SECTION 03 01 36
RESURFACING AND PATCHING OF CONCRETE SLABS

PART 1 - GENERAL

1.1 SUMMARY

A. Grind down high spots in existing concrete surfaces to specified tolerances.

B. Shot blast clean existing concrete slabs free of dirt, laitance, corrosion, or other contamination ready to receive finish flooring.

C. Prepare substrates, level and patch existing concrete surfaces, and concrete surfaces disturbed by the Work of this Contract, including:

1. Restore concrete surfaces after conclusion of demolition.
2. Fill openings in suspended slabs where indicated.
3. Patch concrete at slabs-on-grade where trenching has occurred.

1.2 RELATED REQUIREMENTS

A. Section 03 05 13 - CONCRETE SEALERS: Concrete sealers/coatings on exposed-to-view concrete floors.

B. Section 03 30 00 - CAST-IN-PLACE CONCRETE:

1. Placing and finishing concrete slabs.
2. Dustproofing concrete slabs exposed to view and substrate for carpet.

1.3 REFERENCES

A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ACI 302 - Guide for Concrete Floor and Slab Construction.
2. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.
3. ASTM C 33 - Concrete Aggregates.
4. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch Cube Specimens).
5. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
6. ASTM C 150 - Portland Cement.
7. ASTM C 348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.

8. ASTM C 928 - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.
9. ASTM C 1708 – Self-leveling Mortars Containing Hydraulic Cements.

1.4 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
   1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for proposed patching underlayment.
   2. Concrete Mix Test Reports: Submit Preliminary Design Mix Reports (ACI 301).
   3. Manufacturer's instructions: Manufacturer's preparation, mixing, priming, and application instructions.
   4. Shop drawings:
      a. Patching and resurfacing scope drawings: 1/4-inch scale elevations and plans of areas covered by the Work of this Section.
      b. Reinforcement shop drawings: Plans and details showing bar sizes, spacing, locations, depth of doweling, and quantities of reinforcing steel Include schedules and diagrams to indicate beds, sizes and lengths of reinforcing members.

1.5 QUALIFICATIONS

A. Materials manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years' experience.

B. Mixing and application equipment as approved by the manufacturer.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of materials.

C. Qualifications:
   1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

D. Perform work to provide homogeneous concrete with required strength, durability, and without planes of weakness, and other structural defects, and free of air pockets, voids, projections, off sets of plane, and other defacements on exposed surfaces.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Deliver materials in manufacturer's original undamaged packages or acceptable

bulk containers.

C. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.8 ENVIRONMENTAL CONDITIONS

A. Do not place cementitious underlayment when ambient temperature is below freezing.

B. When air temperature has fallen or is expected to fall below 40 degrees. F (4 degrees. C), heat water and aggregates before mixing to attain concrete at point of placement with temperature of 50 degrees F, 80 degrees F maximum.

C. Do not place concrete underlayment on surfaces that are covered with standing water, snow, or ice.

PART 2 – PRODUCTS

2.1 DESCRIPTION

A. General Description: Interior Work consisting of:

1. Cement and polymer-based, trowel applied underlayment and patching mortar, for conditions:
   a. Feather to 1/2 inch thick.
   b. 1/2 to 3 inches thick.
2. Portland cement concrete fill.

B. Sustainability Requirements:

1. Provide materials with maximum possible recycled content.

2.2 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Ardex Engineered Cements, Aliquippa PA.
2. Bonsal American (Pro Spec), Charlotte NC.
3. Silpro Corporation, Ayer MA.

2.3 UNDERLAYMENT AND PATCHING MORTAR

A. General: Provide products that are compatible with flooring adhesives.

B. Concrete resurfacing and underlayment for applications up to 1/2 inch thick: Factory blended portland cement-based product mixed with latex admixture, having the following performance characteristics:

1. Thickness Range: From feather edge to 1/2" maximum thickness.

2. Working Time: At least 30 minutes at 70°F.
3. Compressive Strength: ASTM C109, minimum 4,700 psi after 28 days.
4. Tensile Strength: ASTM C190, minimum 1,040 psi after 28 days.
5. Flexural Strength: ASTM C348, 1,560 psi after 28 days.
6. Bond Strength to Concrete: ASTM C321, Crossed brick method, failure in concrete.
7. Acceptable products:
   a. Ardex: “SD-F Feather Finish”.
   b. Bonsal (Pro Spec): “Feather Edge”.
   c. Silpro: “Masco Underlayment and Repair Mortar with Silpro C21”.

C. Concrete resurfacing and underlayment for applications over 1/2 inch thick and up to 3 inches thick: Factory blended portland cement-based product with latex admixture, having the following performance characteristics:
1. Thickness Range: From 1/2 inch to 3 inch maximum thickness. Provide without added aggregate, unless recommended by manufacturer for thickness required.
   a. Silpro: 1/2 to 3/4 inch without aggregate; use 3/8 inch pea stone for 3/4 to 3 inch thickness.
   b. Ardex: 1/2 inch to 2 inches without aggregate; Use 3/8 pea stone for 2 to 3 inch thickness.
   c. Bonsal (Pro Spec): 1/2 inch to 2 inches without aggregate; Use 3/8 pea stone for 2 to 3 inch thickness.
2. Working Time: At least 30 minutes at 70°F.
3. Compressive Strength: ASTM C109, minimum 6,000 psi after 28 days.
4. Tensile Strength: ASTM C190, minimum 710 psi after 28 days.
5. Flexural Strength: ASTM C348, minimum 1,200 psi after 28 days.
6. Shear Bond Strength: ASTM C1042, minimum 1,540 psi after 28 days.
7. Acceptable products:
   a. Ardex: “SD-T”.
   b. Bonsal (Pro Spec): “Premium Patch 100”.
   c. Silpro: “Mascrete Topping and Structural Repair Mortar with Silpro C21”.

D. Water: Clean and potable.

E. Primers: Unless otherwise recommended by underlayment and patching mortar manufacturer for substrate material, condition, and porosity encountered:
1. Ardex: “P-51”.
2. Bonsal (Pro Spec): “118 Primer”.
3. Silpro: “C 21 All Acrylic”.

2.4 CONCRETE FILL MATERIALS

A. Minimum compressive strength of slabs on grade, and topping slabs on metal deck: 3000 psi at 28 days, unless otherwise indicated on the structural Drawings.

B. Maximum water to cement ratio: 0.45.

C. Concrete Materials:
1. Cement conforming to ASTM C 150, Type II - Normal.

2. Fine aggregates conforming to ASTM C 33; natural sand.
3. Course aggregates conforming to ASTM C 33; crushed stone or gravel.
4. Water: Clean and potable.

D. Concrete bonding agent: Two component epoxy bonding agent conforming with ASTM C881, Type 2.

2.5 ACCESSORIES:

A. Cleaning Agent: Commercial Muriatic acid.

B. Perimeter Joint Filler: Glass fiber strips, compressible to 50 percent original thickness under load of 25 pounds per square inch with full recovery. Conforming to ASTM C612, Class 2.

2.6 SOURCE QUALITY CONTROL

A. Manufacturer Services: Make arrangements to have Manufacturer's representative (employed by manufacturer) on-site during Work of this Section to periodically review installation procedures. A minimum of 3 site visits are required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Beginning of installation means acceptance of existing conditions.

B. The Contractor shall inspect and sound the areas involved to determine the full extent of the work involved and shall outline the limits of work involved using a marking crayon, paint or other suitable method for review by Architect.

3.2 PREPARATION - GENERAL

A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using acid; rinse surface with clean water and allow to dry.

B. Remove loose and friable materials from depressions and edges so new material bonds to sound existing construction.

C. Flush out cracks and voids with Muriatic acid to remove laitance and dirt. Chemically neutralize by rinsing with water.

D. Apply recommended number of coats of specified primer, at strength recommended for the substrate, by the primer manufacturer.

E. Preparation for patching holes and depressions:
1. Edges: Confirm edges are saw cut. Broken and fractured edges are not acceptable.
2. Shape for slabs-on-grade: Confirm excavated shape has a greater surface area at the bottom than at the top to create a "dovetail slot" where the new concrete fill is mechanically locked.
3. Shape for supported slabs: Confirm sound support and formwork at limits of placement.

F. Where concrete patching, filling, or topping is required to "feather edge", saw cut a minimum 3/4 inch wide by 3/8 inch deep bonding channel in the concrete substrate at the point of feather edging.

3.3 RESURFACING WORK - GENERAL

A. For spalling slab areas: Saw-cut around spalled areas to a depth of 1/2 to 3/4 inch. Angle bottom of saw cut away from spalled areas to provide keying. Chip out spalled area to saw cuts, chip area flat and level. Fill voids flush with surface with underlayment patching material.

B. In locations where concrete is loose, chipped or missing to a depth of more than 3 inches; dowel stainless steel reinforcing into existing concrete. Drill holes in existing concrete equal to depth of repair; insert 1/4-inch diameter stainless steel dowels and pack solid with high- strength non-shrink grout.

3.4 FILLING WITH CONCRETE

A. Install all framing, formwork and dowels required for the placing of concrete and for bonding new concrete to existing.

B. Shortly before placing concrete, saturate the perimeter edges of the openings with water. After the free or glistening water disappears, the edges shall be given a thorough coating of neat cement slurry mixed to the consistency of thick paste and scrubbed in with a stiff bristle brush.

C. Place mix and strike level with adjacent surfaces.

D. Texture of finished concrete shall match that of existing abutting concrete.

3.5 APPLICATION - CONCRETE UNDERLAYMENT AND PATCHING MORTAR

A. Surface Preparation:

1. Clean substrate free of grease, wax, curing compounds and all other foreign materials.
   Substrates shall be solid and sound; remove all soft or crumbly materials.
2. Make adhesion tests as recommended by manufacturer to ensure good bond to substrate. Acid etch polished floors. Completely strip sealed floors of existing sealer compounds.
3. Prime subfloors as recommended by underlayment manufacturer, using the correct primer for porous and non-porous subfloors.

B. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

C. Mix product directly from sealed package with water in proportions recommended by manufacturer. Where recommended by product manufacturer, add crushed stone aggregate and blend to dry mix prior to adding latex admixture. Avoid over watering.

D. Apply underlayment and patching mortar while primer is still tacky. Place and trowel underlayment to the desired thickness. Do not use a power trowel. Steel trowel finish where underlayment will be a substrate for a finished flooring surface.

E. If two or more layers of underlayment are applied, place second layer after first layer has set to walkable hardness.

F. Where depressions occur, fill depressed area level with abutting surfaces.

G. Install expansion joint filler at:

1. Perimeter of placements.

2. Around penetrations through decks.

3.6 TOLERANCES

A. Installation Tolerances: The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Level: 1/8" in 10'-0" when measured with a 10 foot long straight edge in all directions.

3.7 DEFECTIVE UNDERLAYMENT

A. Defective underlayment and patching mortar: Defined as material not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Refinish or remove and replace underlayment and patching mortar surfaces that are too rough to receive finish flooring or where physical properties do not meet specified requirements.

C. Repair or replacement of defective underlayment will be determined by the Architect.

END OF SECTION

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