

**SECTION 03930**

**CONCRETE REHABILITATION**

**PART 1 GENERAL**

**1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. Crack Repairs by Epoxy Injection: Section 03931.
- B. Masonry Restoration: Section 04911.
- C. Cementitious Waterproofing: Section 07161.
- D. Water Repellent Coating: Section 07191.
- E. Joint Sealers: Section 07900.
- F. Opaque Exterior Wall Resurfacing: Section 09981.

**1.02 REFERENCES**

- A. Except as shown or specified, the Work of this Section shall conform to the requirements of International Concrete Repair Institute (ICRI).
  - 1. ICRI Guideline No. 03730 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion.

**1.03 UNIT PRICES FOR ADDED OR DEDUCTED WORK**

- A. Do not exceed the quantities of Work indicated by numeric units on the Drawings, except by Order on Contract. In order to avoid delay, notify the Director's Representative when the amount of completed Work approaches the quantity indicated.
- B. If the installed quantity of Work is greater than the numeric units of Work indicated on the Drawings, the contract sum will be adjusted by an Order on Contract. If the installed quantity of Work is less than the numeric units of Work indicated on the Drawings, the contract sum will be adjusted via a Supplemental Agreement (BDC 134) at time of final payment at the following unit prices:

**SUBPARAGRAPHS BELOW ARE EXAMPLES. EDIT OR MODIFY AS REQUIRED. INSERT MORTAR TYPE. DETERMINE UNIT OF MEASUREMENT FROM THE DRAWINGS. GET UNIT PRICES FROM COST CONTROL AND INSERT; NOTIFY COST CONTROL OF PERTINENT CONDITIONS, SUCH AS HEIGHT OFF GROUND AND WHETHER GENERALLY HORIZONTAL SURFACES (C-2, E-1, E-3 AND R-1 MORTARS) OR VERTICAL/OVERHEAD SURFACES (C-1, E-2 AND E-4 MORTARS). DELETE UNDERLINES BEFORE ENTERING INFORMATION.**

- 1. Patching Concrete Surfaces with Type \_\_\_\_\_ Patching Mortar:
  - a. Added patching @ \$ \_\_\_\_\_ per square foot.
  - b. Deducted patching @ \$ \_\_\_\_\_ per square foot.

2. Patching Concrete Surfaces with Type \_\_\_\_\_ Patching Mortar:
  - a. Added patching @ \$ \_\_\_\_\_ per square foot.
  - b. Deducted patching @ \$ \_\_\_\_\_ per square foot.
- C. The foregoing unit prices include overhead, profit, and all other expenses incidental to the Work. Include in the bid sum all additional costs in connection with quantity changes that are not compensated for at the given unit prices.
- D. Quantities of Work shown on the drawing in numeric units are in addition to any other similar Work required under the Contract. Unit prices for additions and deductions are applicable only to the quantities of Work indicated in numeric units.
- E. If the total amount of a change exceeds 20 percent of a quantity indicated on the Drawings, the adjustment of the contract sum for the quantity in excess of 20 percent will be made in accordance with the General Conditions.

#### **1.04 SUBMITTALS**

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

#### **1.05 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.
- 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).

#### **1.06 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.

#### **1.07 PROJECT CONDITIONS**

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

### **PART 2 PRODUCTS**

## 2.01 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 choice of color is available, select color to match adjoining concrete. A bonding agent/primer and/or sealer shall be used as recommended by the patching mortar manufacturer.

THE FOLLOWING "TYPE C" AND "TYPE E" PATCHING MORTARS MAY BE USED FOR EXTERIOR AND INTERIOR WORK. CEMENTITIOUS MORTARS HAVE THERMAL EXPANSION AND MOVEMENT CHARACTERISTICS MORE COMPATIBLE WITH CONCRETE SUBSTRATE. EPOXY MORTARS ARE USED MOSTLY FOR INTERIOR APPLICATIONS WHERE HIGH CHEMICAL RESISTANCE OR BETTER ABRASION RESISTANCE IS NEEDED, OR WHERE THIN SECTIONS HAVE TO BE APPLIED. EPOXY MORTARS COST 30 PERCENT MORE THAN C-1 AND C-2 MORTARS. IF THE DEPTH OF A HOLE TO BE PATCHED IS OVER 2 INCHES, CONSIDERATION SHOULD BE GIVEN TO PATCHING WITH CONCRETE AND BONDING AGENT.

- B. Cement/Acrylic/Latex Base Patching Mortars:

USE SUBPARAGRAPH BELOW FOR PATCHING VERTICAL AND OVERHEAD CONCRETE SURFACES. IT MAY ALSO BE USED FOR PATCHING BOTH VERTICAL AND HORIZONTAL SURFACES OF CONCRETE STEPS.

1. Type C-1 Patching Mortar: "Verticoat", by Euclid Chemical Company; "Thorite 400 Architectural" or "Emaco Rite" or "Emaco R300 CI" or "Emaco R350 CI" or "Emaco S88 CI" or "Emaco HBA Repair Mortar" by Master Builders/BASF Building Systems; "Gel Patch" by Sonneborn/BASF Building Systems; "TPM 722" or "TPM 723" by General Polymers Corp.; "HB2 Repair Mortar or HBA Repair Mortar" by ThoRoc/ BASF Building Systems; "Patchwell" by Kaufman Products, Inc.; or "Masco Latex Cement" by Silpro Masonry Systems Inc.

USE SUBPARAGRAPH BELOW FOR PATCHING, RESURFACING AND LEVELING HORIZONTAL (EXCEPT OVERHEAD) CONCRETE SURFACES, INCLUDING TREADS OF STEPS.

2. Type C-2 Patching Mortar: "SikaTop 121 Plus", "SikaTop 122 Plus" or "SikaTop 111 Plus" by Sika Corp.; "Emaco 10-60", "Emaco R300 CI", "Emaco R310 CI" or "Emaco T415/T430" by Master Builders/ BASF Building Systems; "Super Can-Crete" by Anti Hydro Co.; "TPM 711" or "TPM 721" by General Polymers Corp.; "SD2 Repair Mortar" by ThoRoc/ BASF Building Systems; "Patchwell Kit", "Patchwell Kit D" or "K Tex 042" by Kaufman Products, Inc.; "Thincoat", "Concrete Coat" or "Thintop 100" by Euclid Chemical Company; or "Masco Latex Cement" by Silpro Masonry Systems Inc.

USE SUBPARAGRAPH BELOW FOR PATCHING VERTICAL/OVERHEAD WORK ONLY. THEIR DEPTHS RANGE FROM 2 1/2" TO FEATHER-EDGE.

3. Type C-3 Patching Mortar: "Patchwell HB", "HiCap" or "DressUp" by Kaufman Products, Inc.; "Emaco S88" by Master Builders/BASF Building Systems; "SikaTop 123 Plus" or "SikaTop 144" by Sika Corp.; or "Verticoat Supreme" by Euclid Chemical Company.

EPOXY MORTARS SHOULD BE LIMITED TO MAXIMUM 1/2 INCH THICK PATCHES FOR EXTERIOR WORK. DO NOT APPLY EPOXY TO EXTERIOR SLAB ON GRADE. DO NOT USE EPOXY MORTARS FOR INTERIOR PATCHES THICKER THAN 3 INCHES.

C. Epoxy Base Patching Mortars:

USE SUBPARAGRAPH BELOW FOR PATCHING HORIZONTAL (EXCEPT OVERHEAD) SURFACES OF NON-STRUCTURAL CONCRETE.

1. Type E-1 Patching Mortar: 100 percent solids, low modulus, low viscosity, moisture insensitive, epoxy resin and aggregate system; "Sikadur 21 Lo-Mod LV" by Sika Corporation; "Concresive 1420", "Concresive NC Adhesive Gel" or "Masterflow MP" by Master Builders/BASF Building Systems; "Flexocrete" by Dural International Corp.; "SurePoxy LMLV" or "SurePoxy LMLV, Class B" by Kaufman Products, Inc.; or "SRC 3577 LV" by General Polymers Corp.

USE SUBPARAGRAPH BELOW FOR PATCHING VERTICAL AND OVERHEAD SURFACES OF NON-STRUCTURAL CONCRETE.

2. Type E-2 Patching Mortar: 100 percent solids, low modulus, high viscosity, moisture insensitive, epoxy resin and aggregate system; "Sikadur 23 Lo-Mod Gel" by Sika Corporation; "Concresive Paste LPL", "Concresive NC Adhesive Gel" or "Concresive 1420" by Master Builders/BASF Building Systems; "Flexocrete Gel" by Dural International Corp.; "A-H Epoxy Patch No. 122" by Anti Hydro Co.; "SurePoxy LM Gel" by Kaufman Products, Inc.; or "SRC 3577 Gel" by General Polymers Corp.

USE SUBPARAGRAPH BELOW FOR PATCHING HORIZONTAL (EXCEPT OVERHEAD) SURFACES OF STRUCTURAL CONCRETE MEMBERS.

3. Type E-3 Patching Mortar: High modulus, medium/low viscosity, moisture insensitive, epoxy resin and aggregate system; "Sikadur 35" or "Sikadur 62" by Sika Corporation, "Concresive Liquid LPL" by Master Builders/BASF Building Systems; "Duralcrete" by Dural International Corp.; "SurePoxy HMLV, Class B" or "SurePoxy HMSLV" by Kaufman Products, Inc.; or "SRC 3575 LV" by General Polymers Corp.

USE SUBPARAGRAPH BELOW FOR PATCHING VERTICAL AND OVERHEAD SURFACES OF STRUCTURAL CONCRETE MEMBERS.

4. Type E-4 Patching Mortar: High modulus, high viscosity, moisture insensitive, epoxy resin and aggregate system; "Sikadur 31 Hi-Mod Gel" or "Sikadur 31 Hi-Mod Gel SBA Slow Set" by Sika Corporation; "Concresive Paste LPL" or "Concresive 1490" by Master Builders/BASF Building Systems; "Duralcrete Gel" by Dural International Corp.; "SurePoxy HM Gel", "SurePoxy 117", "SurePoxy 116" or "SurePoxy HM Gel EPL" by Kaufman Products, Inc.; or "SRC 3575 Gel" by General Polymers Corp.
5. Aggregate: As recommended by the patching mortar manufacturer for the binder and application.

PARAGRAPH BELOW IS A FAST SETTING "ROAD PATCH" USED FOR PATCHING EXTERIOR HORIZONTAL CONCRETE SURFACES WHICH HAVE TO BE PUT BACK IN USE IN A FEW HOURS. IT IS A STRONG REPAIR MATERIAL FOR PATCHES, FROM 1/2 INCH THICK ON UP, IN STREETS, PARKING AND LOADING AREAS, BRIDGE DECKS, SIDEWALKS, AND TUNNELS. THIS MATERIAL CAN BE EXTENDED WITH PEA GRAVEL FOR DEEP PATCHES, BUT CANNOT BE FEATHER EDGED.

- D. Rapid-hardening Cementitious Patching Mortar:
  - 1. Type R-1 Patching Mortar: "Roadpatch DOT" by Thoro/BASF Building Systems; "10-60 Rapid Mortar" or "10-61 Rapid Mortar" by ThoRoc/BASF Building Systems; "Durapatch" by L&M Construction Chemicals, Inc.; or "SikaSet Roadway Patch" by Sika Corp; "Durcrete" by Kaufman Products, Inc.; or "Emaco FS", "Emaco 10-61", "Emaco 10-61", "Emaco T415", "Emaco T430" or "Set 45" by Master Builders/BASF Building Systems.
- E. Rebar Coating: "ECB" by Conproco Corp.; or "Emaco P22" or "Emaco P24" by Master Builders/BASF Building Systems.
- F. 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.

**IF PATCHING WITH CONCRETE IS INDICATED ON THE DRAWINGS, EDIT PARAGRAPH BELOW AND INCLUDE CONCRETE SECTION IN SPECIFICATION; DELETE PARAGRAPH BELOW IF NOT APPLICABLE**

- G. Concrete and Bonding Agent (for concrete): Normal weight cast-in-place concrete and adhesive bonding agent as specified in Section 03050 or 03300.

**CHECK DRAWINGS FOR REINFORCING, DOWELS, OR OTHER ACCESSORIES. SPECIFY GALVANIZED STEEL, STAINLESS STEEL, OR APPROPRIATE NON-FERROUS ACCESSORIES FOR REHABILITATION WORK. ADD TO, OR DELETE, PARAGRAPH BELOW TO SUIT PROJECT.**

- H. Accessories:

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Protection: Cover or otherwise protect adjacent surfaces not being repaired.
- B. Surface Preparation:
  - 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.

**FOR MAJOR REPAIRS AND STRUCTURAL APPLICATIONS, EXPOSED STEEL REINFORCING BARS SHOULD BE GRIT BLASTED UNTIL ALL CORROSION IS REMOVED.**

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.

### **3.02 COATING REBAR**

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

### **3.03 PATCHING CONCRETE**

- 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.
  1. 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.

### **3.04 CLEANING**

- A. Clean up spatters and droppings.

### **3.05 PROTECTION**

- A. Protect mortar after placement in accordance with the product manufacturer's printed instructions.

**END OF SECTION**