Part 1 General

1.1 SUMMARY

.1 This section covers the removal and replacement of scaled surface areas the structural deck to provide a smooth surface for installation of the membrane.

.2 The scaling will be removed with a bush hammer and subsequently infilled with thin patching compound. Topping shall be removed and replaced using the same material, extended with aggregate.

1.2 RELATED SECTIONS

.1 Section 03 91 10 – Surface Preparation for Concrete Delamination Repair.

1.3 REFERENCES

.1 American Concrete Institute (ACI)

.1 ACI 546-04, Concrete Repair Guide.

.2 Canadian Standards Association (CSA)

.1 CSA- S448.1-10, Repair of Reinforced Concrete in Buildings.

.3 International Concrete Repair Institute

.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).

.4 ICRI Guideline No. 320.3-2007, Guideline for Inorganic Repair Material Data Sheet Protocol (formerly No. 03740).

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 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.2 Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

.3 Keep materials in manufacturer's original, unopened containers and packaging until installation.

.4 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 Horizontal Repair Mortar: Two-component, screedable, shrinkage-compensated, portland-cement-based repair mortar, with integral corrosion inhibitor with a minimum application thickness of 1/4 inch (6 mm).

.1 Properties:

.1 Unit Weight, ASTM C 185: 124 to 132 pcf (1,986 to 2,115 kg/m^3).

.2 Working Time, 70 degrees F (21 degrees C): Greater than 30 minutes.

.3 Setting Time, ASTM C 266:

.1 Standard Application Temperature, 70 degrees F (21 degrees C):

.1 Initial Setting Time: 40 to 90 minutes.

.2 Final Setting Time: Less than 120 minutes.

.2 Maximum Application Temperature, 90 degrees F (32 degrees C):

.1 Initial Setting Time: 25 to 50 minutes.

.2 Final Setting Time: Less than 60 minutes.

.3 Minimum Application Temperature, 50 degrees F (10 degrees C):

.1 Initial Setting Time: 100 to 150 minutes.

.2 Final Setting Time: Less than 170 minutes.

.4 Compressive Strength, ASTM C 109, 73 degrees F (23 degrees C):

.1 3 Hours: Greater than 1,500 psi (10.3 MPa).

.2 1 Day: Greater than 3,000 psi (20.7 MPa).

.3 7 Days: Greater than 4,000 psi (27.6 MPa).

.4 28 Days: Greater than 5,000 psi (34.5 MPa).

.5 Drying Shrinkage, ASTM C 157, Modified, 28 Days: Less than 500 percent (μstrain).

.6 Rapid Chloride Permeability, ASTM C 1202/AASHTO T 277: Very low range, coulombs.

.7 Static Modulus of Elasticity, ASTM C 469, 28 Days: 3.2×10^6 psi (22.1 GPa).

.8 Salt Scaling Resistance, ASTM C 672, 50 Cycles, Rating: 1.

.9 Coefficient of Thermal Expansion, CRD C 39: 8.1×10^{-6} in/in/degree F (1.46×10^{-5} m/m/degree C).

.10 Freezing and Thawing Resistance, ASTM C 666, Procedure A:

.1 Average Durability Factor, 300 Cycles: Greater than 85.

.11 Cracking Resistance, ASTM C 1581, plots of steel ring strain versus specimen age for each test specimen:

.1 Average Initial Strain: 4.45.

.2 Average Maximum Strain: 39.91.

.3 Average Age at Cracking: Greater than 60 days.

.12 Compressive Creep, ASTM C 512, Average Creep Strain:

.1 7 Days: 0.053 μstrain/psi.

.2 28 Days: 0.075 μstrain/psi.

.13 Direct Tensile Strength, CRD C 164, 2-inch by 4-inch specimens, Average Tensile Strength:

.1 1 Day: 350 psi.

.2 7 Days: 400 psi.

.3 28 Days: 500 psi.

.14 Bond Strength, ASTM C 882, Modified per ASTM C 928, 3-inch by 6-inch slant-shear specimens, Average Slant-Shear Bond Strength:

.1 1 Day: Greater than 1,000 psi.

.2 7 Days: Greater than 1,500 psi.

.3 28 Days: Greater than 2,000 psi.

.15 VOC Content: 0 lbs per gal (0 g/L), less water and exempt solvents.

.2 Acceptable Product: ZERO-C Horizontal Extended Mortar by BASF Building Systems.

.1 Components:

.1 ZERO-C Horizontal Liquid.

.2 ZERO-C Horizontal Mortar.

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 SCALING REMOVAL PROCEDURES

.1 The Contract Administrator will mark out the perimeter of the scaled or debonded areas, which are to be removed as specified herein.

.2 The Contractor must saw-cut the perimeter of the scaled repair area to 1/4 inch. Removal of the scaled material shall be accomplished by the use of a short stroke electric chipping hammer with a sharp bush hammer bit to remove the surface scaling within the marked-out areas.

.3 Minimum depth of removal will be 1/4 inch, and maximum depth will be 1 inch for scaling repairs.

.4 Once the areas have been bush hammered, the Contractor must chain drag all areas to determine if any further unsound material is present, which must be removed.

.5 Once the areas are determined by the Contractor to be sound, request a final inspection from the Contract Administrator. This inspection shall be done in the presence of the Contractor, who shall complete any further work at the time of the inspection.

.6 Within 24 hours prior to infilling, sandblast and/or shotblast the substrate to remove loose and deteriorated concrete, laitance, dust, dirt, oil, and any other material that could interfere with the bond of the new concrete. Provide a uniform surface profile of ICRI-CSP-5 or better. Sample surfaces are available for inspection in the Contract Administrator's office. These samples will be used as the standard of acceptance.

.7 Vacuum clean surface and/or air blast with oil free compressed air to remove residue and spent media created by surface preparation.

.8 Maintain substrate in a clean condition using polyethylene film until the overlay is ready to be placed.

.9 Waterblast substrate at minimum 4,000 psi to remove any residual dust and dirt. Maintain substrate in a saturated condition for a period of not less than two (2) hours prior to concrete placement. If the concrete surface becomes wet and subsequently dries, the surface preparation and cleaning procedure must be repeated.

3.2 INFILL PROCEDURE

.1 Obtain Contract Administrator's approval before placing repair material. Provide minimum 24 hours notice.

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

.3 Mixing of horizontal mortar]

- .1 Mix materials in accordance with manufacturer’s instructions.
- .2 Precondition components to 16°C to 27° C for 24 hours before mixing.
- .3 Ensure repair mortar is thoroughly mixed.
- .4 Do not use free-fall mixers.
- .5 Never mix partial bags.

.4 Bonding Slurry Application:

- .1 Apply the bonding slurry consisting of neat rapid-setting 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. Remove standing water by vacuuming.
- .2 Scrub plastic slurry into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8” over entire area.
- .3 Place repair material while the bonding slurry is still plastic. Do not apply more slurry than can be covered with concrete before it dries. Do not retemper. If the bond slurry dries prior to placement of the concrete, removal of the dried slurry will be required. The concrete substrate will then be cleaned and prepared in accordance with the requirements described in the previous sections.

.5 Immediately place repair material, into the prepared patch area from one side to the other. Work the repair material firmly into the bottom and sides of the patch, and underneath reinforcing steel, to assure good bond.

.6 Ensure that rate of placing is sufficient to complete proposed placing, finishing and curing operations within scheduled time. Limit batch sizes as required if placing procedures are slower than anticipated.

.7 Continuously consolidate and finish to [matching][specified] elevations, ensuring patch thickness and required elevations are maintained.

.8 Ensure reinforcement, floor drains, inserts, etc. are not disturbed during concrete placement.

3.3 FINISHING

.1 Following consolidation and screeding, the surface shall be immediately bull-floated to close and smooth the surface.

.2 Surface to receive a smooth finish free of ridges and trowel marks.

.3 Apply evaporation retardant at manufacturers recommended coverage rate immediately following final finishing. Do not apply evaporation retardant during any finishing operation nor should it be worked into the surface.

.4 Protect freshly placed repair mortar from exposure to dust, debris and precipitation.

3.4 CURING

.1 Concrete repairs to be cured for a minimum of 3 days at 10°C.

.2 Immediately after final finishing, apply evaporation retardant to prevent drying shrinkage until the concrete has enough strength to support the placement of the wet burlap.

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

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

.5 Wet curing with burlap and water must be maintained throughout entire curing period.

.6 Workers shall not be allowed on the overlay for 12 hours after placement. Do not place load upon new concrete until curing period is over.

3.5 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.

3.6 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