities mean bulges or depressions resulting in gradual changes in the concrete surface.
- .2 Measuring Surface Irregularities:
 - .1 Measure irregularities as deviations from a surface, with a straightedge or shaped template authorized by the Departmental Representative. Move the position of the straightedge about the irregularity as necessary to locate the point where the maximum height and slope exists. Provide 3 m long straightedges for taking measurements.
 - .2 For irregularities protruding above the surface, place 1 end of the straightedge on top of the irregularity. The height of the irregularity is determined by measuring the gap perpendicular to the straightedge. The length of the irregularity is determined by measuring the distance along the straightedge from the gap to the point of contact at the top of the irregularity.
 - .3 For irregularities extending below the surface, place the straightedge across the irregularity. The height of the irregularity is determined by measuring the gap between the straightedge and the surface. The length of the irregularity is the distance along the straightedge from the gap to the point of contact with the surface.
- .3 Check finished concrete surfaces immediately after final working, and again at the end of the curing period and verify their compliance with the specified tolerances.

3.7 REPAIR OF CONCRETE

- .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 depth of 10 mm \pm 1 mm; precision depth control of cutting is required. Do not use replacement repair methods that produce a featheredge.
 - .1 Perform X-ray, ultrasound, or other approved scanning procedures to determine locations of existing reinforcing, piping or conduit in existing concrete elements before cutting concrete. Advise Departmental Representative of findings before proceeding with the Work and await instructions.

- .2 Do not cut existing reinforcing steel:
 - .1 If reinforcing steel is cut, stop work in area and notify the Departmental Representative immediately, and await instructions. If shoring and other remedial and emergency actions are required, all costs shall be borne by Contractor.
- .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 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.
- .7 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.
- .8 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.
- .9 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.
- .10 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.
- .11 Following repairs, promptly initiate curing. Provide completed repair areas that are tightly bonded.

3.8 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 reviewed by Consultant. Fill honeycomb in non-structural elements with mortar; repair honeycomb in structural elements in accordance with CSA Standard.

3.9 FILLING

- .1 Apply thick bed mortar or self-levelling and smoothing underlayment, 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 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 from + 3 mm to 0 mm, as indicated.
- .4 Prepare substrate and install as per manufacturers recommendations, smooth finish.

3.10 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.

3.11 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 Consultant of findings before proceeding with the Work, and revise penetration and anchor locations as required and directed by Consultant.
- .2 Core holes and set anchors in fast-set grout as required. Install per grout manufacturer's specifications.

3.12 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 Clean floors as specified by floor finish manufacturers.
- .4 Vacuum clean and remove all dust and debris. Leave slab clean, ready for future floor finishes. Do not use power wash equipment.

3.13 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at the end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - 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 Section 01 30 00 – Administrative Requirements and Section 01 74 19 - Waste Management and Disposal.

3.14 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