

SECTION 030131 CONCRETE REHABILITATION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Repair of existing spalled and deteriorated concrete surfaces

1.2 REFERENCES

Except as shown or specified, the Work of this Section shall conform to the requirements of International Concrete Repair Institute (ICRI), 3166 S. River Rd., Suite 132, Des Plaines, IL 60018, (847) 827-0830, www.icri.org.

1. ICRI Guideline No. 310.1R-2008 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (formerly Guideline No. 03730).

1.3 SUBMITTALS

- A. Product Data: Manufacturer's specifications and installation instructions for specified products.

1.4 QUALITY ASSURANCE

- A. Field Examples: Prior to performing the Work of this Section, prepare a sample panel, or a portion of existing concrete which is to be repaired, to represent each type of rehabilitation work required. Approved samples will be used as quality standards for the Work. Maintain approved samples at the site until the Work is completed.

1. Vertical patch preparation (6" x 6")
2. Horizontal patch preparation (2' x 2')
3. Concrete encasement reinforcing/ steel coating
4. Concrete coating preparation (4' x 4')

- B. Material Container Labels: Material containers shall bear the manufacturer's label indicating manufacturer's name, trade name of product, lot number, shelf life of product, and mix ratio (if applicable).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site in original, sealed containers. Do not deliver materials that have exceeded shelf life limitation set forth by the manufacturer.
- B. Comply with manufacturer's printed instructions for storing and handling materials.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with the product manufacturer's printed limitations and instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. The Euclid Chemical Company, 19218 Redwood Rd., Cleveland, OH 44110-2799, (800) 321-7628, www.euclidchemical.com.
- B. Sika Corporation, 201 Polito Ave., Lyndhurst, NJ 07071, (800) 933-7452, www.sikausa.com.
- C. Kaufman Products, Inc., 3811 Curtis Ave., Baltimore, MD 21226, (800) 637-6372, www.kaufmanproducts.net.
- D. L&M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152, (800) 362-3331, www.lmcc.com.
- E. Conproco Corp., 17 Production Dr., Dover, NH 03820, (800) 258-3500, www.conproco.com.
- F. BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517, www.buildingsystems.basf.com.

2.2 MATERIALS

- A. The following brand names are specified to establish product generic type and standard of quality. Other comparable products in the manufacturer's same product series may be required to closely fit the particular job conditions. Use appropriate product for depth of patch and temperature at time of application. More than one product may be required for a particular type of patching mortar. When a color choice is available, select the color to match adjoining concrete as closely as practicable. A bonding agent/primer and/or sealer shall be used as recommended by the patching mortar manufacturer.
- B. Vertical Surface Patching Mortars: "VERTICOAT", by The Euclid Chemical Company; "SIKATOP 122 PLUS" or "SIKATOP 123 PLUS" by Sika Corp; "PATCHWELL VO" or "HICAP PLUS" by Kaufman Products, Inc.
- C. Rapid-hardening Cementitious Patching Mortar: "DURAPATCH" by L&M Construction Chemicals, Inc.; or "SIKASET ROADWAY PATCH" by Sika Corp or "DURACRETE II", "DURACRETE II HW", "DURACRETE II FR", "DURACRETE II HWFR", by Kaufman Products, Inc.

- D. Rebar Coating: “SUREPOXY HMEPL” or SUREPOXY HM 12” by Kaufman Products, Inc.; “ECB” by Conproco Corp.; or “EMACO P22” or “EMACO P24” by BASF Building Systems.
- E. Cleaning Agent, Bonding Agent/Primer, Sealer/Topcoat: As recommended by the patching mortar manufacturer, including primer for the reinforcing steel and primer for the concrete substrate.
- F. Vapor Permeable Anti-Carbonation Concrete Coating System:
 - 1. SIKA ARMATEC 110 EPOCEM by Sika Corporation, or approved equal.
 - 2. SIKA TOP 123 PLUS by Sika Corporation, or approved equal.
 - 3. SIKAGARD 670 W by Sika Corporation, or approved equal.
- G. Anti-corrosive Coating System:
 - 1. Rust Converter by Ospho, 24 Young Road, Katonah, NY 10536 (www.skybryte.com, 216-771-1590), or approved equal.
 - 2. Paint: Oil Based Paint by Rust-oleum Corporation (877-385-8155), or approved equal.
- H. Self-Consolidating Concrete Repair Mortar: SikaQuick 1000, by Sika Corporation, or approved equal.
- I. Reinforcement: ASTM A615, Grade 60 for uncoated deformed bars.
- J. Stainless Steel Reinforcing Bars (plain): ASTM A955.
- K. Chemical Adhesive:
 - 1. Anchoring to solid concrete:
 - a. Anchors for use when base material temperature is 0°F or greater: “HIT-Ice” by Hilti; “Epcon A7” by ITW Ramset/Red Head; “AC 100 Plus” by Powers Fasteners; “AT Acrylic-Tie” by Simpson/Strong-Tie; or accepted equivalent.
 - b. Anchors for use when base material temperature is 40°F or greater; “HIT-HY 200 Safe Set System with HIT-Z Rod or Hollow Drill Bit System” or “HIT-RE 500-SD” by Hilti; “Epcon C6” by ITW Ramset/Red Head; “T308 Plus” by Powers Fasteners; “ET Epoxy-Tie” by Simpson/Strong-Tie; or accepted equivalent.
 - 2. Anchoring to brick:
 - a. Anchors for use when base material temperature is 0°F or greater: “Epcon A7” by ITW Ramset/Red Head; “AC 100 Plus” by Powers Fasteners; “AT Acrylic-Tie” by Simpson/Strong-Tie; or accepted equivalent.
 - b. Anchors for use when base material temperature is 40°F or greater: “HIT-HY 70” by Hilti; “Epcon C6” by ITW Ramset/Red Head; “T308 Plus” by

Powers Fasteners; "ET Epoxy-Tie" by Simpson/Strong-Tie; or accepted equivalent.

c. Provide manufacturer's standard screen tubes for use with anchors.

L. Formwork: Plywood materials shall be one of the following:

1. Overlaid plywood complying with U.S. Product Standards PS 1 "A-C or B-B High Density Overlaid (HDO) Concrete Form," Class 1, exterior grade or better.
2. Plywood complying with U.S. Product Standard PS 1 "B-B (Concrete Form) Plywood," Class 1, exterior grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

PART 3 EXECUTION

3.1 PREPARATION

A. Protection: Cover or otherwise protect adjacent surfaces not being repaired.

B. Surface Preparation for concrete patching (top of roof deck):

1. Prepare surfaces to be repaired in accordance with the product manufacturer's printed instructions and as specified.
2. Cut out and remove cracked, spalled, and disintegrated concrete. Cut back to sound concrete. Cut edges of patch perpendicular to surface of patch, unless otherwise recommended by mortar manufacturer. If steel reinforcing bars are exposed, chip concrete out from behind exposed length of bars as required for a minimum clearance around circumference of bar of 3/4 inch. In addition, cut a minimum one inch length of sound concrete away from each end of exposed length of reinforcing bars.
3. Clean exposed steel reinforcement; remove bits of concrete and loose rust. If reinforcement is bowed out toward surface of the concrete, bend reinforcement back from surface.
4. Remove paint, oils, grease, dirt, salt deposits, laitance and other contaminants from surfaces to be patched. Use cleaning agent where required.
5. Clean areas to be patched with oil-free air or water under pressure, except as otherwise recommended by the mortar manufacturer.

C. Surface Preparation for concrete coating (bottom of roof deck):

1. Power wash underside of concrete deck to remove loose concrete.
2. Prepare exposed steel reinforcement prior to installing concrete coating.

D. Surface Preparation for steel beam encasement:

1. Sound existing concrete encasement surfaces identified on Drawings.

2. Remove loose concrete as noted on Drawings.
3. Remove loose paint, rust scale, dirt, oil or grease from exposed steel beam with a wire brush.
4. Apply anti-corrosive steel coating and allow to dry 24-48 hours.
5. Brush off any loose powder that forms prior to painting.
6. Coat with industrial strength, oil based paint. Do not use latex or water based coating.

3.2 COATING REBAR

- A. Coat reinforcing as soon as possible after completion of surface preparation.
- B. Place reinforcement coating complying with manufacturers printed instructions.

3.3 PATCHING CONCRETE DECK

- A. Patch concrete as soon as possible after completion of surface preparation.
- B. Mixing Patching Mortar: Comply with mortar manufacturer's printed instructions. Proportion components and sizes of aggregate as recommended by mortar manufacturer for the particular job conditions.
- C. Patch concrete in accordance with the product manufacturer's printed instructions. Coat contact surfaces of existing concrete and steel reinforcing with a bonding agent/primer as recommended in the product manufacturer's instructions.
- D. Bring patches out to the original surfaces in true planes. Finish patches to match texture of adjoining concrete as close as possible.
- E. Cure patches in accordance with the product manufacturer's printed instructions.

3.4 ANTI-CARBONATION COATING

- A. Wire brush exposed reinforcing mesh.
- B. Apply Sika Armatec 110 EpoCem and coat with SikaTop 123 Plus while wet.
- C. Coating representative to review prepared surface prior to coating application.
- D. Apply anti-carbonation coating, per manufacturer's instructions.

3.5 PROTECTION

- A. Protect exposed roof deck repairs until roofing system is installed.

ALTERATIONS TO BUILDING #51
EMERGENCY HOUSING SHELTER
38 SEWARD AVENUE
MIDDLETOWN, NY 10940

1802-01
RFB-OC095-21

END OF SECTION 030131

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
 - 1. Concrete equipment pads
 - 2. Miscellaneous floor infill

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1.5 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. Structural Performance: concrete and reinforcement, shall withstand the effects of gravity loads.
- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301
 2. ACI 117

2.2 FORM-FACING MATERIALS

- A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
 1. Portland Cement: ASTM C 150, Type II, gray.
 2. Fly Ash: ASTM C 618, Class F or C.
- B. Normal-Weight Aggregates: ASTM C33, graded.
 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
- C. Air-Entraining Admixture: ASTM C 260.

- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride. Admixtures shall be added to concrete mix design at discretion of contractor. Contractor shall send all mixture designs with admixtures to Engineer of Record for approval prior to construction.
1. Water-Reducing Admixture: ASTM C 494, Type A.
 2. Retarding Admixture: ASTM C 494, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.8 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum W/C Ratio: 0.50
3. Slump Limit: 4 inches for concrete with verified slump of 3 to 4 inches before adding high-range admixture , plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.9 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 11.
- C. Do not chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301

3.5 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
 - 2. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.7 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

3.8 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000