SECTION 03930

CONCRETE REHABILITATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Surface restoration of Level Two parking deck.
   2. Chloride and corrosion testing

B. Related Sections include the following:
   1. Division 7 Section "Traffic Coatings" for liquid polyurethane elastomer surface coating.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.

B. Rehabilitation Program: For each phase of rehabilitation process, including protection of surrounding materials and Project site during operations. Describe in detail materials, methods, equipment, and sequence of operations to be used for each phase of the Work.
   1. If alternative materials and methods to those indicated are proposed for any phase of rehabilitation work, submit substitution request complying with Division 1 Section "Product Requirements" and provide a written description of proposed materials and methods, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.4 TESTING

A. Pre-Construction Testing: Perform chloride and half-cell testing of the slab to verify surface condition to receive specified patching material and to verify condition of reinforcing steel for corrosion.
   1. Testing Firm: CTL Group; Contact: Scott Tarr, 847-972-3230.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer that employs workers trained and approved by manufacturer to apply rapid hardening, early strength gaining, repair mortar.
   1. Approved Installer: Hascall & Hall, 207-775-1481

B. Manufacturer Qualifications: Manufacturer that employs factory-trained representatives who are available for consultation and Project-site inspection.

C. Source Limitations: Obtain concrete patching and rebuilding materials through one source from a single manufacturer.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.

B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

C. Store cementitious materials off the ground, under cover, and in a dry location.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements for Cementitious Materials: Do not apply unless air temperature is above 40 deg F (5 deg C) and will remain so for at least 48 hours after completion of Work.

B. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of 90 deg F (32 deg C) and above.

PART 2 - PRODUCTS

2.1 BONDING AGENTS

A. Epoxy Bonding Agent: ASTM C 881/C 881M, Type V.
1. Sika Corporation; Sikadur 32, Hi-Mod.

2.2 PATCHING MORTAR

A. Rapid Hardening, Early Strength Gaining Repair Mortar:
1. Sika Corporation, SikaQuick 1000.
a. Performance Criteria:
1) Drying shrinkage at 28 days (ASTM C-596): 0.06%.
2) Bond strength at 28 days (ASTM C-882 Modified): > 3,100 psi.
3) Compressive strength (ASTM C-109):
a) 3 hours: 1,000 psi (as a mortar)
b) 1 day: 4,500 psi (as a mortar)
c) 7 day: 7,800 psi (as a mortar)
d) 28 day: 9,000 psi (as a mortar)
4) Flexural strength at 28 days (ASTM C-78): > 1,100 psi.
5) Splitting tensile strength at 28 days (ASTM C-496): > 1,100 psi.
6) Chloride Permeability (ASTM C-1202): < 450 coulombs.
7) Freeze/thaw resistance at 28 days (ASTM C-666): 98%.
8) Modulus of elasticity at 28 days (ASTM C-496): 4.6 x 106 psi.
9) Scaling Resistance (ASTM C-672): 50 Cycles 0.080.

2.3 MISCELLANEOUS MATERIALS

A. Corrosion-Inhibiting Treatment Materials: Do not include corrosion-inhibiting treatment in the concrete rehabilitation bid. If slab testing survey results indicate the need for treatment, cost for material and application will be added by appropriate change order. Product specified below shall be used.

B. Corrosion-Inhibiting Treatment Materials: Water-based solution of alkaline corrosion-inhibiting chemicals that penetrates concrete by diffusion and forms a protective film on steel reinforcement.
1. Sika Corporation; Sika Ferrogard 903.

2.4 MIXES

A. Mix products, in clean containers, according to manufacturer's written instructions.
   1. Mix rapid hardening early strength gaining repair mortar by pouring 4.5 pints of water into a clean bucket or mortar mixer and slowly adding the powder component while mixing. Add up to another ½ pint of water to achieve desired consistency. Use a low speed drill with appropriate mixing paddle to mix product in a clean bucket. Mix thoroughly until a uniform consistency is achieved without exceeding 3 minutes.
   2. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Have slab tested for chloride content before ordering patching mortar to assure material compatibility with concrete surface. If material depth or product needs to change due to test results, material cost will be revised by appropriate change order.
   1. Perform half-cell testing to see if corrosion-inhibiting treatment is required. If slab testing survey results indicate the need for treatment, cost for material and application will be added by appropriate change order.

3.2 PREPARATION

A. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.

B. Surface Preparation for Overlays:
   1. Saw-cut entire slab for concrete removal to a depth of 1/2 inch. Make cuts perpendicular to concrete surfaces, approximately 1/2 inch apart. Remove concrete by breaking up and dislodging from slab surface. Saw cut perimeter of deeper spalls and remove concrete to solid substrate, but not less than 1/2 inch depth for starting elevation.
   2. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.
   3. Provide fractured aggregate surfaces with a profile of at least 1/8 inch that are approximately perpendicular or parallel to original concrete surfaces.
   4. Thoroughly clean removal areas of loose concrete, dust, and debris.
   5. Sprinkle slab for 12 hours to fully saturate surface. Remove standing water, so surface is in a surface-saturated dry (SSD) condition at time of material placement.

C. Surface Preparation for Corrosion-Inhibiting Treatment: Clean concrete by pressure water cleaning to remove dirt, oils, films, and other materials detrimental to treatment application. Allow surface to dry before applying corrosion-inhibiting treatment.

3.3 APPLICATION

A. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation.

B. Epoxy Bonding Agent: Apply to concrete by brush, roller, or spray according to manufacturer's written instructions, leaving no pinholes or other uncoated areas. Apply patching mortar while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar or concrete.

C. Patching Mortar: Unless otherwise recommended by manufacturer, apply as follows:
   1. Patch deeper spalls to make level with surrounding areas and permit material to cure before placing final layer of patching mortar.
   2. Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. Fill edges first and then work toward center, always troweling toward edges of patch.

3. After filling repair, consolidate, then screed. Allow repair mortar to set to appropriate stiffness, then finish as desired.
4. Where multiple lifts are used, score surface of lifts to provide a rough surface for application of subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
5. Wet-cure cementitious patching materials immediately after finishing for not less than 48 hours by water-fog spray or water-saturated absorptive cover. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength.

D. Corrosion-Inhibiting Treatment: Apply by brush, roller, or airless spray in two coats at manufacturer's recommended application rate. Remove film of excess treatment by high-pressure washing before prep and application of traffic coating.

END OF SECTION