SECTION B

CITY OF HOUSTON
GENERAL SERVICES DEPARTMENT
CONVENTION AND ENTERTAINMENT FACILITIES DEPARTMENT

PROJECT MANUAL
STRUCTURAL ASSESSMENT AND REPAIRS
THEATER DISTRICT PARKING
CIVIC CENTER, SMALL TRANQUILITY, AND LARGE TRANQUILITY GARAGES

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TASK ITEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 TASK ITEM (T.I.) DESCRIPTION

T.I. 1.1 PROJECT MOBILIZATION

A. Scope of Work

1. Work consists of coordinating, scheduling, obtaining and assembling at construction site all equipment, materials, permits, supplies, manpower and other essentials and incidentals necessary to perform Work defined in this Contract.

T.I. 2.3 CONCRETE FLOOR REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate and remove delaminated/spalled concrete, prepare cavities, install patching materials to restore concrete slabs to original condition and appearance. **Work should proceed with caution in slabs with post-tensioning tendons to avoid causing structural damage to the slab.** Refer to Detail 2.3. Refer to Plan Sheets for location of work.

B. Materials

2. Material for repairs shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Contractor shall identify all critical repair work areas before staring the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods as specified in Section "Surface Preparation for Patching."
4. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."

5. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
6. Patch installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 3.2 BEAM REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, scaffolding, shoring, and incidentals necessary to locate and remove delaminated/spalled concrete, prepare cavities, install patching materials to restore concrete beams to original condition and appearance. Refer to Detail 3.2. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repairs shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Contractor shall identify all critical repair work areas before staring the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods as specified in Section "Surface Preparation for Patching."
2. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
3. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
4. Patch installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 3.4 JOIST REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, scaffolding, shoring, and incidentals necessary to locate and remove delaminated/spalled concrete, prepare cavities, install patching materials to restore joists to original condition and appearance. Refer to Detail 3.4. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repairs shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Contractor shall identify all critical repair work areas before staring the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods as specified in Section "Surface Preparation for Patching."
2. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
3. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
4. Patch installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 3.5 HAUNCH / CORBEL REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, shoring, staging, signage, bracing, formwork, supervision, and incidentals necessary to locate existing spalls, locate, and remove delaminated, unsound concrete, prepare cavities, place patching materials to restore concrete haunch / corbel to original condition and appearance, fabricate and install metal corbel. Refer to Details 3.5A and 3.5B for concrete and steel corbel repair, respectively.

B. Materials

1. Material for repair areas shall be as specified in Section "Concrete Repair Materials."
2. Structural steel plates shall be ASTM A36 steel, hot-dipped galvanized.
3. ASTM F1554 thru bolts shall be corrosion resistant.
4. Slide bearing pads shall be Elastomeric (Neoprene) structural pads with Shore A durometer hardness of 60 ± 5 and having a minimum thickness of 1". Acceptable manufactures are: Con-Serv Inc., JVI, Inc., Tulsa Rubber Company.
5. Sprayed-on cementitious fireproofing (for steel corbel repair)

C. Execution

<u>Concrete Corbel</u>

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Marking will be done with methods approved by Engineer and Owner. Contractor shall identify all critical repair work areas before starting the work. Contractor shall provide shoring of structural members supported by the corbel before starting the repair. Refer to Detail 3.5A for shoring capacity requirements.
2. Contractor shall coordinate work with Owner for phasing of the work prior to starting the work.
3. Procedure for delaminated, spalled, and unsound concrete removal shall be specified in Section "Surface Preparation for Patching."

4. All steel exposed within cavities shall be cleaned.
5. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
6. Install formwork and place patch material in accordance with referenced specifications for selected material. Do not remove any shoring until the patch material has reached a minimum compressive strength of 5000 psi.

Steel Corbel

1. Contractor shall locate and mark all work areas. Contractor shall provide shoring of structural members supported by the corbel before starting the repair. Refer to Detail 3.5B for shoring capacity requirements.
2. Contractor shall coordinate work with Owner for phasing of the work prior to starting the work.
3. For steel corbel installation, follow the procedural notes given in Detail 3.5B.

T.I. 3.7 SOFFIT (PAN) REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, staging, formwork, supervision, and incidentals necessary to locate existing spalls, locate, and remove full delaminated and unsound concrete from soffit (pan), prepare cavities and install repair materials to restore soffit (pan) to original condition and appearance. **Work should proceed with caution in slabs with post-tensioning tendons to avoid causing structural damage to the slab.** Refer to Detail 3.7 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repair areas shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Marking will be done with methods approved by Engineer and Owner. Contractor shall identify all critical repair work areas before staring the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods or other approved methods as specified in Section "Surface Preparation for Patching."
4. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
6. Patch installation procedures shall be in accordance with referenced specifications for selected material.

7. Provide proper concrete cover according to Detail 3.7 for all exposed rebar.

T.I. 6.1 EXPANSION JOINT REPLACEMENT – ADHERED

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipments, staging, formwork, supervision, and incidentals necessary to locate Work area, remove existing expansion joint system, and miscellaneous accessories, repair existing concrete blockout to conform to expansion joint manufacturer and install a new expansion joint system. Refer to Detail 6.1 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Materials for concrete repairs shall be specified in Section "Concrete Repair Materials."
2. Expansion joint systems specified in Section "Expansion Joints" and in Detail 6.1.

C. Execution

1. Contractor shall remove existing expansion joint system materials in manner that minimizes damage to adjacent concrete. Alterations, repairs and modifications to existing expansion joint blockout required for installation of new expansion joint systems shall be incidental in this task item.
2. Coordinate this task item with owner representative in order to produce minimum disruptions to the patrons.
3. All sound and unsound concrete shall be removed by sawcutting and chipping to sufficient width and depth. Caution shall be exercised near surface of concrete.
4. Procedure for delaminated, spalled, and unsound concrete removal shall be specified in Section "Surface Preparation for Patching."
5. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods or other approved methods as specified in Section "Surface Preparation for Patching."
6. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
7. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
8. Patch installation procedures shall be in accordance with referenced specifications for selected material.
9. Control joints shall be tooled and formed in plastic concrete. Sawcutting joints after concrete sets will not be allowed.
10. Tooled joints shall be of proper dimension in plastic concrete.
11. Install new expansion joint system in strict accordance by manufacturer's instructions.
12. In-place testing: Prior to opening to traffic, test joint seal for leaks with 2 in. water depth maintained continuously for 12 hours. Repair leaks revealed by examination of seal underside. Repeat test and repairs until all leaks stopped for full 12 hours.

T.I. 7.2 JOINT SEALANT REPLACEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate, remove, prepare, and re-seal areas in concrete floor slab and other concrete members. Refer to Detail 7.2 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Approved materials to be used in this Work are specified in Section "Joint Sealants."
2. Closed cell backer rod as required.

C. Execution

1. Contractor shall locate and mark all work areas.
2. Contractor shall remove existing sealant from joints.
3. Entire work area shall then be cleaned with compressed air to assure that all loose particles have been removed and that intersection is dry.
4. When existing joint dimension do not conform to Detail 7.2, joints shall be routed or sawcut to an adequate width and depth as required by Task Item Detail. Routing shall be performed by mechanized device hat has positive mechanical control over depth and alignment of cut.
5. Cavities shall be thoroughly cleaned by either abrasive methods or grinding to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion. Groove shall be air blasted to remove remaining debris.
6. Install backer rod at wide joints in strict accordance with manufacturer's instructions.
7. Sealant materials and associated reference specifications are listed in Section "Joint Sealants." Sealant installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 9.4 SHEAR TRANSFER CONNECTION INSTALLATION

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals to install shear transfer connections along the construction joint concrete blockout. Refer to Detail 9.4. See Plan Sheets for location of work.

B. Materials

1. Structural steel angles shall be ASTM A36 steel, hot-dipped galvanized with standard holes in horizontal leg.
2. Anchor bolts shall be corrosion resistant.
3. Slide bearing pads shall be Elastomeric (Neoprene) structural pads with Shore A durometer hardness of 60 ± 5 and having a minimum thickness

of 1/2". Acceptable manufactures are: Con-Serv Inc., JVI, Inc., Tulsa Rubber Company.

C. Execution

1. Contractor shall locate and mark all work areas.
2. Contractor shall remove existing shear transfer devices including angles and bolts in a manner that minimizes damage to the surrounding concrete blockout.
3. Contractor shall wait 28 days before installing shear transfer devices into poured concrete repair materials.
4. Contractor shall layout and install shear transfer devices as shown on Detail 9.4. **This work should be done prior to installing new expansion joint.**
5. Provide Neoprene bearing pad between soffit of concrete blockout and the non-anchored end of the angle to provide uniform bearing.
6. Any gap between anchored end of the angle and soffit of concrete blockout shall be filled with galvanized steel shims to provide uniform bearing.

T.I. 10.4 CORRODED BEAM REPAIR (LEVEL 2 TUNNEL)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals to install metal support brackets, cleaning and priming and fireproofing existing steel framing in the air shaft maintenance room. Refer to Detail 10.4. See Plan Sheets for location of work.

B. Materials

1. Structural steel plates and angles, hot-dipped galvanized.
2. ASTM A325 Bolts
3. HAS E-Rods and RE500 Epoxy by Hilti
4. Primer and fireproofing from Section "Sprayed-on Fireproofing"

C. Execution

1. Contractor shall locate and mark all work areas in the air shaft room.
2. Contractor shall install beam support brackets as shown in Detail 10.4.
3. Abrasively clean existing structural steel beams and metal connections in the air shaft maintenance beams by mechanical means.
4. Apply primer and cementitious fireproofing from Section "Sprayed-on Fireproofing" to structural steel members in the air shaft room in accordance with manufacturer's recommendations.

END OF SECTION 01015

Section 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Summary of the Work including work by the City, City-furnished Products, work sequence, future work, Contractor use of Premises, special conditions for substantial completion and City occupancy.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of the Contract is for repair of the following Task Items:
   2.3 Concrete Floor Repair
   3.2 Concrete Beam Repair
   3.4 Concrete Joist Repair
   3.5 Haunch/Corbel Repair
   3.7 Concrete Soffit Repair
   6.1 Expansion Joint Replacement
   7.2 Joint Sealant Replacement
   9.4 Shear Transfer Connection Repair
   10.4 Corroded Beam Repair (Tunnel)

B. Stipulated price for work shall include all include all related costs including contractors, material, labor, profit, overhead, taxes, transportation, and incidental costs.

1.03 CITY-FURNISHED PRODUCTS

A. Items Furnished by the City for Installation and final connection by Contractor: None.

B. Contractor's Responsibilities:

1. Contractor will supply all new construction materials.
2. Arrange and pay for Product delivery to the site
3. Receive and unload Products at the site; jointly with the City, inspect for completeness or damage.
4. Handle, store, Install, and finish Products.
5. Repair or replace damaged items.

1.04 WORK SEQUENCE

A. During the construction period, coordinate construction schedule and operations with the City

1.05 CONTRACTOR USE OF PREMISES

A. Comply with procedures for access to the site and Contractor's use of rights-of way.

B. Construction Operations: Limited to the City's rights-of-way provided by the City and areas shown or described in the Contract documents.

C. Utility Outages and Shutdown: Provide a minimum of 48 hours notice to the City and private utility companies (when applicable), excluding weekends and holidays, in advance of required utility shutdown. Coordinate all work as required.

1.06 WARRANTY

A. Comply with warranty requirements in accordance with General Conditions.

1.07 ADDITIONAL CONDITIONS FOR SUBSTANTIAL COMPLETION

A. In addition to requirements outlined in General Conditions, for Contractor to be substantially complete with the Work and call for inspection by Project Manager to confirm, the following conditions must be met or completed:

1. All testing shall be completed and accepted by Project Manager.
2. All Safety related work including pavement stripping, signing and signalization
3. All pay items complete report.
4. *Contractor shall contact Construction Project Manager to complete Texas Department of Licensing and Regulation Post Construction Inspection of pedestrian elements for Texas Accessibility Standards.*

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Document 03305

SURFACE PREPARATION FOR PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the provisions of all labor, materials, supervision and incidentals required to locate and remove all delaminated and unsound concrete, including preparation of cavities created by removal to receive patching material and preparation of existing surface spalls to receive patching material.

B. Related Sections include the following:

1. Division 3 Section "Concrete Repair Materials."

C. Contractor shall fully acquaint himself with the existing job site conditions and discuss the accessibility of the work areas with the Owner.

D. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.

E. Contractor shall provide all traffic cones or barriers to direct traffic during the repair of the facility. This work shall be done in consultation with the Owner.

1.2 REFERENCES

A. Applicable Standards:

1. American Concrete Institute (ACI), latest version:

ACI 301-05	Specifications for Structural Concrete
ACI 546.1R-80	Guide for Repair of Concrete Bridge Structures
ACI 546R-04	Concrete Repair Guide

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Epoxy Coating for existing exposed non-prestressed steel reinforcement:

1. BASF: Emaco P24

2. Sika Chemical Corporation: Armatec 110

Substitutions may be considered provided complete technical information and job references are furnished to the Owner/Engineer and approved prior to commencement of work.

Changes in products required to suit temperature and environmental conditions at the time of material application shall be specified as separate line items by the Contractor showing credit or additions to the price for the various tasks.

In using the above products, follow strictly the manufacturer's specifications and directions for mixing and application. Also heed all label warnings by manufacturer. Make application in accordance with applicable safety laws.

PART 3 - EXECUTION

3.1 INSPECTION

A. Horizontal Surfaces

1. Contractor shall sound all designated floor areas for delaminations.

B. Vertical and Overhead Surfaces

1. Contractor shall sound only vertical and overhead surfaces in designated areas that show evidence of cracking and/or staining. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.

C. Delaminated areas: Once located by Contractor, Contractor shall further sound and mark them to define limits.

D. Spalls: Contractor shall locate spalls by visual inspection, and mark boundaries.

E. Engineer may mark additional unsound concrete for removal.

F. Areas to be removed shall be rectangular to provide adequate appearance.

G. Contractor shall locate and determine the depth of all embedded reinforcement, electrical conduit, post-tensioned tendons, in repair area and mark these locations for reference during concrete removal. Do not cut any embeds unless approved by Engineer.

3.2 REPAIR PREPARATION

A. Contractor shall review all marked removal and preparation areas and request clarification by Engineer of shoring requirements in questionable areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.

B. All delaminated, spalled and unsound concrete shall be removed from within marked boundary to minimum depth of ¾" using 15 to 30 lb air hammers equipped with chisel point bits. When directed by Engineer, chipping hammers less than 15 lb shall be used to minimize damage to sound concrete. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

C. Where embedded reinforcement, anchorages, or electrical conduit is exposed by concrete removal, proceed with caution to avoid damaging it during removal of unsound concrete. If bond between exposed embedded reinforcement/anchorages and adjacent

concrete is impaired by Contractor's removal operation, Contractor shall perform additional removal around and beyond perimeter of reinforcement for minimum of ¾" along entire length affected at no cost to owner.

D. Necessary approvals shall be obtained by the Contractor from authorizing governmental or other agencies prior to abrasive-blasting. Abrasive-blasting operations shall comply with the requirements of OSHA and NIOSH (National Institute for Occupational Safety and Health) Standard PB-246-697.

E. If rust is present on embedded reinforcement where it enters sound concrete, additional removal of concrete along and beneath reinforcement will be required. Additional removal shall continue until non-rusted reinforcement is exposed, or may be terminated per Engineer's instructions.

F. Removal of concrete for repair requires saw cutting ¾" into floor slab of the perimeter of the removal, unless a more stringent criteria applies. For vertical and overhead surfaces marked areas may be saw-cut, ground, or chipped to depth of ½" to existing concrete, measured from original surface.

G. Edges of patch areas shall be dressed perpendicular to member face to eliminate feather edges. All edges shall be straight and patch areas square or rectangular-shaped.

H. Contractor shall exercise extra caution during saw cutting to avoid damaging existing reinforcement particularly post-tensioned tendons, sheathing, electrical conduit and any other embedded items near surface of concrete. Any damage to existing embedded items shall be repaired by Contractor with Engineer's approved methods at no additional cost to Owner.

3.3 INSPECTION OF REPAIR PREPARATION

A. After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer for compliance with requirements of this Section.

B. Contractor shall inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations. Contractor shall notify Engineer of all defective and damaged reinforcement or conduits. Replacement of damaged or defective reinforcement/conduits shall be performed in accordance to the requirements of this Section.

3.4 CLEANING OF REINFORCEMENT

A. All exposed reinforcing steel shall be cleaned and free of rust and other contaminants. Cleaning shall be accomplished by abrasive methods. Cleaning shall be completed immediately before patch placement to insure that base metal is not exposed to elements and further rusting for extended periods of time. Use powered wire brushes in locations where reinforcing steel cannot be cleaned by abrasive-blasting or water-blasting.

B. All exposed reinforcing steel shall be coated with a corrosion inhibiting product specified in the Section "Products" in this specification prior to mortar application. Protect prepared surfaces from damage prior to and during patch placement.

3.5 REINFORCEMENT IN REPAIR AREAS

A. All embedded reinforcement exposed during surface preparation that has lost more that 10% of original cross-sectional area due to corrosion shall be considered defective. Defective reinforcement shall be supplemented in accordance to Engineer's instructions and shall be paid for by Owner.

B. Damaged reinforcement caused during removals made by Contractor shall be supplemented in accordance to Engineer's instructions and shall be paid for by Contractor.

C. Supplement defective or damaged embedded reinforcement of equal diameter with a Class B splice in accordance to ACI –318-05 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with approved anchors. Supplemental steel shall be A615 Grade 60 steel except where more stringent requirements apply in drawings and/or details.

D. Loose reinforcement exposed during surface preparation shall be securely anchored prior to patch placement. Loose reinforcement shall be adequately secured with wire ties to bonded reinforcement or with drilled-in anchors. Drilled-in anchors shall be Hilti 14 "Kwik Tie" anchors, ITW Ramset/Red head WT-1400 anchors or approved equal. Engineer will determine adequacy of wire ties and anchors. Securing loose reinforcement is incidental to surface preparation.

E. Minimum of 1 ½" concrete cover shall be provided over all new/existing reinforcement except where more stringent requirements apply in drawings and/or details.

3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

A. Cavities will be examined prior to commencement of patching operations. Sounding surface shall be part of examination. Delaminations noted during sounding shall be removed as specified in this Section.

B. All debris shall be removed from site prior to commencement of patching.

END OF SECTION 03305

Document 03320

CONCRETE REPAIR MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the provisions of all labor, materials, supervision and incidentals required to prepare deteriorated or damaged concrete surfaces and install patching materials to restore original surface condition and integrity.

B. Related Sections include the following:

1. Division 3 Section "Surface Preparation for Patching."

C. Contractor shall fully acquaint himself with the existing job site conditions and discuss the accessibility of the work areas with the Owner.

D. Contractor shall ensure that there is adequate ventilation in areas where repair work is being performed and that no work results in nauseating, annoying or toxic fumes and odors from entering occupied areas. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.

E. Contractor shall provide all traffic cones or barriers to direct traffic during the repair of the facility. This work shall be done in consultation with the Owner.

1.3 SUBMITTALS

A. Make submittals in accordance with requirements of Division 1 and as specified in this Section.

B. At the preconstruction meeting, contractor shall submit procedures to protect fresh patches from weather and traffic (if applicable).

1.4 QUALITY ASSURANCE

A. Work shall conform to requirements of the American Concrete Institute (ACI) as applicable except where more stringent requirements are shown on Drawings or specified in this Section.

B. Manufacturer's Qualifications: Companies furnishing the repair materials shall have a proven track record of at least five years. Furthermore, they shall have in existence a program of training, certifying, and supporting a nationally organized program of approved contractors. Evidence of this shall be made available to the Engineer/Owner upon request.

C. Contractor's Qualifications: Contractor performing the work shall be an approved contractor by the manufacturer furnishing the repair materials, and shall have no less than five years experience in the various types of polymer related work required in this project. Upon request by the Engineer, a notarized certification from the manufacturer attesting to the training shall be submitted to the Engineer/Owner.

1.5 REFERENCES

A. Applicable Standards:

1. American Concrete Institute (ACI), latest version:

ACI 301R	Specifications for Structural Concrete
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to Curing Concrete
ACI 318R	Building Code Requirements for Structural Concrete
ACI 548.1R	Guide for Use of Polymers in Concrete

2. American Society for Testing and Materials (ASTM):

ASTM C109	Test Method for Compressive Strength of Hydraulic Cement Mortars

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR POLYMER MODIFIED CEMENTITIOUS MORTARS

A. Mortar used for bonding, patching, and resurfacing in exposed or exterior environmental conditions with large cyclic temperature changes shall have the following properties:

1. Mortar shall be non-sagging.

2. Acceptable materials shall have minimum 3-day compressive strength of 3,000 psi, and 5,000 psi at 28 days as certified by manufacturer.

3. Coefficient of thermal expansion shall be comparable with that of concrete (5.5×10^{-6} in/in/°F).

4. Sand used in preparing mortar shall be graded oven dry quartzite furnished in bags.

5. The mortar patch material shall match the existing texture and color of existing exposed/cured concrete without giving a blotchy appearance. A test patch shall be applied for approval prior to final acceptance of the mortar. Size of test patch shall be approximately equal to the size of the average mortar patch to be used on the project.

2.2 PRODUCTS AND MANUFACTURERS

A. Acceptable materials for this Work are:

HORIZONTAL REPAIRS (POLYMER MODIFIED):

1. EMACO R300 CI, EMACO R310 CI by BASF

2. SikaTop 122 Plus by Sika

OVERHEAD/VERTICAL REPAIRS: (POLYMER MODIFIED):

1. Gel Patch by BASF

2. SikaTop 123 Plus by Sika

B. High early strength products (NON-POLYMER MODIFIED):

1. EMACO T415 OR EMACO T430 by BASF

2. SikaQuick 1000 or SikaQuick 2500 by Sika

Substitutions may be considered provided complete technical information and job references are furnished to the Owner/Engineer and approved prior to commencement of work.

Changes in products required to suit temperature and environmental conditions at the time of material application shall be specified as separate line items by the Contractor showing credit or additions to the price for the various tasks.

In using the above products, follow strictly the manufacturer's specifications and directions for mixing and application. Also read all label warnings by manufacturer. Make application in accordance with applicable safety laws.

PART 3 - EXECUTION

3.1 POLYMER MODIFIED AND NON-POLYMER MODIFIED CEMENTITIOUS MORTAR PATCH

A. Applicator's Qualifications

1. Mortar repair work shall only be performed by contractors who have successfully used this process on at least three similar structural repairs of equal scope which have performed successfully for a minimum period of five years.

2. Only adequately trained and experienced personnel shall be used on the job.

B. Surface Preparation

1. Concrete surface to which the mortar is to be applied shall be exposed parent concrete free of loose and unsound materials. Preparation of cavity to receive new mortar shall be in accordance to Section "Surface Preparation for Patching" and manufacturer's instructions.

C. Concrete Surface Inspection: Ensure that the surface and ambient temperature is at least 45°F and rising at the time of application.

D. Bonding Grout

1. Apply bonding grout in strict accordance with manufacturer's recommendations.

2. If bonding grout dries, cavity shall not be patched until it has been re-cleaned and prepared as indicated in Section "Surface Preparation for Patching." Grout shall not be applied to more cavities than can be patched within 15 min. by available manpower.

3. Patching materials shall be placed immediately following grout application in strict accordance with manufacturer's instructions.

E. Mortar Application

1. Condition polymer mortar material to 65°F-80°F unless otherwise recommended by the manufacturer. Materials beyond this range of temperature shall not be used.

2. Mix the two components in a clean container free of contaminants as recommended by the manufacturer.

3. Thoroughly blend components and aggregates with Jiffy mixers (made by The Jiffy Mixer Co., Irvine, California) to a uniform and homogenous mixture. Small batches of one quart or less may be mixed by spatulas, pallette knives or similar devices.

4. Mixing should be accomplished within three minutes when using Jiffy mixer or five minutes when mixed by hand.

5. Apply mortar by means suitable for the consistency of the mortar mix.

6. Use appropriate forms as required for retaining mortar if mixed to a flowable consistency.

7. Consolidate the mortar thoroughly to remove entrapped air.

8. Supplemental wire mesh shall be required for delamination and spall repairs greater than 2" in depth. Fresh bonding grout is required between successive lifts of patching material.

9. Finish surface of mortar to match the texture and contours of existing concrete.

F. Curing

1. Immediately after finishing, keep patch material continually moist for at least 24 hrs. Continue curing for first 7 days after patch placement. During initial and final curing periods maintain patch material above 50 °F.

2. Prevent rapid drying at end of curing period.

3. Provide additional curing as required by manufacturer's recommendations.

G. Cleanup

1. Protect surfaces surrounding the work areas against spillage.

2. Material spillage shall be cleaned before they set and become difficult to remove.

3. Cleanup all portions of the existing structure that are soiled or stained in the process of mortar repair work.

3.2 FIELD QUALITY CONTROL

A. Testing Agency:

1. Independent testing laboratory employed by Owner and acceptable to Engineer.

2. Sampling and testing of mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than three years old.

3. Testing Agency is responsible for conducting, monitoring, and reporting results of all tests required under this Section. Testing Agency has authority to reject mortar not meeting Specifications.

4. Concrete Compressive Strength (Mold test cubes per ASTM C-109):

a. Take minimum of 6 cubes (2'x2") for each 10 ft^3 or fraction of each repair mortar placed in any one day.
b. Additional cubes shall be taken as directed by Engineer.
c. Cover and protect molds from contact with water for the first 24-hrs. after molding.
d. Follow ACI Specifications for storage and handling of specimens.
e. Test 3 cubes at 3 days.
f. Test 3 cubes at 7 days.
g. Test 3 cubes at 28 days.

3.3 ACCEPTANCE OF REPAIRS

A. Acceptance of completed concrete repair will be in accordance to ACI 301.

B. Patched areas shall be sounded by Engineer and Contractor after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no cost to Owner.

C. If shrinkage cracks appear in patch area after the initial curing period is concluded, the patch in question shall be considered unacceptable, and it shall be removed and replaced by Contractor at no cost to Owner.

END OF SECTION 03310

Document 07190

EXPANSION JOINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Contractor shall fully acquaint himself with the existing job site conditions and discuss the accessibility of the work areas with the Owner.

B. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.

C. Contractor shall provide all traffic cones or barriers to direct traffic during the repair of the facility. This work shall be done in consultation with the Owner.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. An expansion joint system is detailed on Drawings. Shop drawings shall include temperature adjustment table with expansion joint opening calculated at 10°F increments. Shop drawing submittal shall show that proposed joint system is of similar gland configuration, capable of equal individual and combined movements in each direction when installed at designated temperature shown on drawings.

C. Where installation temperature is other than specified temperature, submittal shall include calculations showing joint is capable of movement within design temperature range (supplied by Engineer) for "other" temperature, and that design and installation follow manufacturer's recommendations. Design temperature range is -30° F to +130° F. Material samples.

D. Installation plans and large scale details. Show all conditions including, but not limited to, splices, terminations, and change in section or alignment.

E. Field samples of premolded joint sealant. Width, thickness and durometer hardness of sealant shall be checked by Testing Agency. Upward buckling caused by joint gap closure shall be limited to a maximum of ¼ inch per ADA Guidelines.

F. Other information required to define joint placement or installation.

G. ADA Certification: Prior to installation, submit written certification from manufacturer indicating that expansion joints conform to Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, as published by U.S. Architectural &

Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111. 1-800-872-2253.

H. Quality Assurance – Contractor setting expansion joint opening will require a temperature adjustment table to properly size joint gap at time of concrete pour or precast erection.

I. Caution – The expansion joint movement capability and the actual joint gap movement may not coincide if Quality Assurance measure not followed.

J. Submit test reports from accredited laboratory attesting to joint systems' movement capability and ADA compliance.

K. Submit three copies of System Maintenance Manual.

1.4 QUALITY ASSURANCE

A. Manufacturer/Applicator: Review and approve all details before construction. Confirm in writing to Engineer.

B. Applicator: Coordinate services with related Work including layout of joint system and approval of methods for providing joints.

C. Applicator: Inspect site to insure proper joint configuration in field.

D. Manufacturer: Provide qualified representative for periodic inspection of Work.

E. Expansion joint blockouts shall be floated and troweled before final cure to remove all air pockets, voids and spalls caused by form work.

F. Expansion joint surface areas two feet on each side of joint gap shall be finish graded perpendicular to joint gap creating flush slab-to-slab transition. Elevations on each side shall be identical.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1. Manufacturer: Provide qualified representative on site for duration of work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels showing the following information:

1. Manufacturer's brand name.
2. Type of material.
3. Directions for storage.
4. Date of manufacture and shelf life.
5. Lot or batch number.

6. Mixing and application instructions.
7. Color.

B. Store materials in a clean, dry location protected from exposure to direct sunlight. In storage areas, maintain environmental conditions within range recommended in writing by manufacturer

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Install expansion joint systems within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1. Special Warranty: Written warranty, signed by expansion joint manufacturer agreeing to repair or replace expansion joint systems that do not comply with requirements or that deteriorate during the specified warranty period.

B. Warranty Period: Five years from date of acceptance of work, jointly executed by Manufacturer and Applicator.

C. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.

D. Perform any repair under this guarantee at no cost to Owner

E. Vandalism and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Conform to Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, as published by U.S. Architectural & Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111. 1–800-872-2253.

2. Surfaces accessible to pedestrian traffic: anti-slip construction.

3. Material shall be applied in lengths no shorter than 20 ft, with no joints in the drive aisle.

B. Adhered extruded rubber expansion joint sealant system. Acceptable systems:

1. Iso-Flex Pressure Lok Expansion Joint System by LymTal
2. Jeene® Structural Sealing Joint System FW Series by Watson Bowman - BASF

C. Extruded Neoprene closed cell rubber expansion joint for vertical applications, stair towers, columns and perimeter floor-to-wall joints. Acceptable systems:

1. Iso-Flex Foamflux Joint Seal by LymTal
2. Wabo®InverSeal by Watson Bowman – BASF

D. Field applied silicone sealant expansion joint system for joint gaps of 1.5 inches or less.

1. Dow Corning FC parking structure sealant (fast cure) by Dow Corning
2. Wabo®SiliconeSeal Two-Part Silicone by Watson Bowman – BASF

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect surfaces to receive Work and report immediately in writing to Engineer any deficiencies in surface which render it unsuitable for proper execution of Work.

B. Coordinate and verify that related Work meets following requirements:

1. Concrete surfaces are finished as acceptable for system to be installed.
2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
3. Concrete surfaces have completed proper curing period for system selected.
4. Joint Sealants are compatible with traffic toppings.

C. Acid etching: Prohibited.

D. All openings to occupied space shall be sealed to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.

3.2 PREPARATION

A. General Contractor: Correct unsatisfactory conditions in manner acceptable to installer before installing expansion joint system. All honeycombs and air voids in blockouts shall be patched as acceptable to Engineer/Architect prior to installation of Expansion Joint Sealant system.

B. Coordinate expansion joint system with other related Work before installation of expansion joint.

C. Check adhesion to substrates and recommend appropriate preparatory measures.

D. Proceed with expansion joint system only after unsatisfactory conditions have been corrected in manner acceptable to installer and product manufacturer.

E. Clean joints thoroughly in accordance with manufacturer's instructions to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion.

F. Cease installation of expansion joints under adverse weather conditions, or when temperatures are outside manufacturer's recommended limitations for installation.

G. Prepare for installation of extruded expansion joint systems in accordance with manufacturer's recommendations.

H. Cease installation if expansion joint blockouts and/or openings exhibit cracked edges, voids or spalls. Repair with accepted material prior to installation of expansion joint.

I. Check elevations on each side of expansion joint gap utilizing metal straight edge to ensure flush slab-to-slab transition. Present discrepancies to Engineer.

J. Check anticipated or actual minimum and maximum joint openings with Engineer. Compare to manufacturer's movement specifications and make joint sizing recommendations.

3.3 INSTALLATION

A. Install extruded expansion joint system in accordance with manufacturer's instructions.

B. Areas adjacent to the joint must be masked with tape to assure clean joint lines.

C. In-place testing: Prior to opening to traffic, test joint seal for leaks with maintained continuously wet for 12 hrs. Repair leaks revealed by examination of seal underside. Repeat test and repairs until all leaks stopped for full 12 hrs.

3.4 CLEANING

A. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturers.

3.5 PROTECTION

A. Protect the Expansion Joint System during construction. Heavy construction vehicles will not be permitted to cross the joint without specific and written permission by the Engineer. Subsequent damage to the expansion joint system shall be repaired at the contractor's expense.

END OF SECTION 07190

Document 07250

SPRAYED-ON FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 STANDARDS

A. The following Standards are listed in this specification:

ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E119	Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E605	Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E736	Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
NFPA 251	Standard Methods of Tests of Fire Resistance of Building Construction and Materials
UL 263	Standard for Fire Tests of Building Construction and Materials
UL 1709	Standard for Rapid Rise Fire Tests of Protection Materials for Structural Steel

1.3 DEFINITIONS

A. Concealed Sprayed-on Fireproofing: Refers to applications where sprayed-on materials are applied to surfaces which will be concealed from view behind other construction when the work is completed.

B. Exposed Sprayed-on Fireproofing: Refers to applications where sprayed-on materials are applied to surfaces which are exposed to view when the work is completed.

1.4 SCOPE OF WORK

A. The types of sprayed-on fireproofing included in this section are as follows:

1. High Density Portland Cement-Aggregate Fireproofing.

B. The extent of sprayed-on fireproofing is indicated on the structural drawings.

1.5 QUALITY ASSURANCE

A. Installer of Sprayed-On Fireproofing: The installer of sprayed-on fireproofing shall be a firm licensed or otherwise approved by the manufacturer of fireproofing materials,

including qualified factory training where recommended by the manufacturer. Obtain materials from a single manufacturer for each different product required.

B. Fire Endurance Ratings: Provide products which have been tested in accordance with ASTM E 119, UL 263, UL 1709, ANSI A2.1, and NFPA 251 for fire resistance and rated by Underwriter's Laboratories (UL) or other industry recognized agency for the required resistances.

C. Fire Spread Ratings: Provide products which have been tested and listed by UL for required surface burning characteristics (flame spread, fuel contributed, smoke developed) in accordance with ASTM E 84.

Except as otherwise indicated, provide completed installations including coatings rated at a maximum flame spread of 25.

D. Preinstallation Conference: Conduct conference at Project site to review methods and procedures related to fireproofing material including, but not limited to, the following:

1. Review products, exposure conditions, design ratings, restrained and unrestrained conditions, calculations, densities, thicknesses, bond strengths, and other performance requirements.

2. Review and finalize construction schedule and verify sequencing and coordination requirements.

3. Review weather predictions, ambient conditions, and proposed temporary protections for SFRM during and after installation.

4. Review surface conditions and preparations.

5. Review field quality-control testing procedures.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications and installation instructions for each type of material and application method required on galvanized steel surfaces. Extent of fireproofing material for each construction and fire-resistance rating, including the following:

1. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.

2. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components.

3. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

B. Laboratory Test Reports: Submit laboratory test reports on each required test of in place fireproofing including location and date of samples tested and interpretations of test data. Refer to Testing Laboratory section of the specifications. Include compatibility and adhesion test reports from manufacturer indicating the following:

1. Materials have been tested for bond with treated galvanized substrates.

2. Materials have been verified by fireproofing manufacturer to be compatible with substrate primers over treated galvanized substrates.

C. Certificates:

Submit the following certificates:

1. Steel Primers:

   a. Where primers are applied to treated galvanized steel in shop or field, submit a statement from primer manufacturers, certifying that primers are compatible with sprayed-on fireproofing and will not impair its performance under fire exposure for applications indicated, as proven by ASTM E 119 test. Include test and other data as evidence; distribute data to sprayed-on fireproofing manufacturer.
   b. Also submit acceptance of steel primers by sprayed-on fireproofing manufacturer based on data submitted by primer manufacturer.

2. Fireproofing Materials: Sprayed-on fireproofing manufacturers' certification that their products comply with specification requirements and are suitable for the use indicated.

D. Warranties: Special warranties specified in this section.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace fireproofing material that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of fireproofing material from substrates.
   b. Water infiltration and corrosion of substrate.
   c. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIREPROOFING MATERIALS

A. High Density Portland Cement-Aggregate Fireproofing: Factory-mixed dry formulation of Portland cement, lightweight or normal weight mineral aggregates and additives mixed

with water at project site to form a slurry for pumping and for dispersal by compressed air introduced at spray nozzle.

1. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 43,200 psf.

2. Corrosion Resistance: No evidence of corrosion per ASTM E 937.

3. Dry Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/ULC design or as required by the authority having jurisdiction, or shall have a minimum average and individual density of 44 pcf and 40 pcf respectively.

4. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 1,000 psf.

5. Hardness: 10 per ASTM D 2240, Type D durometer.

6. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 0 and 0, respectively.

Subject to compliance with requirements, acceptable products and manufacturers include the following:

"Cafco Fendolite M-II"; Isolatek International

2.2 AUXILIARY FIREPROOFING MATERIALS

A. General: Provide auxiliary fireproofing materials which are compatible with sprayed-on fireproofing products and substrates, approved for use indicated by manufacturer of sprayed-on fireproofing, and which have been approved by UL or other acceptable testing and inspecting agency for use in fire-resistance rated designs indicated.

B. Substrate Primers: Provide type which is compatible with condition of each substrate to be fireproofed, including shop primers applied by metal fabricators/erectors, and which is recommended by fireproofing materials manufacturers for (in each case) compatibility with bonding adhesives and fireproofing materials.

C. Adhesive for Bonding Fireproofing: Type recommended by fireproofing manufacturer, and complying with selection requirements of applicable fire-endurance tests.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

A. Initial Inspection: Installer must examine substrates and conditions under which fireproofing work is to be performed, and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with fireproofing work until unsatisfactory conditions have been corrected in a manner acceptable to Installer. A satisfactory substrate is defined as follows:

1. Substrate complies with requirements of the section in which the substrate and related work is specified and is free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt or other foreign substances capable of impairing bond of fireproofing with substrate under conditions of normal use or fire exposure.

2. Objects which will penetrate fireproofing, including clips, hangers, support sleeves and similar items have been securely attached to substrates.

3. Substrates are not obstructed by ducts, piping, equipment and other suspended construction that could interfere with application of fireproofing.

B. Substrate Cleaning: Clean substrates of substances which might be incompatible with or interfere with bond of fireproofing, including oil, dirt, scale, rust and noncompatible shop primer. Remove ill-timed work which might interfere with installation of fireproofing.

1. High Density Cementitious Fireproofing: Power wash hot-dipped galvanized steel surfaces in strict accordance with manufacturer's instructions.

C. Seal all penetrations or open ended fireproofing termination by chamfering at a 45 degree angle and sealing with high heat silicone sealant. This termination sealant shall be a concrete tolerant silicone based sealant.

D. Install reinforcement over structural members as indicated on Drawings, or U.L. Fire Resistance Directory Listings.

E. Substrate Priming: Prime treated galvanized substrates as recommended by fireproofing manufacturer, covering surfaces to receive direct-bonded application of fireproofing. Use only primer products recommended by fireproofing manufacturer. Provide primer "cut-back" three inches for bolted connections and 12 inches for welded connections.

1. Products: Primer adhesive for "Cafco Fendolite M-II" shall be "Cafco Bond-Seal" (water-based sealer).

F. Protection of Other Work: Cover other work which might be damaged by fall-out or overspray of fireproofing materials during spraying operations. Provide temporary enclosure as may be required to confine operations, protect the environment, and ensure adequate ambient conditions including temperature minimum of 40°F (4°C) and rising. Maintain substrate temperatures of at least 40°F (4°C) and rising. Provide temporary protection and heat to maintain this temperature for 24 hours before and 24 hours after application or as required by the manufacturer. Ventilate spray fireproofing by natural or forced air circulation as required until it dries thoroughly.

3.2 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in original, unopened packages with manufacturers' labels identifying products legible and intact. Include on labels names of products and manufacturers, date of manufacture and shelf life, where applicable. Also include UL labels for fire-resistance ratings applicable to project.

B. Use materials with limited shelf life within period indicated. Remove from project site and discard any materials whose shelf life has expired.

C. Store materials inside, under cover, above ground and in a manner to keep them dry until ready to use. Remove from project site and discard any materials that have been exposed to moisture or have otherwise deteriorated.

3.3 SEQUENCING AND COORDINATION

A. Sequence and coordinate application of sprayed-on fireproofing with other related work specified in other sections to comply with the following requirements.

B. Prevent deterioration of sprayed-fireproofing for interior applications due to exposure to unfavorable environmental conditions.

C. Avoid unnecessary exposure of sprayed-on fireproofing to abrasion and other damage likely to occur during construction operations subsequent to its application.

D. Ensure that sprayed-fireproofing is installed prior to installation of enclosing or concealing work, with sufficient time allowed for inspection, testing and correction of defective fireproofing.

3.4 INSTALLATION

A. General Requirements:

1. Comply with manufacturer's instructions for proper treatment of galvanized steel surfaces, mixing materials, application procedures, and types of equipment used to mix, convey, and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated. Consult with manufacturer's technical representative for conditions not covered by printed instructions.

2. Provide thicknesses as indicated or as required for compliance with indicated fire-endurance ratings, whichever is greater in each instance. Extend fireproofing full thickness over entire area of each substrate to be protected. Except as otherwise indicated or recommended by manufacturer, install body of fireproof covering material in a single course.

3. Provide sprayed-in-place installation of fireproofing materials to the greatest extent possible. Following spraying operation in each area, complete the coverage by troweled installation or other appropriate placement method recommended by manufacturer.

4. Maintain ambient conditions during installation and for cure period following installation, as recommended by manufacturer. When temperature is less than 40 degrees F, follow manufacturer's field instructions for cold weather installation. Do not apply when surface temperature is less than 5 degrees F above the dew point. Provide ventilation and avoid excessive rate of drying. Protect from exposure to sun.

5. Maintain non-toxic, unpolluted working area. Provide temporary enclosure to prevent spray from contaminating air.

B. High Density Portland Cement Fireproofing: Apply high density cementitious fireproofing to comply with requirements indicated and in strict accordance with manufacturer's instructions:

1. Equipment, mixing and application shall be in accordance with the manufacturer's written application instructions.

2. The application of spray-applied fire resistive material shall not commence until certification has been received by the General Contractor that surfaces to receive sprayed fire protection have been inspected by the applicator and are acceptable to receive sprayed fire protection.

3. All unsuitable substrates must be identified and made known to the General Contractor and corrected prior to the application of the spray-applied fire resistive material.

4. Provide masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.

5. Bonding materials (adhesives, catch coats, metal lath, mesh, stud pins, etc.) shall be applied as per the appropriate UL/ULC fire resistance design and manufacturer's written recommendations.

3.5 FIELD QUALITY CONTROL

A. See Testing Laboratory Section of specifications for required field tests of sprayed-on fireproofing.

3.6 CLEANING, PATCHING, PROTECTION

A. Cleaning: Immediately upon completion of spraying operations in each containable area of project, remove over-spray and fall-out of materials from surfaces of the work, and clean surfaces to remove evidence of soiling. Repair or replace damaged work to restore surfaces to acceptable condition.

B. Patching: Repair or replace fireproofing found (by field tests) to be below compliance requirements. Add extra course of fireproofing material where feasible to achieve compliance; otherwise remove course and replace with newly installed complying work.

Coordinate installation of fireproofing with other work so as to minimize the need for other trades to cut into or remove installed fireproofing. As other trades successively complete installations of other work, patch fireproofing installations which have been cut away to facilitate such installations, so as to maintain complete coverages of full thickness on substrates to be protected with fireproofing. Trowel-applied fireproofing materials are acceptable for patching of work. Do not allow work requiring patchings to be covered over or otherwise concealed before patching is completed.

C. Protection: Installer of sprayed-on fireproofing shall advise Contractor of protection requirements for fireproofing work, which will ensure that fireproofing will be substantially without damage or deterioration at time of substantial completion of project. Provide protection from reasonably predictable harmful exposures. Repair or replace work which has not been successfully protected.

END OF SECTION 07250

Document 07900

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each joint sealant product required, including instructions for joint preparation and joint sealant application.

B. Certificates: Submit certificates from manufacturers of joint sealants attesting that their products comply with Specification requirements and are suitable for the use indicated.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required. Provide one year warranty on installation and materials.

B. Review and approve joint details before construction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original unopened containers, or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials.

B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturers.
2. When joint substrates are wet due to rain, frost, condensation or other causes.
3. Joint Width Conditions: Do not proceed with installation of joint sealants when joint widths are less than allowed by sealant manufacturer for application indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.

2.2 SEALANT FOR HORIZONTAL (NON-COVE) JOINTS:

A. Products: Acceptable joint sealants:

1. "Sonolastic SL-2" by Chemrex - BASF
2. "Sikaflex-2c NS TG" by Sika
3. "Iso-Flex 880 GB" by Lymtal International, Inc.

B. Compounds used for sealants shall not stain concrete or masonry. Aluminum pigmented compounds not acceptable..

C. The color of sealants shall match adjacent surfaces.

2.3 SEALANT FOR VERTICAL JOINTS AND COVE JOINTS:

A. Products: Acceptable joint sealants:

1. "Sonolastic NP-2" by BASF
2. "Sikaflex-2c NS" by Sika
3. "Iso-Flex 881" by Lymtal International, Inc.

B. Compound used for sealants shall not stain concrete or masonry. Aluminum pigmented compounds not acceptable.

C. The color of sealants shall match adjacent surfaces.

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Either flexible, open cell polyurethane foam or non-gassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint. Provide self-adhesive taper where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 INSPECTION

A. Require installer to inspect joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealant performance. Obtain installer's written report listing any condition detrimental to performance of joint sealant work. Do not allow joint sealant work to proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust; paint, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellants; water; surface dirt and frost.

2. Clean concrete, substrate surfaces, by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance from concrete.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primers to areas of joint sealant bond. Do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

2. Do not leave gaps between ends of joint-fillers.

3. Do not stretch, twist, puncture or tear joint-fillers.

4. Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.

5. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joint where required to prevent third-side adhesion of sealant to back of joint.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants in concave joint configuration per ASTM C 962, unless otherwise indicated to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.4 PROTECTION AND CLEANING

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and reseal joints with new materials to produce sealant installations with repaired areas indistinguishable from original work.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by the manufacturer of the sealants and of the products used in the joints.

END OF SECTION 07900