

Part 1 General

1.1 SUMMARY

- .1 Slab soffit areas, beams, columns, and walls exhibiting extensive spalling and/or delamination requiring localized repairs less than 2 inches in depth will be repaired by removing the deteriorated concrete, cleaning and preparing the substrate, and patching the area with a cementitious patching material

1.2 RELATED SECTIONS

- .1 Section 03 20 00 – Concrete Reinforcing.
- .2 Section 03 91 10 – Surface Preparation for Concrete Delamination Repairs.

1.3 REFERENCES

- .1 ACI 546-04, Concrete Repair Guide.
- .2 ACI RAP-6, Vertical and Overhead Spall Repair by Hand Application.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM C109/C109M-08, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. (50-mm) Cube Specimens).
 - .2 ASTM C309-03, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C1315-08, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- .3 Canadian Standards Association (CSA)
 - .1 CSA- S448.1-10, Repair of Reinforced Concrete in Buildings.
- .4 International Concrete Repair Institute (ICRI)
 - .1 ICRI concrete Repair Terminology (2010 Edition).
 - .2 ICRI Guideline No. 120.1–2009, Guidelines and Recommendations for Safety in the Concrete Repair Industry.
 - .3 ICRI Guideline No. 130.1R–2009, Guide for Methods of Measurement and Contract Types for Concrete Repair Work (formerly No. 03735).

1.4 MEASUREMENT PROCEDURES

- .1 Prior to construction, concrete repair areas will be identified on-site via soundings completed by the Contract Administrator in the presence of and with the assistance of the Contractor. The areas will then be marked and agreed upon by the Contractor and Contract Administrator prior to commencement of work.
- .2 All costs associated with concrete repair and restoration required to satisfy the intent of the Drawings and Specifications must be included in the Bidders lump sum price.

1.5 QUALITY ASSURANCE

- .1 Contractor Qualifications:
 - .1 Minimum of 5 years experience in application of specified (or similar) products on projects of similar size and scope.
 - .2 Successful completion of a minimum of 5 projects of similar size and complexity to specified Work within the last 3 years.
- .2 Field Mock-up:
 - .1 Upon request, install field mock-up at Project site or pre-selected area of building or location approved by Contract Administrator. Install material in accordance with this Section.
 - .2 Field mock-up will be standard for judging workmanship on remainder of Project.
 - .3 Manufacturer's representative or designated representative will review technical aspects; surface preparation, repair, and workmanship.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Comply with Section 01 61 00.
- .2 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .3 Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.
- .4 Keep materials in manufacturer's original, unopened containers and packaging until installation.
- .5 Protect materials during storage, handling, and application to prevent contamination or damage.

1.7 PROJECT CONDITIONS

- .1 Environmental Requirements:
 - .1 Ensure that substrate surface and ambient air temperature are minimum of 4°C and rising at application time and remain above 4°C for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.
 - .2 Ensure that substrate surface and ambient air temperature are below of 32°C and remain below 32°C for at least 8 hours after application.
 - .3 Do not apply material if snow, rain, fog, and mist are anticipated within 12 hours after application. Allow surfaces to attain temperature and conditions specified before proceeding with application.

Part 2 Products

2.1 MATERIALS

- .1 Patching Mortar: Infilling with a one-component, thixotropic, rheoplastic, cement-based, fiber-reinforced, shrinkage-compensated, sulfate-resistant structural repair mortar.
 - .1 Drying shrinkage to ASTM C157:
 - .1 less than 0.10% at 28 days.
 - .2 Compressive Strength to ASTM C109:
 - .1 Minimum 7 MPa at 3 hours.
 - .2 Minimum 21 MPa at 1 day.
 - .3 Minimum 28 MPa at 7 days.
 - .3 Modulus of elasticity to ASTM C469:
 - .1 25×10^3 MPa \pm 10×10^3 MPa.
 - .4 Freeze/Thaw Resistance to ASTM C 666, Procedure A:
 - .1 Minimum 96.0% RDM at 300 cycles.
 - .5 Salt Scale Resistance to ASTM C672:
 - .1 Less than 0.05 kg/m² at 50 cycles.
- .2 Acceptable product(s):
 - .1 Emaco S88 CI by BASF Building Systems.
 - .2 Planitop X by Mapei.

2.2 ACCESSORIES

- .1 Evaporation retardant: 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 WB by BASF Building Systems at a minimum application rate of 4.9 m²/L.

Part 3 Execution

3.1 PREPARATION

- .1 Protection: Protect adjacent Work areas and finish surfaces from damage during repair mortar application.
- .2 Surface Preparation:
 - .1 Complete concrete delamination repairs to 03 91 10 – Surface Preparation for Concrete Delamination Repairs.
- .3 The repair area must be thoroughly cleaned and well soaked prior to infilling. The surface should be thoroughly wetted for a period of not less than two (2) hours. The repair areas

shall be kept continuously wet until just before infilling. Any standing water must be removed prior to grouting.

- .4 Maintain the substrate in a saturated, surface-dry (SSD) condition with no surface water, and concrete that is turning from dark to light.

3.2 APPLICATION PROCEDURES

- .1 Obtain Contract Administrator's approval before placing repair material. Provide minimum 24 hours notice.
- .2 The patch material must be installed and cured in strict accordance with manufacturer's specifications.
- .3 Apply repair mortar to a saturated surface dry (SSD) substrate with no standing water and dry to the touch. A SSD substrate typically exhibits a colour change of dark grey to light grey.
- .4 Apply a bond slurry, consisting of neat patching mortar, to the prepared surface. Thoroughly scrub a thin layer of normal consistency mortar into the saturated surface with a stiff bristle brush to produce a uniform thickness of approximately 1/8" over entire area.
- .5 Apply repair mortar by hand troweling on vertical or overhead surfaces in depths ranging from 1/2" to 2".
 - .1 Vertical Applications: Repair mortar can be applied on vertical applications up to a 2" depth per lift.
 - .2 Overhead Applications: Do not exceed 1.5" thickness per lift. For depths greater than 1.5", limit succeeding lifts to 1" thickness.
 - .3 Multiple Passes: Place succeeding lifts after repair mortar has developed initial set. Scarify the surface of the first lift to ensure integral bond between successive layers.

3.3 FINISHING

- .1 Level surface of repair mortar using a float or screed.
- .2 Apply final finish when mortar has begun to stiffen using a wooden, plastic, or synthetic sponge float or trowel.
- .3 Spray apply undiluted evaporation reducer lightly to aid in finishing.
- .4 Trim or shape to the desired profile if required.

3.4 CURING

- .1 Apply two coats of curing compound in accordance with manufacturer's specifications. Apply the first coat immediately after completing finishing operations. Apply the second coat about 24 hours later.

3.5 CURING

- .1 Protect fresh mortar from premature evaporation.

- .2 Concrete repairs to be wet cured for a minimum of 3 days at 10°C.
- .3 Apply two coats curing compound in accordance with manufacturer's specifications. Apply the first coat immediately upon removal of forms. Apply the second coat about 24 hours later.

3.6 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CSA-A23.1 and Section 01 45 00 - Quality Control and as described herein.
- .2 The Contractor will pay for costs of tests via the testing cash allowance as per Section 01 2 10 - Allowances.
- .3 Not less than one test per 50 square feet of patching material placed and not less than one test for each day of placement.
 - .1 Test samples to be prepared by a CSA certified laboratory in accordance with ASTM C109.
- .4 Bond tests will be completed at the discretion of the Contract Administrator.
 - .1 Infilling of the core hole will be the responsibility of the General Contractor. Unless otherwise directed by the Contract Administrator, repair in accordance with this Section.
- .5 Testing agency to submit copies of concrete test reports directly to Owner and Contract Administrator.
- .6 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve contractual responsibility.

3.7 DEFECTIVE CONCRETE

- .1 Defective concrete: bond strengths below minimum specified value, cracking, spalling, scaling and concrete not conforming to required lines, details, dimensions, tolerances, finishes 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.

END OF SECTION