THP Limited

Addendum No. 2
February 27, 2025

To the Project Manual and Drawings for:
Scheumann Stadium
Bleacher Repairs Phase 1
Ball State University
BSU Project No. 2025-010.01 ST
January 2025
THP #24438

Prepared by:
THP Limited, Inc.

To: All Bidders

This addendum supplements and modifies the Project Manual and Drawings for the above Project dated January 2025 and shall hereby be incorporated into the Work as part of the Contract Documents. Bidders shall verify this fact by indicating receipt of the Addendum in their bids.

Attachments:
Specification Section 030100.
Specification Section 071800.

Project Manual:

1. Section 030100.
   Reissued entire Section 030100, to list updated prepackaged material names in Part 2.

2. Section 071800.
   Reissued entire Section 071800, to incorporate additional technical support requirements per 1.4.I, if contractor does not meet experience requirements per 1.4.C.

Clarifications:

1. Drawing Plans 101A/B, Note 35. Note 35 does not include the inside isolation joint at the top spandrels of the stadium.

2. Drawing Detail 1/201. Assume up to 4” wide for joint edge repairs Pay per lin. ft.

3. Drawing Detail 4/201. Per Note 5, if mesh reinforcement is not salvageable, provide small diameter rebar or Rawl spikes in the sides of the patch, confirming spacing needs with Engineer on case by case basis.

4. Drawing Detail 6/201. Assume width at top of wall up to 4”. Height varies. Pay per sq. ft.

5. Drawing Detail 8/401. Per Note 4, there is no need for a vertical sawcut at the termination for coating on risers. Sawcut need is only in treads for membrane, per Detail 8/401.

END OF ADDENDUM

DIVISION 03 – CONCRETE

SECTION 030100

CONCRETE REPAIRS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. All labor, material, equipment, special tools, and services required to complete the work required for the project as indicated on the Drawings and in the Specifications, including but not limited to:
    a. Shallow floor repairs.
    b. Vertical repairs to beams and tee stems.
    c. Expansion joint blockout repairs.
    d. Miscellaneous repairs indicated on the Drawings.
    e. Gravity feed concrete crack repairs.

B. Related Sections

1. Section 012000: Price and Payment Procedures.
2. Section 012200: Unit Prices.
3. Section 015600: Barriers.
4. Section 071800: Pedestrian Traffic Membrane.
5. Section 079000: Expansion Joints.
6. Section 079200: Sealants.
7. Section 099100: High Performance Coatings.

C. Unit Prices

1. Unit prices are taken for the work items listed in Section 012200, for the quantity measurements listed in Section 012900.
2. Include in the lump sum bid the quantities in Section 012200.
3. Final adjustment to the contract amount will depend on actual quantities of repair performed.
4. Repair quantities will be determined by measurements made jointly by the owner or its representative and the contractor. The contractor will record the measurements with both parties signing the record to attest to its accuracy.

1.2 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 301 - Specification for Structural Concrete for Buildings.
2. ACI 305R - Hot Weather Concreting.
3. ACI 306R - Cold Weather Concreting.
4. ACI 318 - Building Code Requirements for Reinforced Concrete.

B. American Society for Testing and Materials (ASTM)

1. ASTM A185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
2. ASTM A615 - Specification for Deformed and Plain-Billet Steel Bars for Concrete Reinforcement.
3. ASTM A775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
4. ASTM C33 - Concrete Aggregates.
5. ASTM C881 - Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
6. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete.

C. Structural Steel Painting Council (SSPC)

1. Surface Preparation Specification No. 3 (SP3) - Wire Wheel Cleaning.
2. Surface Preparation Specification No. 6 (SP6) - Commercial Blast Cleaning.

D. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M182 - Specifications for Burlap Cloth Made from Jute or Kenaf.

E. Keep a copy of the referenced specifications cited in this section in the on-site field office.

1.3 SUBMITTALS

A. Submit literature for manufactured products, including manufacturer's specifications, test data and installation instructions.

B. Letter stating this Contractor and supplier are familiar with the referenced standards.

C. Submit shop drawings for review for all steel reinforcement in new curbs, topping slabs, and localized full slab replacement.

D. The Owner's review of details and construction operations shall not relieve this Contractor of his responsibility for completing the work successfully in accordance with the Contract Documents.

1.4 QUALITY ASSURANCE

A. The Contractor shall comply with all Federal, State and Municipal laws, codes, ordinances and regulations applicable to the Work in this Contract and also with all

requirements of the National Fire Protection Association, the National Electric Code, and the Occupational Safety and Health Administration (OSHA). If the above laws, codes or ordinances conflict with this Specification, then the laws, codes or ordinances shall govern, except in such cases where the Specification exceeds them in quality of materials or labor, then the Specifications shall be followed.

B. Concrete that does not conform to the specified requirements, including bond to substrate, strength, finish and tolerances shall be subject to removal and replacement, including necessary preparatory work, at no additional cost to the Owner and without extension to the Contract Time.

C. Contractor shall be responsible for restoration of other components of the Work damaged during placement of concrete or damaged during removal of unsatisfactory concrete.

D. ACI 301, ACI 305R and ACI 306R are a part of the Contract Documents, are incorporated herein as fully as if here set forth and are referred to as General Concreting Requirements.

E. Chloride Ion Limitations: Maximum acid-soluble chloride ion concentration, in hardened concrete shall not exceed .10% by weight of cement.

F. Concrete testing and certification shall be as described in ACI 301, Chapter 16.

1.5 PROJECT CONDITIONS

A. Riser End Repairs/Shoring

1. Two consecutive riser end repairs are not permitted, unless supplemental shoring support for the riser ends is provided. Shoring can be either shore posts positioned on a sound base below, or steel beam set on the top side bleacher surfaces supporting anchors to the affected precast members. If consecutive riser repairs are desired by the contractor, submittal of shop drawings of the shoring will be required in conjunction with material submittals per this section at the start of the project.

2. Install shores before removing concrete from the structural member that is designated to be shored.

3. Shores must be on-site prior to beginning any concrete demolition work.

1.6 WARRANTY

A. A warranty period of two (2) years shall be provided for concrete work performed under this Section against defects, as determined by the Owner, including but not limited to debonding, excessive cracking and surface scaling.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fine and Coarse Aggregates

1. Meeting requirements of ASTM C-33.

B. Water
   1. Mixing water shall be potable meeting requirements of ASTM C-94.

C. Pre-packed Concrete Materials
   1. Horizontal Application: Typical Repair Areas (Patch Material Type A)
      a. Plainitop 11 SCC by Mapei.
      b. SikaEmaco 100 CI by Sika Corp.
      c. EucoRepair SCC by Euclid Chemical Company
   2. Horizontal Application: Typical Repair Areas (Patch Material Type A)
      a. SikaQuick 1000 by Sika Corp.
      b. SikaEmaco 1060 EX / 1061 by Sika Corp.
      c. Planitop 18 ES by Mapei.
      d. VersaSpeed 100 Euclid Chemical Co
   3. Vertical and Overhead Repair Areas: Trowel Grade (Patch Material Type B.1)
      a. SikaEmaco 488Cl by Sika, Inc.
      b. SikaQuick VOH by Sika, Inc.
      c. SikaEmaco 425 Gel Patch by Sika Corp.
      d. Planitop XS by Mapei
      e. Verticoat Supreme, Euclid Chemical Co.
   4. Vertical and Overhead Repair Areas: Form-and-Pour (Patch Material Type B.2)
      a. SikaQuick FNP by Sika, Inc.
      b. SikaEmaco440 by Sika, Inc.
      c. Planitop 15 by Mapei
      d. Eucorete Supreme, Euclid Chemical Co.

D. Bar Coating
   1. Sikadur 32, Hi-Mod LPL by Sika, Inc.
   2. MasterEmaco ADH 326 by Sika, Inc.

E. Bonding Agent (used for shallow floor patches if the patch is not deep enough for patch anchors; patch material must be placed while epoxy is still wet)
   1. Sikadur 32, Hi-Mod LPL by Sika, Inc.

F. Welded Wire Reinforcement

1. Conforming to ASTM A185.
2. All steel to be epoxy coated unless specifically noted otherwise on the drawings.

G. Reinforcing Steel
1. All reinforcing steel shall have a minimum Fy of 60 ksi.
2. All steel to be epoxy coated unless specifically noted otherwise on the drawings.

H. Curing Materials
1. 10 oz. burlap meeting the requirements of AASHTO M-182.
2. Visqueen: 6 mil polyethylene (white).

I. Curing Compound
1. VOCOMP-25 by W.R. Meadows.
2. MasterKure CC 1315WB by Sika, Inc.
3. Liquid membrane forming curing compound shall conform to the requirements of ASTM C1315, Type 1, Class A and have data from an independent laboratory indicating a maximum moisture loss of 0.40 grams per square cm. when applied at a coverage rate of 300 square feet per gallon.

J. Form Lumber
1. New fire-retardant material, grade and size to adequately form, support and brace concrete and to provide finishes that match adjacent surfaces.

K. Epoxy Grout
1. Sikadur 32, Hi-Mod LPL epoxy mixed with silica sand.

L. Patch Anchors
1. Stainless steel mushroom head spikes by DeWalt.

M. Gravity Feed Crack Repair Material
1. Rigid Epoxy (Crack Filler Type A)
   a. Sikadur 55 SLV by Sika, Inc. or similar meeting the following requirements:
      1) Type IV, Grade 1, Class C epoxy resin per ASTM C881.
      2) Maximum Viscosity = 120 cps (at 73 deg F).
      3) Minimum 28 Day Compressive Strength = 10,000 psi.
      4) Minimum Tensile Strength = 6,000 psi.
      5) Quick setting.

N. Epoxy Surface Coating
1. Sikadur 35, Hi-Mod LV or 35, Hi-Mod LV-LPL by Sika, Inc.

a. Base Coat 15 dry mils thickness heavily seeded with manufacturer approved aggregate.

b. Topcoat 15 mils thickness.

PART 3 EXECUTION

3.1 GENERAL

A. Prior to the start of work, the Contractor shall survey areas to receive repair concrete to determine locations and approximate quantity of material.

B. Prior to start of excavations, perform an on-site review of the work areas with the Owner. Provide a minimum of 2 working days' notice prior to the requested review day.

C. Prior to performing operations such as jack hammer work, the Contractor shall make a careful and thorough survey of the underside of the level on which he intends to work and shall remove all loose soffit concrete which may fall as a result of those operations. The Contractor shall also be responsible for posting all signs and erecting all barricades as necessary to prevent pedestrians and vehicles from entering the area below hazardous work.

D. During concrete removal work, Contractor shall not damage existing mild steel reinforcement. Mild steel reinforcement that is damaged by the Contractor, as determined by the Owner, shall have a new reinforcing bar the same size as the damaged bar lapped to each side of the damaged area. Lap lengths shall be determined by ACI 318. Cost of new reinforcing bar, concrete removal and patching for lap length shall be borne by the Contractor.

E. It is intended that the existing reinforcement steel exposed during the work shall remain in place (unless noted on Drawing for removal) and undamaged during removal of the unsatisfactory concrete. Tie loose reinforcement bars in place in an approved manner prior to placing patch mix. If the reinforcement is deteriorated, as determined by the Owner, the Owner may direct that it be replaced and spliced in accordance with ACI splice and development requirements for reinforcement bars. Additional concrete removal may be required to expose undamaged reinforcing. If required, compensation will be made in accordance with the established Unit Prices.

F. Concrete placement for patches or overlays on sloping surfaces shall begin on the low elevation end and proceed upwards to the high elevation end.

G. Control joints to be either tooled or sawed into concrete slab. Confirm control joint pattern with Owner prior a minimum of 24 hours prior to placement of concrete. Tooled joints are to be cut while concrete is wet. Sawed joints to be cut within 6 hours of slab placement before slab begins to crack.

3.2 PREPARATION

A. Protection

1. Contractor shall protect all open excavations, and reinforcing therein, from damage due to mechanical disturbance, weather conditions or other causes.
2. Contractor shall protect occupied areas below the work area during all phases of the work including removal, preparation and placement of materials.
3. Provide barricades to close areas immediately below the work area. Coordinate the time closing of required areas with the Owner.

3.3 CONCRETE FLOOR REPAIR PROCEDURE

A. Refer to the Drawings for repair details. Contractor shall sound the concrete deck using chain drag method and hammer survey to identify the limits of deteriorated concrete within the Work Area. Mark with paint each area to be repaired. Location of paint marks must be approved by the Owner's representative.

B. Before removal of floor concrete within a Work Area, the Contractor and the Owner's representative will record the area bounded by the paint marks. Take measurements to the nearest inch in such a way that results in a total plan area at each location.

C. Contractor and Owner's representative shall affix their signatures to each measurement sheet completed, attesting to the agreed-upon accuracy of the measurements. Furnish copies of measurement sheets to both parties for their records.

D. Sum and calculate the total repair area to yield total square feet. Measurements are the sole basis for calculation of final payment, based upon the item's unit price. Refer to Section 012200 and Section 012900. Base unit price on the area of the repair and the depths indicated on the repair details.

E. Remove floor concrete within the Work Area by conventional chipping methods.

F. Conventional Chipping Method

1. Sawcut the concrete deck surface along the perimeter of the paint marks which define the removal area. Do not cut existing reinforcement. Depth of sawcuts shall be 3/4 inch. Cut perimeter of removal area before beginning chipping hammer work. Do not over cut corners of patch area.
2. Perform concrete removal with no larger than 18 pound chipping hammers.
3. Begin concrete removal at the center of the removal area and work towards the sawcut perimeter. Maintain vertical sawcut edge at perimeter. Re-saw if necessary, to maintain required edge.
4. Contractor shall use due diligence to perform concrete chipping operation in a manner to avoid punching through slab. Means such as utilizing wide chipping blades and performing chipping procedures on a low angle are recommended.

G. The surface of the sound, exposed concrete shall be relatively flat with 1/4" amplitude over the repair area for new concrete patches and overlays. Contractor is responsible for ensuring that the final concrete repair area is sound.

H. Within 24 hours of concrete repair material placement, media blast the excavation and the immediately adjacent surface. Reinforcing steel shall be cleaned to a SSPC-SP6 condition unless otherwise indicated.

I. After completion of all cleaning operations, blow-out excavations with oil-free and water-free compressed air. Previously cleaned excavations that are subjected to contamination must be re-cleaned.

J. The Owner will inspect excavations prior to coating reinforcing steel. Final touch-up of excavations and reinforcing steel shall be performed before proceeding.

K. Within 8 hours after cleaning, coat all surfaces of exposed steel with one coat of bar coating. Allow coating to become tack free before proceeding with second coat.

L. Apply second coat of bar coating to previously coated steel. Do not apply coating to substrate or allow coating to puddle in low areas of excavation.

M. Thoroughly saturate all concrete surfaces to be in contact with new concrete as necessary to provide a saturated surface dry condition.

N. Just prior to concrete placement blow-down area with oil-free compressed air to remove standing and puddled water.

O. Place Patch Material Type A in the excavations. Vibrate new patch material to ensure consolidation in maximum-depth areas and at the excavation's perimeter. Screed material flush with adjacent surfaces and finish with a float or light trowel.

P. After finishing, fog concrete surfaces with water using approved fog spray device (hose not permitted) to prevent surface drying prior to start of curing.

Q. Cure Patch Material Type A in accordance with manufacturer's written instructions.

3.4 OVERHEAD AND VERTICAL SURFACE KNOCKDOWN PROCEDURE

A. Contractor to visually survey all slab soffit surfaces and locate delaminated, spalled or otherwise deteriorated concrete requiring repairs. Mark area with paint.

B. Engineer to verify locations prior to beginning knockdown repairs.

C. Remove all loose or delaminated concrete.

D. Wire-wheel prepare all exposed reinforcing steel to an SSPC-SP3 condition.

E. Blow clean with oil-water free compressed air.

F. Within 8 hours after cleaning, coat all surfaces of exposed steel with (2) coats of bar coating. Ensure complete coverage of steel surfaces. Allow coating to become tack free before proceeding with second coat.

G. Apply second coat of bar coating to previously coated steel.

3.5 OVERHEAD AND VERTICAL REPAIR PROCEDURE

A. Refer to the Drawings for repair details. Contractor shall sound overhead and vertical

concrete surfaces using hammer sounding techniques to identify the limits of deteriorated concrete within the Work Area. Mark with paint each area to be repaired. Location of paint marks must be approved by the Owner's representative.

B. Before removal of overhead or vertical concrete within a Work Area, the Contractor and the Owner's representative will record the area bounded by the paint marks. Take measurements to the nearest inch in such a way that results in a total plan area at each location.

C. Contractor and Owner's representative shall affix their signatures to each measurement sheet completed, attesting to the agreed-upon accuracy of the measurements. Furnish copies of measurement sheets to both parties for their records.

D. Calculate and sum the total repair area to yield total square feet. Measurements are the sole basis for calculation of final payment, based upon the item's unit price. Refer to Section 012200 and Section 012900. Base unit price on the area of the repair and the depths indicated on the repair details.

E. Remove concrete within the Work Area by conventional chipping methods.

F. Conventional Chipping Method:

1. Saw cut the concrete surface along the perimeter of the paint marks which define the removal area. Do not cut existing reinforcement. Depth of saw cuts shall be 1/2 inch. Cut perimeter of removal area before beginning chipping hammer work. Do not over cut corners of patch area.

2. Perform concrete removal with no larger than 18-pound chipping hammers.

3. Begin concrete removal at the center of the removal area and work towards the saw cut perimeter. Maintain vertical saw cut edge at perimeter. Resaw if necessary, to maintain required edge.

4. Contractor shall use due diligence to perform concrete chipping operation in a manner to avoid punching through a slab. Means such as utilizing wide chipping blades and performing chipping procedures on a low angle are recommended.

G. The surface of sound, exposed concrete shall be relatively flat with a ¼" amplitude over the repair area. Contractor is responsible for ensuring that the final concrete repair area is sound.

H. Within 24 hours of concrete repair material placement, media blast the excavation and the immediately adjacent surface. Reinforcing steel shall be cleaned to a SSPC-SP6 condition unless otherwise indicated.

I. After completion of all cleaning operations, blow-out excavations with oil-free and water-free compressed air. Previously cleaned excavations that are subjected to contamination must be re-cleaned.

J. The Owner will inspect excavations prior to coating reinforcing steel. Final touch-up of

excavations and reinforcing steel shall be performed before proceeding.

K. Within 8 hours after cleaning, coat all surfaces of exposed steel with one coat of bar coating. Allow coating to become tack free before proceeding with second coat.

L. Apply second coat of bar coating to previously coated steel. Do not apply coating to substrate.

M. Maintain all concrete surfaces of repair areas in a wet condition to provide a surface saturated dry condition.

N. Just prior to material placement, blow-down area with oil-free compressed air to remove any standing water near vertical repair locations.

O. Place Patch Material Type B in the excavations per manufacturer's written instructions. Vibrate new patch material at vertical repairs to ensure consolidation in maximum-depth areas. Screed material flush with adjacent surfaces and finish with a light trowel.

P. After finishing, fog concrete surfaces with water using approved fog spray device (hose not permitted) to prevent surface drying prior to start of curing.

Q. Cure Patch Material Type B in accordance with manufacturer's written instructions.

3.6 EPOXY GROUT INSTALLATION PROCEDURE

A. Saw cut the concrete deck surface along the perimeter of the paint marks which define the removal area. Do not cut existing reinforcement. Depth of saw cuts shall be ¾ inch. Cut perimeter of removal area before beginning chipping hammer work.

B. Begin concrete removal at the center of the removal area and work towards the saw cut perimeter. Maintain vertical saw cut edge at perimeter. Resaw if necessary, to maintain required edge.

C. Prior to epoxy grout placement, media blast the excavation and the immediately adjacent surface. Reinforcing steel shall be cleaned to a SSPC-SP6 condition unless otherwise indicated.

D. Mix epoxy mortar using 2 parts epoxy and 1 part clean over dried silica sand.

E. Apply neat epoxy worked into substrate for positive adhesion. Immediately follow with application of the epoxy mortar. Follow manufacturer's instructions for mixing and installation.

F. Do not allow traffic on epoxy mortar patch for a minimum of 24 hours.

3.7 GRAVITY FEED CRACK REPAIR PROCEDURE

A. Contractor and adhesive repair material manufacturer shall jointly review existing substrate materials to ensure compatibility with the systems. Submit in writing any material which may cause material adhesion to substrate less than normally anticipated or other compatibility or performance difficulties. Failure to review and identify deleterious products/materials, and if failure of the materials is a result of adhesion

difficulties or chemical or physical incompatibilities with substrate materials, the Contractor or Manufacturer shall be responsible for all costs related to correcting the deficient Work.

B. Fumes and dust shall be controlled to prevent harmful or undesirable effects in surrounding areas. All potential avenues for penetration of fumes or dust into surrounding occupied areas shall be sealed prior to the start of the work.

C. The Contractor shall cover all exposed drain grates. Drains shall be functional during non-working hours.

D. The contractor shall post all signs and erect all barricades as necessary to prevent pedestrians and vehicles from entering the area below.

E. The contractor shall survey repair area and locate all minor spalls and cracks larger than 1/8” wide and perform necessary repairs using manufacturers approved materials and procedures.

F. All cracks and surfaces shall be free of loose matter, dirt, laitance, oil, grease, salt, and other contaminants which would inhibit the flow and/or bond of the adhesive repair material.

G. Concrete surfaces shall be cleaned using shotblast or media blast operations. The size of shot and travel speed of the equipment shall be chosen to provide a uniformly clean surface and profile.

H. Surface seal all cracks and penetrations at the underside of the deck using manufacturers approved materials and procedures.

I. Mixing times and quantities are to be in strict accordance with the manufacturers written instructions. Upon completion of mixing, immediately distribute material into hand carried spray containers. If crack filler material begins to set up, cease application and discard unused material. Any and all cost for unused material shall be paid for by the contractor.

J. DO NOT route vee-notch in cracks prior to material installation.

K. Apply filler material directly over unrouted crack and allow material to fully penetrate into crack. Reapply additional material as necessary and cease installation in cracks upon denial. Roll out and evenly distribute all such material laying on surface.

L. Continuously monitor spaces below work areas for material loss through cracks, seams or penetrations in the deck, and cease installation in the vicinity of any such locations until cracks, seams or penetrations are sealed.

M. When performing the work on a time-and material basis, the contractor shall keep daily records. Record at each repair location: 1) the start time and number of workers continuously involved in the work, 2) the materials used, and quantities involved, 3) the ending time for each worker continuously involved in the work. Turn records over to

Engineer on a daily basis via fax or Email.

3.8 EPOXY SURFACE COATING

A. Immediately following Gravity Feed Crack Repair efforts, blow shotblasted surfaces clean with compressed air, and install materials per manufacturer's direction and written requirements. Terminate installation in neat, straight lines, using masking tape or similar means.

B. Contractor shall ensure the specified/recommended application rates of all components of the coating systems. Base coat and top coat of the coating system shall be distributed onto the deck by calibrated, notched squeegees. Squeegees showing signs of wear shall be discarded.

C. Each fluid-applied component of the coating system shall be back-rolled to eliminate squeegee marks.

D. The final, average static coefficient of friction shall be a minimum of 0.85 under wet and dry conditions. No individual test area shall have a coefficient less than 0.80. Any coating system that does not conform, as determined by the Engineer, to the specified acceptance criteria shall be subject to rework, upgrading or replacement of the deficient areas, including necessary preparatory work, at no additional cost to the Owner.

3.9 FIELD QUALITY CONTROL

A. All excavations shall be inspected and approved prior to placing concrete. The Contractor shall notify the Owner 2 working days in advance of required inspection.

B. Notify the Owner at least 2 working days prior to placing concrete.

C. Acceptance of Structure

1. Acceptance of Structure shall be in accordance with ACI 301 Chapter 18.

2. Contractor shall bear all costs of correcting rejected work, including the cost of Owner's services thereby made necessary.

3.10 CLEANING

A. Empty containers shall be removed from the structure at the end of each working day. Cloths soiled with adhesive materials that might constitute a fire hazard shall be placed in suitable metal safety containers or shall be removed from the structure at the end of each working day. Special care shall be taken in storage of disposal of flammable materials. Comply with health, fire and environmental regulations.

B. All spilled materials shall be completely removed from hardware, adjacent floor areas, metal work, etc. Remove spilled coating by approved methods.

C. Repaint in matching color all curbs, columns, walls, etc., where existing paint was removed during preparation of adhesive materials installations.

D. All hardware, adjacent floor areas, metal work, etc., and the general premises shall be

left clean and free of all construction dust, dirt and debris.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 071800

PEDESTRIAN TRAFFIC MEMBRANE

PART 1 GENERAL

1.1 SUMMERY

A. Section Includes

1. All labor, material, equipment, special tools, and services required to complete the work required for the project as indicated on the Drawings and in the Specifications, including but not limited to:

a. Medium duty traffic membrane system: Type A.

B. Related Sections

1. Section 015600: Barriers.
2. Section 030100: Concrete Repairs.
3. Section 079000: Expansion Joints.
4. Section 079200: Sealants.
5. Section 099100: High Performance Coatings.

1.2 DEFINITIONS

A. The term "manufacturer's recommendations”, or variations thereon it shall mean "manufacturer's recommendations which are found in publications available to and commonly used by the general architectural and consulting professions."

1.3 SUBMITTALS

A. Joint and Several Warranty Form meeting the requirements of Article 1.7.

B. Skid Resistance Addenda Form to Joint and Several Warranty meeting the requirements of Articles 1.7 and 3.4.

C. Bond Test Addenda Form to Joint and Several Warranty meeting the requirements of Articles 1.7 and 3.4.

D. Literature for all manufactured products, including manufacturer's specifications, test data and installation instructions or applicator's manual.

E. 12" x 12" samples of each membrane system to be used. Sample shall be applied to plywood or similar rigid material.

F. 1/4-lb. (±) sample of aggregate type intended to be used. Provide two (2) samples, one sent to THP for record, and other sample sent to Membrane Manufacturer for laboratory testing and sieve analysis.

G. Letter from Membrane Manufacturer stating sample aggregate was received, tested, and reviewed, and is approved for use for the specified system and jobsite conditions. Letter shall include the following information:
   1. Sieve or particle size analysis.
   2. Grain Shape.
   3. Hardness (Moh's Scale).
   4. Moisture Content (ASTM C-566).
   5. Specific Gravity (ASTM C-128).
   6. Bulk Density (ASTM C-29).
   7. Chemical Analysis.

H. If requested, copy of letter of approval per Article 1.4.B.

I. If requested, resume per Article 1.4.C.

J. Provide letters of Certification per Article 1.4 Paragraphs E, F, and G.

K. Safety Data Sheets on all materials which are classified as hazardous materials.

L. Maintenance manuals with the following information:
   1. Project name.
   2. Project location.
   3. Date.
   4. Owner's name.
   5. Coating system(s).
   6. Drawings indicating the coating systems and their location in the structure.
   7. Schematic drawing of each membrane type identifying each element of the membrane system by dry film thickness and manufacturer's reference number or name.
   8. Recommendations for routine care and maintenance.
   9. List of three (3) approved Contractors nearest the project location authorized to perform repairs.
   10. Identify common causes of damage and instructions for temporary patching until permanent repair can be made.
   11. Upon completion of the Work and prior to final payment, provide a fully executed warranty.

1.4 QUALITY ASSURANCE

A. Applicable Codes

1. The Contractor shall comply with all Federal, State and Municipal laws, codes, ordinances, and regulations applicable to the Work in this Contract and also with all requirements of the National Fire Protection Association, the National Electric Code, and the Occupational Safety and Health Administration (OSHA). If the above laws, codes, or ordinances conflict with this Specification, then the laws, codes or ordinances shall govern, except in such cases where the Specification exceeds them in quality of materials or labor, then the Specifications shall be followed.

B. The membrane applicator shall be approved by the manufacturer and shall have been an approved manufacturer's applicator for the membrane products, as identified on the subcontractor supplemental proposal form, for a minimum of three consecutive years. If requested, the contractor shall provide written confirmation from the manufacturer within three calendar days of the request.

C. The membrane applicator and its superintendent shall meet the following minimum requirements:

1. Installed the approved membrane materials as identified on the Bid Form in a traffic membrane system in three previous similar projects. Each of the three projects shall have been a minimum of 5,000 square feet in size.

2. Installed the approved membrane materials as identified on the Bid Form in a traffic membrane system currently in use within the last two years.

D. Conform to the Field Quality Control requirements in Part 3 of this Section.

E. Membrane manufacturer to certify that aggregate specified is acceptable for use in the membrane system.

F. Membrane manufacturer to certify that sealants in contact with membrane are compatible with membrane system and are included as part of the warranty.

G. Membrane manufacturer to certify that substrate surfaces in contact with any component of the vehicular traffic membrane are compatible.

H. Field Samples

1. Prior to beginning surface preparation, prepare a sample area in the initial phase work area for the project to be used as the minimum standard of acceptability for cleanliness and surface texture to be achieved throughout the work. The area shall be at least 20 sq. ft. Size and location shall be as directed by the Engineer. The standard shall be jointly reviewed and approved by both the Engineer and the Manufacturer relative to Article 3.2 paragraph B.4 prior to start of full scale surface preparation work. The approved standard shall remain uncoated until all surface preparation work is completed.

2. After approval, the sample area shall be covered with 6 mil thick plastic sheets. Edges shall be continuously taped, as well as splices, and the perimeter shall be weighted down. The sample area shall be kept covered unless viewing is needed for

comparative purposes or until final preparation for membrane application. Contractor shall monitor the area to ensure the integrity of the covering. Neither foot nor vehicular traffic shall be allowed on the covering unless additional protective measures are taken to protect the cleanliness of the sample area.

I. Manufacturer's Representation

1. For installation of membrane materials, a technically competent employee of the membrane manufacturer, approved by the Engineer and not associated with the installation crew, shall be on site before and during the installation of the membrane system during the first Work Area. If the contractor is approved by the manufacturer per paragraph 1.4.B, but does not meet the experience requirements per paragraph 1.4.C, the same technically competent employee of the membrane shall also be on site before and during the second work area installation of the membrane system.
2. Application of the membrane shall not begin until the manufacturer's technician has approved the cleanliness and surface texture of the substrate.
3. The technician shall remain on site for the length of time necessary to observe the installation of the total membrane system.
4. The technician shall review all Contract application techniques and procedures and shall advise the Contractor when, where and as required to obtain Specification compliance.
5. The Contractor and the membrane Manufacturer shall comply with the terms set forth in items 1 through 4 above at no additional cost to the Owner.

J. An employee of the applicator who has been trained by the membrane manufacturer on the installation of the approved membrane system shall be present during all applications of the membrane system.

K. Within twenty-four hours of application of membrane materials submit log required by Article 3.4 Paragraph F to Engineer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site in sealed, undamaged containers. Each container shall be identified with material's name, date of manufacture and lot number.

B. Only those materials being used during any one work shift may be stored in the current work area. Materials being used for shift work shall be uniformly distributed throughout the intended work area so as to not overload or otherwise distress the structural system. All other materials, if stored on site, shall be stored at the designated staging area.

C. Coating materials shall be kept sealed when not in use.

D. Storage and handling of materials shall conform to the manufacturer's requirements and the requirements of the applicable environmental protection and safety regulatory agencies.

E. Storage areas shall be heated or cooled as required to maintain the temperatures within the range recommended by the coating manufacturer.

F. The handling and use of toxic or flammable solvents shall conform to the requirements of the applicable safety regulatory agencies, recommended by the manufacturer.

1.6 WARRANTY

A. Completed installation shall be warranted jointly and severally on a single document by manufacturer and applicator against defects of materials and workmanship. The length of the warranty period shall not be less than (5) years from the date of substantial completion of the Project.

B. Manufacturer and installer shall further warrant the skid resistance and bond strength of the installed systems. The test may be measured at any single location and shall meet the specified criteria in Article 3.4. The length of the warranty period shall not be less than five (5) years from the date of substantial completion of the Project.

C. Warranty documents shall not require the signature of the Owner to be effective, shall not limit the Owner's legal remedies otherwise allowed per the project contract, and shall not limit the venue of any potential legal jurisdiction.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Lymtal International

B. Neogard Corporation

C. Sika Corporation

2.2 MATERIALS

A. Medium Duty Traffic Membrane System (Type A)

1. Iso-flex 760 Aliphatic System by Lymtal International, comprised of:

a. Primer

1) Iso-Flex Epoxy SF, Primer 750, or Primer 757.

2) Apply at manufacturer's recommended application rate.

b. Base Coat

1) Iso-Flex 750 Base Coat.

2) Apply at 40 mils dry film thickness.

c. Top Coat

1) Iso-Flex 760 Aliphatic Top Coat.

2) Apply at 18 mils dry film thickness.

3) Aggregate seeded and back rolled to provide slip resistant surface.

d. Aggregate

1) Unimin 12/20 by US Silica, either Ottawa, MN or Voca, Texas.
2) Install at membrane manufacturer's maximum application rate.
3) Uniformly distributed with no bare spots.

2. FC System by Neogard Corporation, comprised of:

a. Primer

1) Neogard 7760/7761 VOC.
2) Apply at manufacturer's recommended application rate.

b. Base Coat

1) Neogard FC7500/FC7960.
2) Apply at 40 mils dry film thickness.

c. Top Coat

1) Neogard FC7540/FC7964.
2) Apply at 18 mils dry film thickness.
3) Aggregate seeded and back rolled to provide slip resistant surface.

d. Aggregate

1) 12/20 silica by Carmeuse Industrial Sands, Brady, Texas.
2) Install at membrane manufacturer's maximum application rate.
3) Uniformly distributed with no bare spots.

3. Sikalastic Traffic System by Sika Corporation, comprised of:

a. Primer

1) Sikalastic FTP Lo-VOC Primer or MT Primer.
2) Apply at manufacturer's recommended application rate.

b. Base Coat

1) Sikalastic 720 Base Coat.
2) Apply at 40 mils dry film thickness.

c. Top Coat

1) Sikalastic 745 Aliphatic Top Coat.
2) Apply at 18 mils dry film thickness.
3) Aggregate seeded and back rolled to provide slip resistant surface.

d. Aggregate
    1) Unimin 12/20 by US Silica, either Ottawa, MN or Voca, Texas.
    2) Install at membrane manufacturer's maximum application rate.
    3) Uniformly distributed with no bare spots.
e. Aggregate
    1) Unimin 12/20 by US Silica, either Ottawa, MN or Voca, Texas.

B. Localized Leveling Repairs
1. Lymtal Systems
    a. Primer
        1) Per Article 2.2 Paragraph A.1.a.
    b. Leveling Material
        1) Iso-Flex 750 Base Coat.
        2) Pre-mix with manufacturer approved aggregate.
        3) Install in multiple lifts up to 1" thickness total.
2. Neogard Systems
    a. Primer
        1) Per Article 2.2 Paragraph A.2.a.
    b. Leveling Material
        1) Neogard FC7500 Base Coat.
        2) Pre-mix with manufacturer approved aggregate.
        3) Install in multiple lifts up to 1" thickness total.
3. Sika Systems
    a. Primer
        1) Per Article 2. 2 Paragraph A.3.a.
    b. Leveling Material
        1) Sikalastic 720 Base Coat.
        2) Pre-mix with manufacturer approved aggregate.
        3) Install in multiple lifts up to 1" thickness total.

C. Individual steps of any systems inclusive of greater than 5 percent solvents by either weight or volume calculations shall require monitoring by a licensed industrial hygienist for fumes and odors within work areas, at open air intakes within 200 ft. of work areas, and inside occupied spaces adjacent to work areas. Credentials of licensed hygienist and

a monitoring plan must be approved by the Engineer in advance of the start of any membrane work.

D. Membrane color shall be manufacturer's standard gray, unless otherwise indicated in the Documents.

E. Intermediate coat and lock coat materials shall be U.V. stable.

PART 3 EXECUTIONS

3.1 EXAMINATION

A. Contractor and membrane manufacturer shall jointly review existing substrates (original concrete, past or new concrete repairs or overlays, past membrane, or coating systems) to ensure compatibility with the specified membrane system. Submit in writing any materials which may cause membrane adhesion to substrate less than normally anticipated or other compatibility or performance difficulties. Failure to review and identify deleterious products/materials, and if failure of the membrane is a result of adhesion difficulties or chemical or physical incompatibilities with substrate materials, the Contractor and Manufacturer shall be responsible for all costs related to correcting the deficient Work. Manufacturer is bound to meet the above noted responsibilities equally with the Contractor regardless of the provisions of other agreements.

B. Inspect deck surface for any visibly distressed concrete. If encountered, chain drag area to determine extent of distressed or delaminated area and repair as directed by engineer.

C. Examine areas for slab cracks to be routed and sealed.

3.2 PREPARATION

A. Protection

1. Erect barriers and barricades to protect adjoining areas from dirt, steel shot and debris generated from this work.

2. Cover exposed drain grates during shotblasting/grinding operations. Recoat with approved rust inhibitive or galvanizing paint grates damaged by blasting operations. Similarly protect and recoat if necessary other, in place metal elements. Drains to be functional during non-working hours and during periods of inclement weather.

3. Cover exposed drain grates to protect from membrane material. Drains to be functional during non-working hours and during periods of inclement weather. Do not allow membrane material to enter drain piping system.

B. Concrete (General)

1. Preparation and cleaning procedures shall be in strict accordance with this Specification unless more stringent requirements are recommended by the system manufacturer.

2. Surface must be dry. New concrete shall be at least 28 days old and proven dry via

mat tests, to be considered for membrane system installation without installation of a vapor barrier. Review manufacturer requirements relative to site conditions in advance of performing the work.

3. Surfaces shall be free from all traces of dirt, salt, grease, oil, asphalt, laitance, curing compounds, paint stripes, coatings, and other foreign materials. Use manufacturer approved degreasing agents if necessary.
4. Concrete surfaces shall be cleaned using shotblast equipment (with integral vacuum process) to achieve standard of cleanliness per Article 1.4. The size of shot and travel speed of the equipment shall be chosen to provide a uniformly clean surface and profile; basis for bid must be two perpendicular normal speed passes, or one slow speed pass.
5. Areas which cannot be adequately cleaned by shotblasting shall be cleaned by grinding with accompanying vacuum procedures.
6. Surfaces that become contaminated by dirt or moisture after initial shotblasting or grinding, shall be cleaned again by shotblasting, or grinding to manufacturer's requirements at no additional cost to the Owner.
7. Minimum standard of acceptability applies to all surfaces intended to receive membrane regardless of surface preparation procedure or process.
8. The use of acids in surface preparation procedures and techniques is prohibited.
9. After completion of shotblasting/grinding, and prior to application of membrane materials, repair all scaled, freeze-thaw damaged and loose, pop-out areas, cracks and all damage made apparent by the shotblasting/grinding procedures, in a manner approved by the Engineer. Such repair work shall be part of the Base Bid without unit price adjustment. Areas requiring patching will be subject to re-shotblast or re-grinding where a patch exceeds one (1) square foot in area.
10. Grind all high spots or transition grind all depressions per details, and clean to manufacturer's requirements.

C. Existing Membrane (Recoat)

1. Preparation and cleaning procedures shall be in strict accordance with this Specification unless more stringent requirements are recommended by the system manufacturer.
2. Locate and remove areas of deteriorated or debonded membrane.
3. Remove deteriorated membrane with approved procedures until sound, intact and well bonded membrane is achieved. Prepare concrete and install leveling per procedures outlined in Article 2.2.
4. All surfaces to be recoated shall be cleaned using shotblast equipment (with integral vacuum process) to achieve standard of cleanliness per Article 1.4. The size of shot

and travel speed of the equipment shall be chosen to provide a uniformly clean surface and profile.

5. Areas which cannot be adequately cleaned by shotblasting shall be cleaned by grinding with accompanying vacuum procedures.
6. Degrease all oil and other staining per the manufacturer's recommendations.
7. Detergent scrub and pressure wash clean existing membrane surfaces. Thoroughly rinse surfaces to assure all detergents and residual degreasing agents are flushed to drains.

D. Precast Concrete (Stadium seating areas)

1. Preparation and cleaning procedures shall be in strict accordance with this Specification unless more stringent requirements are recommended by the system manufacturer.
2. Locate, remove, and replace areas of deteriorated or debonded concrete.
3. Pressure wash clean all surfaces to receive new pedestrian traffic membrane system - minimum 4,000 psi with oscillating turbo tip. Contractor shall perform cleaning in manner that does not mar existing structure features to remain.
4. Minimum standard of acceptability applies to all surfaces intended to receive membrane regardless of surface preparation procedure or process.
5. Surface must be completely dry prior to start of recoating efforts.

E. Membrane Removal

1. If existing membrane system scheduled to be removed, the criteria for acceptance are 0% of the existing membrane remaining on horizontal surfaces. 5% of the existing membrane may remain on the vertical curb faces with no area larger than 3 square inches.
2. The membrane removal is to be done with a dry cutting process only.
3. After removal, perform surface preparation the same as for Concrete, Article 3.2 Paragraph B.

3.3 INSTALLATION

A. General

1. Install materials in strict accordance with all safety and weather conditions required by product literature and Local, State and Federal regulations.
2. Fumes and dust shall be controlled to prevent harmful or undesirable effects in surrounding areas. All potential avenues for penetration of fumes or dust into surrounding occupied areas shall be sealed prior to the start of the work.
3. All exposed membrane edges and termination details shall be taped to provide

straight, neat edges.

4. Install base coat membrane materials on concrete surfaces only when concrete temperature has stabilized or is falling. Do not install base coat membrane on concrete surfaces when surface temperature is rising.
5. Install membrane materials only if the temperature of the surfaces to be coated is 5 degrees or higher than the dew point temperature measured at the job site.

B. Membrane

1. Where necessary to locally level surfaces and after approval by Owner, install membrane leveling materials in depressed areas. Refer to Article 2.2.
2. Install detail coat 4" wide by 20 mil thick (dry film thickness) over properly primed cracks, caulked joints, joints between concrete pours, or leveling repairs, junctures and other locations in the membrane area which is a deviation from the nominal membrane plane, except where otherwise indicated by the Specifications or Drawings.
    a. Detail coat may be omitted at membrane strip installations over tee-to-tee joints on level surfaces. Detail coat is still required for membrane strips over tee-to-tee joints on ramps.
3. The membrane system shall turn up 4" at all vertical surfaces unless shown otherwise on the drawings. Detail coat is required at all turn-ups to vertical surfaces. Detail coat at turn-ups shall be the same as the detail coat required by Article 3.3 Paragraph C.1.
4. Contractor shall ensure the specified/recommended application rates of all components of the membrane system. Base coat(s), intermediate coat, and lock coat of each application of the membrane system shall be distributed onto the deck by calibrated, notched squeegees. Squeegees showing signs of wear shall be discarded.
5. Contractor shall ensure specified/recommended application rates of liquid products on vertical or sloped surfaces by the use of non-sag grade materials or by multiple applications of material over previous applications which are fully cured.
6. Each fluid-applied component of the membrane system shall be back-rolled to properly distribute materials across the deck and eliminate squeegee marks.
7. Use of power rollers either to distribute the membrane system or to back roll squeegee marks shall not be permitted.
8. No vehicular traffic shall be allowed on membrane areas for at least 48 hours after completion of membrane installation. Provide extended cure time with no vehicular traffic exposure if temperatures fall below 50°F.

3.4 FIELD QUALITY CONTROL

A. Bond Test

1. Bond tests of the installed membrane systems may be performed by the Engineer

during and after the membrane work on this project. Tests shall be conducted using a calibrated instrument which measures in-place bond strength by applying a direct axial pull on a 3 inch diameter steel disk epoxied to the completed membrane top surface.

2. A membrane phase for the purpose of bond testing is an area of base coat installed in a single work shift. If examined, a membrane phase will be tested at (3) locations per phase no sooner than 10 days after completion of the entire membrane system and no sooner than 14 days if temperatures fall below 40°F for two or more days. Contractor shall assume a total of 6 test locations in the Base Bid.
3. The acceptance criteria for initial tests of a Phase shall average bond strength of 200 psi for all locations, with no single location testing below 150 psi. Any Phase failing to meet the initial acceptance criteria may be retested at a later date by the Engineer. Retests of Phase shall include at least 4 separate test locations not sooner than 14 days after the initial tests. The acceptance criteria for retests of a Phase shall average bond strength of 200 psi for all locations, with no single location testing below 175 psi.
4. Any Phase failing to meet the initial test and retest acceptance criteria shall be considered "deficient" and shall be cause for the Contractor to execute or provide one of the following remedies:
    a. Extend Standard Guarantee to include an additional 5 years (for a total of 10 years) on membrane system intercoat bond and bond to the concrete for the “deficient” areas.
    b. Removal and replacement of the "deficient" area, including all necessary preparatory work and Engineering costs to coordinate and observe the work, at no additional cost to the Owner.
5. Any additional bond testing requested by the Contractor to limit the extent of the "deficient" area(s) as determined by initial tests and retests as defined above shall be paid for by the Contractor.
6. Contractor shall include as part of his proposal the costs of repairing all test locations.

B. Skid Test

1. Prior to any membrane preparation work and after membrane installation, the Engineer may conduct tests to determine values of the static coefficient of friction between the coated and uncoated floor surfaces and the neoprene base of the Engineer's test equipment.
2. Determination of the coefficient of friction will consist of a series of individual tests for each surface type. The initial coefficient of friction is defined as the average of the tests performed on the concrete surfaces prior to membrane preparatory work. The final coefficient of friction is defined as the averages of the tests performed on each type of completed membrane system surface.
3. The final, average static coefficient of friction shall be a minimum of 0.85 under wet

and dry conditions and equal to or greater than 110% of the initial coefficient of friction. No individual test area shall have a coefficient less than 0.80 or 95% of the initial coefficient of friction. Any membrane system that does not conform, as determined by the Engineer, to the specified acceptance criteria shall be subject to rework, upgrading or replacement of the deficient areas, including necessary preparatory work, at no additional cost to the Owner.

C. The Engineer may direct the Contractor to make test cuts in the membrane for testing purposes. Tests cuts shall be 2" x 2" and will be in partially-completed or fully-completed membrane. A maximum of 3 total tests per separate installation phase may be made. Contractor shall include as part of his Proposal the costs of taking test cuts as directed and located by the Engineer and the costs of patching test cut areas.

D. The Engineer will periodically monitor application rates of the membrane system individual components and will notify job foremen of discrepancies noted.

E. The Contractor shall keep at the site and maintain in proper condition an adequate number (at least one per application crew) of wet film thickness gages and shall continuously use such to ensure the specified thickness of each membrane coat is uniformly maintained. The periodic monitoring of application rates per Article 3.4 Paragraph D shall not relieve the Contractor of the responsibility of verifying specified coating thickness.

F. Contractor shall provide information required by Article 3.6.

3.5 CLEANING

A. Empty containers shall be removed from the project work areas at the end of each working day. Cloths soiled with coating that might constitute a fire hazard shall be placed in suitable metal safety containers or shall be removed from the structure at the end of each working day. Special care shall be taken in storage or disposal of flammable materials. Comply with health, fire, and environmental regulations.

B. All spilled coating material shall be completely removed from hardware, adjacent floor areas, metal work, etc. Remove spilled coating by approved methods.

C. Repaint in matching color all curbs, columns, walls, etc., where existing paint was removed during preparation for membrane application.

D. All hardware, adjacent floor areas, metal work, etc., and the general premises shall be left clean and free of all construction dirt and debris.

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3.6 MEMBRANE APPLICATION LOG FORM EXAMPLE

DAILY MEMBRANE APPLICATION LOG

Project:

Date: Time Start Time End

Work Area
(Give Description)

Membrane Materials Applied
Type and Quantity

Crew Size Size of Area Materials Applied
(in Square Feet)

Temperature Data (°F)

	Start				End
Deck					
Air					
Relative Humidity (%)					
Dewpoint					

Note: Contractor shall estimate quarter points in time between the start and end of membrane application. Record air and deck temperatures at those times.

Superintendent's Signature:

END OF SECTION