

SECTION 03 01 00.01
REHABILITATION OF CONCRETE CURBS, WALLS, STAIRS AND PLATFORMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- B. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
- C. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2016.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- E. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- F. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
- G. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2023.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- I. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2021.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
- K. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020a.
- L. ASTM C928/C928M - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs; 2020a.
- M. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2021.
- N. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

1.02 1.01 SECTION INCLUDES

- A. Cleaning of existing concrete surfaces.
- B. Repair of exposed structural, shrinkage, and settlement cracks.
- C. Resurfacing of concrete surfaces having spalled areas and other damage.
- D. Repair of deteriorated concrete.
- E. Repair of internal concrete reinforcement.

1.03 1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete, Control Joints and Reinforcing: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.04 1.03 REFERENCE STANDARDS

- A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.
- B. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
- C. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2014.

- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.
- E. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- F. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2014.
- G. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars; (Using 2 inch cube specimens); 2013.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- I. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2014.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- K. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2013.
- L. ASTM C928/C928M - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Material for Concrete Repairs; 2013.
- M. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- N. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2011.

1.05 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administration of Contracts and Project Procedures, for submittal procedures.
- B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

1.06 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.01 2.01 CLEANING MATERIALS

- A. Detergent: Non-ionic detergent.

2.02 2.02 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

- A. Manufacturers:
 1. Adhesives Technology Corporation: www.atcepoxy.com.
 2. ARDEX Engineered Cements: www.ardexamericas.com.
 3. BASF Corporation Construction Systems: www.master-builders-solutions.basf.us.
 4. Dayton Superior Corporation: www.daytonsuperior.com.
 5. The QUIKRETE Companies: www.quikrete.com.
 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Bonding Slurry: Water-based latex admixture complying with ASTM C1059/C1059M, combined with Portland cement and sand in accordance with admixture manufacturer's instructions.
 1. Admixture Products:
 - a. Dayton Superior Corporation; Acrylic Bonding Agent J40: www.daytonsuperior.com.
 - b. The QUIKRETE Companies; QUIKRETE® Concrete Bonding Adhesive: www.quikrete.com.
 - c. SpecChem, LLC; Acrylic Bonder: www.specchemllc.com.
- C. Cementitious Resurfacing Mortar: One- or two-component, factory-mixed, polymer-modified cementitious mortar designed for continuous thin-coat application.

1. In-place material resistant to freeze/thaw conditions.
 2. Mixed with water or latex type bonding agent in proportions as recommended by manufacturer.
 3. Integral corrosion inhibitor.
 4. Recommended Thickness: Feather edge to 1/8 inch.
 5. Color: Light gray.
 6. Products:
 - a. Kaufman Products Inc.; Patchwell Deep Light: www.kaufmanproducts.net.
 - b. Prospec, an Oldcastle brand; CR Concrete Resurfacer: www.prospec.com.
 - c. SpecChem, LLC; Duo Patch: www.specchemllc.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Cementitious Repair Mortar, Trowel Grade: One- or two-component, factory-mixed, polymer-modified cementitious mortar.
1. In-place material resistant to freeze/thaw conditions.
 2. Mixed with water or latex type bonding agent in proportions as recommended by manufacturer.
 3. Dry Material: Complies with ASTM C928/C928M.
 4. Integral corrosion inhibitor.
 5. Products:
 - a. Adhesives Technology Corporation; HARD-ROC Jet Patch: www.atcepoxy.com.
 - b. Kaufman Products Inc.; Patchwell Deep Light: www.kaufmanproducts.net.
 - c. The QUIKRETE Companies; QUIKRETE® FastSet Repair Mortar: www.quikrete.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Cementitious Repair Mortar, Form and Pour/Pump Grade: Flowable, one- or two-component, factory-mixed, polymer-modified cementitious mortar; in-place material resistant to freeze/thaw conditions.
1. Mixed with water in proportions as recommended by manufacturer.
 2. Integral corrosion inhibitor.
 3. Products:
 - a. ARDEX Engineered Cements; ARDEX FDM: www.ardexamericas.com.
 - b. Dayton Superior Corporation; Civil/Structural FPX : www.daytonsuperior.com.
 - c. Kaufman Products Inc.; Patchwell Deep: www.kaufmanproducts.net.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Cementitious Pavement Repair Mortar: Fast hardening, flowable; composed of cement, sand, and additives; capable of setting in cold weather conditions without the aid of chloride- or gypsum-based accelerators; in-place material resistant to freeze/thaw conditions.
1. Dry Material: Complies with ASTM C928/C928M.
 2. Integral corrosion inhibitor.
 3. Time To Open To Traffic: 6 hours, maximum.
 4. Time to Top-Coating: 4 hours, maximum.
 5. Products:
 - a. Dayton Superior Corporation; HD 50 : www.daytonsuperior.com.
 - b. Kaufman Products Inc.; Duracrete II: www.kaufmanproducts.net.
 - c. SpecChem, LLC; RepCon 928: www.specchemllc.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Cementitious Hydraulic Waterstop: Very fast setting, low slump, hand formable, and capable of stopping active water leaks; in-place material resistant to freeze/thaw conditions.
1. Products:
 - a. Dayton Superior Corporation; Waterstop : www.daytonsuperior.com.
 - b. Kaufman Products Inc.; SurePlug - regular set: www.kaufmanproducts.net.
 - c. W.R. Meadows, Inc.; Meadow-Plug or Meadow-Patch 5: www.wrmeadows.com.

- d. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Exterior Self-Leveling Concrete Topping: Portland cement-based; suitable as wear surface topping in exterior and wet locations as well as underlayment for applied materials.
 - 1. Compressive Strength: 4300 psi(4354 psi), minimum, at 28 days, when tested in accordance with ASTM C109/C109M, air cured.
 - 2. Flexural Strength: 1000 psi(1016 psi), minimum, at 28 days, when tested in accordance with ASTM C348.
 - 3. Products: Product information supplied by Contractor.
- I. Pre-Blended Concrete Mix for Small Projects: Construction-grade Portland cement uniformly blended with aggregates and other approved concrete ingredients, requiring only the addition of water.
 - 1. Compressive Strength: 4000 psi(4006 psi), minimum, at 28 days, when tested in accordance with ASTM C39/C39M.
 - 2. Products:
 - a. The QUIKRETE Companies; QUIKRETE® Concrete Mix: www.quikrete.com.
 - b. The QUIKRETE Companies; QUIKRETE® Crack Resistant Concrete Mix: www.quikrete.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 2.03 EPOXY PATCHING AND REPAIR MATERIALS

- A. Manufacturers:
 - 1. Adhesives Technology Corporation: www.atcepoxy.com.
 - 2. Dayton Superior Corporation: www.daytonsuperior.com.
 - 3. Chase Construction Products: www.chasecorp.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Epoxy Repair Mortar: Epoxy resin mixed with aggregate and other materials in accordance with manufacturer's instructions for purpose intended; conform to pot life and workability limits.
 - 1. Products:
 - a. Adhesives Technology Corporation; Crackbond LR-321: www.atcepoxy.com.
 - b. Dayton Superior Corporation; Sure Patch: www.daytonsuperior.com.
 - c. Kaufman Products Inc.; SurePoxo Mortar, SurePoxo HMLV, or SurePoxo HMLV Class B: www.kaufmanproducts.net.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Epoxy Injection Adhesive:
 - 1. Products:
 - a. Adhesives Technology Corporation; Crackbond LR-321: www.atcepoxy.com
 - b. Dayton Superior Corporation; Sure Inject J56: www.daytonsuperior.com.
 - c. Kaufman Products Inc.; SurePoxo HMLV, SurePoxo HMLV Class B, or SurePoxo HMSLV: www.kaufmanproducts.net.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Epoxy Bonding Adhesive: Non-sag, two-part, 100 percent solids; recommended by manufacturer for purpose and conditions under which used.
 - 1. Non-Load-Bearing Applications: ASTM C881/C881M Type I, II, IV, or V, whichever is appropriate to application.
 - 2. Load-Bearing Applications: ASTM C881/C881M Type IV or V, whichever is appropriate to application.
 - 3. Other Applications: ASTM C881/C881M Type as appropriate to application.
 - 4. Products:
 - a. Adhesives Technology Corporation; Crackbond LR321: www.atcepoxy.com.
 - b. SpecChem, LLC; SpecPoxo 2000: www.specchemllc.com.
 - c. W.R. Meadows, Inc.; Rezi-Weld Gel Paste: www.wrmeadows.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 2.04 POLYURETHANE PATCHING AND REPAIR MATERIALS

- A. Manufacturers:
 - 1. Adhesives Technology Corporation: www.atcepoxy.com.
 - 2. Dayton Superior Corporation: www.daytonsuperior.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Polyurethane Repair Gel:
 - 1. Products:
 - a. Adhesives Technology Corporation; Crackbond CSR: www.atcepoxy.com.
 - b. Dayton Superior Corporation; Rapid Resin Repair: www.daytonsuperior.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 2.05 ACCESSORIES

- A. Anchoring Adhesive: Self-leveling or non-sag as applicable.
 - 1. Self-Leveling Polyester-Based Products:
 - a. W.R. Meadows, Inc.; Poly-Grip: www.wrmeadows.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Self-Leveling Epoxy Products:
 - a. SpecChem, LLC; SpecPoxy 2000; www.specchemllc.com.
 - b. W.R. Meadows, Inc.; Rezi-Weld 1000, Rezi-Weld (IP), or Rezi-Weld 3/2: www.wrmeadows.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 3. Non-Sag Epoxy Products:
 - a. Dayton Superior Corporation; Sure Anchor J50, Sure Anchor I J51, All Weather J51 AW, Pro-Poxy 300, Pro-Poxy 300 FAST or Pro-Poxy 400: www.daytonsuperior.com.
 - b. SpecChem, LLC; SpecPoxy 3000 or SpecPoxy 3000 FS: www.specchemllc.com.
 - c. W.R. Meadows, Inc.; Rezi-Weld Gel Paste or Rezi-Weld Gel Paste State: www.wrmeadows.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Portland Cement: ASTM C150/C150M, Type I, grey.
- C. Sand: ASTM C33/C33M or ASTM C404; uniformly graded, clean.
- D. Water: Clean and potable.
- E. Reinforcing Steel: ASTM A615/A615M Grade 40 (40,000 psi) (40639 psi) billet-steel deformed bars, unfinished.
- F. Reinforcing Steel: Deformed bars, ASTM A996/A996M Grade 40 (280), Type A.
 - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Stirrup Steel: ASTM A1064/A1064M.

PART 3 EXECUTION

3.01 3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of substrate.

3.02 3.02 CLEANING EXISTING CONCRETE

- A. Provide enclosures, barricades, and other temporary construction as required to protect adjacent work from damage.
- B. Clean concrete surfaces of dirt or other contamination using the gentlest method that is effective.
 - 1. Try the gentlest method first, then, if not clean enough, use a less gentle method taking care to watch for impending damage.
 - 2. Clean out cracks and voids using same methods.

- C. The following are acceptable cleaning methods, in order from gentlest to less gentle:
 1. Water washing using low-pressure, maximum of 100 psi, and, if necessary, brushes with natural or synthetic bristles.
 2. Increasing the water washing pressure to maximum of 400 psi.
 3. Adding detergent to washing water; with final water rinse to remove residual detergent.
 4. Steam-generated low-pressure hot-water washing.
 5. Alkaline cleaning agent applied for the least amount of time that is effective, followed by slight acid rinse and water rinse.
 6. Acidic cleaning agent applied for the least amount of time that is effective, followed by water rinse. Test acidic cleaning agents on mock-up surfaces prior to use.
 7. Abrasive blasting: Use only abrasive media that have been proven not to damage concrete by testing on mock-up.
- D. Do not use any of the following cleaning methods, unless otherwise indicated:
 1. Brushes with wire bristles, grinding with abrasives, solvents, hydrochloric or muriatic acid, sodium hydroxide, caustic soda, or lye.
 2. Soap or detergent that is not non-ionic.

3.03 3.03 CONCRETE STRUCTURAL MEMBER REPAIR

- A. See the drawings for specific areas to be repaired.
- B. Remove broken and soft concrete at least 1/4 inch deep.
- C. Mechanically cut away damaged portions of reinforcement.
- D. Remove corrosion from steel and clean mechanically.
- E. Blast clean remaining exposed reinforcement surfaces.
- F. Repair by welding new bar reinforcement to existing reinforcement using sleeve splices.
 1. Perform welding work in accordance with AWS D1.4/D1.4M.
 2. Make welded sleeve splices to achieve strength to exceed strength of new reinforcement.
- G. Cover exposed steel reinforcement with epoxy mortar.
- H. Work epoxy mortar into broken surface and build up patch to match original.
- I. Feather edges of repairs flush to sound surface and trowel surface to match surrounding area.

3.04 3.04 CRACK REPAIR USING EPOXY ADHESIVE INJECTION

- A. Repair exposed cracks.
- B. Provide temporary entry ports spaced to accomplish movement of fluids between ports; no deeper than the depth of the crack to be filled or port size diameter no greater than the thickness of the crack. Provide temporary seal at concrete surface to prevent leakage of adhesive.
- C. Inject adhesive into ports under pressure using equipment appropriate for particular application.
- D. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.
- E. Remove temporary seal and excess adhesive.
- F. Clean surfaces adjacent to repair and blend finish.

3.05 3.05 CONCRETE SURFACE REPAIR USING CEMENTITIOUS MATERIALS

- A. Remove all loose and deteriorated concrete by hammer and hand-held pointed tools until sound concrete is reached. Do not fracture adjacent surfaces. Clean concrete surfaces, cracks, and joints of dirt, laitance, corrosion, and other contamination using method(s) specified above and allow to dry. Cut out at least 1/2" of concrete around exposed steel rebar. Clean all areas to be patched including rebar, using power wire brush. Vacuum clean and prepare them as per patching compound Manufacturer's instructions. Paint all cleaned steel rebars with anti-corrosion coating immediately after cleaning. Anti-corrosion coatings shall be Thoroc Zincrich

Rebar Primer or equal. Cut out rebars within 1/2" of exterior surface and replace with new bars in kind with minimum clear cover of 3/4". Weld new rebars to existing rebars. Whenever the depth of spall is 2" or more, provide 1/4" diameter 2" long pins in base concrete at 6" on center with 1" embedment.

- B. Apply coating of bonding agent to entire concrete surface to be repaired.
- C. Fill voids with cementitious mortar flush with surface.
- D. Apply repair mortar by steel trowel to a minimum thickness of 1/4 inch over entire surface, terminating at a vertical change in plane on all sides.
- E. Trowel finish to match adjacent concrete surfaces. Trowel in the patching compound in layers as per the Manufacturer's recommendations. The number of layers and the thickness shall vary according to the depth and extent of the cavity to be repaired. The final layer shall be carefully tooled flush and smooth with the adjacent existing surfaces. Cure repaired surfaces in accordance with the Manufacturer's recommendations.
- F. Damp cure for four days. Apply two coats of acrylic modified cementitious coating over the repaired concrete surfaces as per Manufacturer's recommendations. The color of the coating shall match and blend with the color of the existing adjacent surfaces. Protective cement coating (acrylic modified cementitious material) shall be Thoroc Cement Coating or equal.

3.06 3.06 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 40 00, will perform field inspection and testing.
 - 1. Test concrete for calcium chloride content during the execution of the Work.

END OF SECTION 03 01 00.01