SPECIAL SPECIFICATION

5822

Restoration of the San Jacinto Monument

1. **Description.** This Item shall govern for the restoration of the exterior envelope of the San Jacinto Monument, San Jacinto State Historical Park, Harris County, Texas, with the work consisting of replacement of the Museum roof and skylights and repairs to the Shaft Base and sculptural frieze, Museum Walls, Terrace Walls, and approach steps.

2. **General Requirement.** The repair of the exterior envelope of the San Jacinto Monument shall be in accordance with the design requirements and details shown on the plans, and in conformity with the requirements of this Special Specification and the following attached Special Specification Sections.

3. **Attached Special Specification Sections**

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4. **Materials and Construction Methods.** The restoration of the San Jacinto Monument shall be governed by the above noted and attached Special Specification Sections.

5. **Measurement.** This Item will be measured by the lump sum.

6. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement,” will be for at the unit price bid for “Restoration of the San Jacinto Monument.” This price will be full compensation for furnishing, preparing, handling, and installing all materials specified; equipment, labor and incidentals necessary to complete the work specified.
(1) **Section 01010 – Summary of Work**

**PART 1 – GENERAL**

(1) **Historical buildings:** Project work involves rehabilitation of a historically significant building. The building and site shall be treated respectfully. Existing conditions are to be carefully respected and no material or element shall be removed or disfigured unless specifically indicated on Drawings, included in these Special Specifications, or directed by the Owner.

(2) **Description of work:** The work shall include, but is not limited to, the following at the San Jacinto Monument, San Jacinto State Historical Park, Harris County, Texas:

(a) **Selective demolition:**
   1. Removal of distressed stone units on Ashlar masonry.
   2. Removal of existing mortar patches.
   3. Removal of distressed stone units on ornamental bas-relief frieze panels.
   4. Removal of pointing mortar from areas of Ashlar masonry.
   5. Removal of pointing mortar on selected areas of ornamental bas-relief frieze panels.
   7. Removal of stone units and brick masonry to accomplish flashing.
   8. Removal of selected portions of Terrace exposed aggregate concrete paving to install lightning protection grounding terminal components.
   9. Removal of portions of Terrace concrete paving to increase joint width at edge of paving.
   10. Removal of distressed stone units on Terrace approach steps.
   12. Removal and legal disposal of existing Museum roofing construction:
      a. Pavers
      b. Roofing membrane
      c. Insulation
      d. Base flashings
      e. Counterflashings
      f. Roof drain flashings
g. Roof projection flashings

h. Sealant materials

13. Removal of roofing materials and plywood decking over existing skylight monitors.

(b) Masonry repair:

1. Repairs for distressed stone at Shaft Base
   a. Install installation of stone Dutchman repairs at areas of distressed stone on Ashlar masonry.
   b. Installation of new mortar patches on Ashlar masonry.
   c. Repointing of designated mortar joints on Ashlar masonry.
   d. Routing of mortar joints and installation of sealant and backer rods at Ashlar masonry.
   e. Routing of cracks and installation of pointing mortar on Ashlar masonry.
   f. Routing of cracks and installation of sealant and backer rod on Ashlar masonry.
   g. Installation of stainless steel anchors at areas of distressed stone on Ashlar masonry.
   h. Repairs to incised lettering, including the following:
      1) Stone Dutchman repairs at incised lettering
      2) Installation of mortar patches at incised lettering
      3) Repointing of selected mortar joints adjacent to incised lettering
      4) Carving of existing mortar patches and mortar joints to reveal incised lettering detail
   i. Installation of stone Dutchman repairs at areas of distressed stone on ornamental bas-relief frieze panels.
   j. Installation of designated new mortar patches on ornamental bas-relief frieze panels.
   k. Repointing of mortar joints on ornamental bas-relief panels.
   l. Routing of cracks and installation of pointing mortar on ornamental bas-relief frieze panels.
   m. Routing of cracks and installation of sealant and backer rod on ornamental bas-relief frieze panels.
n. Installation of stainless steel anchors at areas of distressed stone on ornamental bas-relief frieze panels.

2. Repairs for distressed stone at Museum Walls
   a. Installation of stone Dutchman repairs at areas of distressed stone on Ashlar masonry.
   b. Installation of new mortar patches on Ashlar masonry.
   c. Repointing of designated mortar joints on Ashlar masonry.
   d. Routing of cracks and installation of pointing mortar on Ashlar masonry.
   e. Routing of cracks and installation of sealant and backer rod on Ashlar masonry.
   f. Installation of stainless steel anchors at areas of distressed stone on Ashlar masonry.
   g. Repairs to incised lettering, including the following:
      1) Stone Dutchman repairs at incised lettering
      2) Installation of mortar patches at incised lettering
      3) Repointing of selected mortar joints adjacent to incised lettering
      4) Carving of existing mortar patches and mortar joints to reveal incised lettering detail.
   h. Installation of stone Dutchman repairs at areas of distressed stone on ornamental stone carvings.

3. Repairs for distressed stone at Terrace Walls
   a. Reset existing stone coping units at Upper and Lower Terrace Walls.
   b. Installing new stone coping units at selected locations of Upper and Lower Terrace Walls.
   c. Installing new stone units at selected locations at Upper and Lower Terrace Walls with new stainless steel anchor system
   d. Installation of new stainless steel anchors at selected locations on the Upper and Lower Terrace Walls.
   e. Installation of expansion joints at selected locations on the Upper Terrace Walls
   f. Repairs to cracks in the structural reinforced concrete retaining wall at the Upper Terrace Walls.
g. Repairs to cracks in the structural reinforced concrete retaining wall at the Lower Terrace Walls.

h. Mortar patch removals and Dutchman repairs.

i. New mortar patch repairs.

4. Repairs for distressed stone at steps
   a. Installation of new stone units.
   b. Installation of new Dutchman stone units.
   c. Installation of new mortar patches.
   d. Repointing of mortar joints.
   e. Repointing of cracks with mortar.
   f. Repair of mortar joint with sealants and backer rod.
   g. Remove and reset existing units.

(c) Concrete repairs

1. Repairs to cracks in the structural reinforced concrete retaining wall at the Upper and Lower Terrace Walls.

(d) Roofing

1. Replacement of roofing system
   a. Installation of fluid applied membrane system on statue pedestals.
   b. Installation of modified bitumen-roofing membrane on Museum roof.

2. Installation of new skylights
   a. Removal of existing skylight opening covers and installation of new aluminum-framed skylights with insulated glazing units containing tempered and laminated glass sheets
   b. Installation of new lay-in light glazing panels with removable uv filters above existing lay-in light glazing
   c. Removal of interior paint coatings from skylight lay-in light glazing at ceiling level and reinstallation in existing frames
   d. Installation of new diffuse lay-in light glazing at areas of damaged or missing existing glazing

3. Sheet metal and flashing:
a. Installation of sheet metal flashing at the following locations as detailed:

1) Shaft base setback courses
2) Museum coping
3) Roofing details
4) Skylights
5) Cap of projecting bays on Museum wall
6) Beneath Terrace wall coping units
7) Alternate No.3: Interior face of Museum parapet

4. Sealants

a. Installation of sealant materials at the following locations as detailed:

1) Stone repair details
2) Museum parapet coping
3) Roofing details
4) Terrace Walls, steps, and paving

5. Terrace repairs

a. Install new sections of exposed aggregate concrete to match existing at locations of new lightning protection grounding terminal components.

b. Installation of new metal handrails at disabled access ramps at Upper and Lower Terrace levels.

c. Rod out existing Terrace drain lines at perimeter trench drains. Revise method to reduce future drain blockages.

6. Lightning protection

a. Install new equalization loops within the monument shafts’ basement.

b. Install new air terminals on the Museum roof.

c. Install new conductor cables from the Museum roof to the grounding terminals.

d. Install new grounding terminals beneath the Upper Terrace level paving.

PART 2 – PRODUCTS
(1) Products (not applicable)

PART 3 – EXECUTION

(1) Execution (not applicable)

END OF SECTION
(2) **Section 01040 - Project Coordination**

**PART 1 – GENERAL**

(1) **Description.** This Section specifies administrative and supervisory requirements necessary for project coordination including, but not necessarily limited to:

   (a) Coordination.

   (b) Administrative and supervisory personnel.

   (c) General installation provisions.

   (d) Requirements for the Contractor’s construction schedule are included in Section 01150 – Special Conditions.

(2) **Coordination:** Coordinate construction activities included under various Sections of these Special Specifications to assure efficient and orderly installation of each part of the work. Coordinate construction operations included under different Sections of the Special Specifications that are dependent upon each other for proper installation, connection, and operation.

   (a) Where installation of one part of the work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

   (b) Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

   (c) Make adequate provisions to accommodate items scheduled for later installation.

   (d) Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports and attendance at meetings.

   (e) **Administrative procedures:** Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the work. Such administrative activities include but are not limited to, the following:

      1. Preparation of schedules.
      2. Installation and removal of temporary facilities.
      3. Delivery and processing of submittals.
      4. Progress meetings.
5. Project closeout activities.

(f) Administrative and supervisory personnel
1. Staff names: Contractors submitting proposals shall provide proposed organization charts, listing both home and field office personnel to be assigned to the project.

2. Within 10 days of notice to proceed, submit a list of the Contractor’s principal staff assignments, including the superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

3. TxDOT and the Owner may make investigations as necessary to determine the ability of the designated superintendent and shall have the authority to reject any superintendent initially or during the course of the project when there is good cause for doing so. In event of a rejection, the Contractor will be notified in writing of the rejection and reasons therefore. The Contractor shall within fifteen (15) calendar days after receipt of such notice submit the name and qualifications of another designated construction superintendent. TxDOT and the Owner will, within a reasonable period, approve or reject the nomination.

4. Refer to Section 01150 for preconstruction submittals.

(g) General installation provisions
1. Manufacturer’s instructions: Comply with manufacturer’s installation instructions and recommendations to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in contract documents.

2. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

3. Contractor shall verify field dimensions prior to beginning work procedures.

4. Install each component during weather conditions and point in project sequence that will ensure the best possible results. Isolate each part of the completed construction from work in progress as necessary to prevent deterioration.

5. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

(h) Cleaning and protection
1. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required
to ensure protection from damage or deterioration until certified substantial completion.

2. Limiting exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

a. Excessive static or dynamic loading.
b. Excessive internal or external pressures.
c. Heavy traffic.
d. Vibration from adjacent activity.
e. Damage by contact with construction equipment.
f. Damage to air intake and exhausts.
g. Damage to sculptural frieze.
h. Damage to Shaft Base and window penetration.
i. Damage to Museum Walls, parapets, doors, and windows.
j. Damage to Terrace paving and associated drains and gratings.
k. Damage to Terrace steps and Walls, including stone cladding, reinforced concrete retaining Walls, electrical outlets, drains, weeps and other associated elements.
l. Damage to site vegetation.
m. Damage to the Museum interior and Museum property.
n. Roofing systems and roof features, including skylights, drains, statue bases, etc.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Execution (not applicable)

END OF SECTION
(3) Section 01060 – Safety

PART 1 – GENERAL

(1) Description. This Section specifies general project safety requirements. Development of a project-specific safety plan is the responsibility of the Contractor.

(2) Applicable publications: The publications listed below form a part of this Special Specification and are referred to in the text by the basic designation only.

(3) General: Safety of workers and others on site is of paramount importance. Contractor shall follow all safety and health requirements established for this type of work by OSHA.

(4) Safety program:

(a) The Contractor shall designate an employee responsible for overall supervision of accident prevention activities. Such duties shall include: (1) assuring applicable safety requirements are incorporated in work methods and (2) inspecting the work to ensure that safety measures and instructions are actually applied. The proposed safety supervisor’s name and qualifications shall be submitted in writing for approval to TxDOT and the Owner. This individual must have prior experience as a safety engineer or be able to demonstrate his/her familiarity and understanding of the safety requirements over a prescribed trial period. The safety engineer shall have the authority to act on behalf of the Contractor’s general management to take whatever action is necessary to assure compliance with safety requirements. The safety supervisor is required to be on the site when work is being performed.

(b) Prior to commencement of any work at a job site, a preconstruction safety meeting shall be held between the Contractor, TxDOT and the Owners to discuss the Contractor’s safety program and in particular to review the following submittals:

1. Accident prevention plan: An acceptable accident prevention plan, written by the Contractor for the work of this project, shall be submitted for approval by TxDOT and the Owner.

(5) Subsequent jobsite safety meetings shall be held as follows:

(a) A safety meeting shall be held at least once a month for all supervisors on the project to review past activities, to plan ahead for new or changed operations and to establish safe working procedures to anticipated hazards. An outline report of each monthly meeting shall be submitted to TxDOT and the Owner.

(b) At least one safety meeting shall be conducted weekly, or whenever new crews begin work, by the appropriate field supervisors or foremen for all workers. An outline report of the meeting giving date, time, attendance, subjects discussed and who conducted it shall be maintained and copies furnished to the Project Inspectors on request.
(6) Accidents: Chargeable accidents are to be investigated by Contractor personnel, TxDOT, and the Owner.

(a) Comply with all OSHA requirements for accident reporting.

(b) Submit a copy of the Contractor’s OSHA log of injuries to the Project Inspectors on a monthly basis.

(c) Contractors shall immediately notify TxDOT and the Owner when an OSHA compliance official (federal or state representative) presents his/her credentials and informs the Contractor that the workplace will be inspected for OSHA compliance. Contractors shall also notify TxDOT and the Owner upon determination that an exit interview will take place upon completion of the OSHA inspection.

(7) Submittals for TxDOT and Owner approval: submittals shall be in accordance with Section 01300 - Submittals. All required submittals of items specified in this Section shall be for information only, except for those items including, but not limited to, the following which shall be submitted for approval:

(a) Written designation of safety representative.

(b) Written project-specific accident prevention plan.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 - EXECUTION

(1) Execution (not applicable)

END OF SECTION
(4) Section 01070 - Cutting, Patching, And Repairing

PART 1 – GENERAL

(1) Description: This Section pertains to work performed within the Museum, and covers the provision of all cutting, removing, replacing, patching, repairing, restoration, refinishing and similar type work as necessary to existing work scheduled to remain and to new work required to be cut or uncovered. All existing facilities damaged as a result of the construction activities shall be restored to a condition equivalent to that prior to the start of work, except where otherwise shown or specified.

(2) Extent of work includes uncovering work to provide for installation of ill-timed work, removal and replacement of defective work or work that does not conform to the contract documents, installation of new work to be installed in existing construction, and as necessary to make several parts fit.

(3) Cutting, patching, and repairing related to stone restoration is covered in Section 04460 and related Sections of this Special Specification.

PART 2 – PRODUCTS

(1) Materials
   (a) Materials for replacement, repairing, patching, restoration, and similar type work shall conform to applicable Sections of the Special Specifications for new materials or work. Where existing materials and/or installations are not covered by the Special Specifications, such materials shall match existing. All excess materials resulting from cutting and removal work shall be removed from the job site.

PART 3 - EXECUTION

(1) Inspection and preparation
   (a) Inspect all existing conditions of work, for possible movement or damage during cutting or uncovering procedures. After uncovering work, inspect conditions affecting installation of new products. Do not proceed with any further cutting, patching or repairing work if defects are observed; or if any unsafe condition exists.

   (b) Prior to cutting or uncovering work, provide all shoring, bracing and supports as required to maintain the structural integrity of the project. Prior to restoration work, properly prepare existing surfaces to receive new materials such as to provide a proper bond or joining.

(2) Cutting and drilling
   (a) Contractor shall do all cutting and drilling of existing walls, partitions, ceilings, floors, etc., As necessary for installation of the new work as shown, including cutting of holes and other openings for new plumbing, mechanical and electrical
work. Cutting shall be performed by hand or small power tools; holes and slots cut neat and to size required, with minimum disturbance of adjacent work; cut holes in concrete slabs for pipes and conduit with core drills of proper sizes. Openings shall be covered temporarily when not in use and patched as soon as work is installed.

(3) Patching and repairs

(a) Existing work shall be cut, altered, removed, temporarily removed and replaced, or relocated as required for the performance of the work indicated on the Drawings. Work remaining in place that is damaged or defaced by reason of alteration or demolition shall be restored to a condition equivalent to that prior to the start of work. Contractor shall be responsible for coordinating all patching and repairing involving the various trades, whether or not specifically mentioned under the respective Sections.

(b) Where alterations or removals exposes damaged or unfinished surfaces or materials, such surfaces or materials shall be refinished or replaced as necessary to make continuous areas uniform. Where new work by any trade occurs in an existing finished area the entire wall or ceiling surface in which such work occurs shall be refinished. Where such new work occurs in an existing unfinished area, the work shall be done to render the new work inconspicuous.

(c) Where utilities are removed, relocated, or abandoned, they shall be capped, valved or plugged to make a complete and working installation as required. Resulting holes and damaged surfaces shall be properly patched to match adjacent undisturbed surfaces or prepared to receive new finish as applicable.

(d) All surfaces affected by patching and repairing work shall be restored to match existing adjacent surfaces. Repainting of affected areas or surfaces shall match color and shade of existing painted surfaces.

(4) Submittals

(a) The procedures proposed for the accomplishment of cutting, patching, and repairing work shall be submitted when such work affects:

1. Work of Texas Parks and Wildlife Department or Museum employees or Contractors working under separate contract.

2. The structural value of or structural integrity of any element of the project.

3. Integrity of effectiveness of weather-exposed or moisture-resistant elements or systems.

4. Efficiency and operational life, maintenance or safety of operational elements.

5. Visual qualities of sight-exposed elements.

(b) The submittals shall include:
1. Identification of the project.
2. Description of affected work.
3. Necessity for cutting, patching or alteration.
4. The affect on work of the Owner or any separate Contractor.
5. The affect on the structural or weatherproof integrity of the project.
6. Description of proposed work.
7. Scope of cutting, patching, alteration and repairing.
8. Trades who will execute the work.
9. Products proposed to be used.
10. Schedule of work.
11. Alternatives to cutting, patching, and repairing.

(c) Samples of proposed cutting, patching, and repairing work shall be provided for TxDOT and Owner’s review and approval prior to proceeding with work. Approved samples shall be standard for this work.

END OF SECTION
Section 01090 - Definitions and Standards

PART 1 – GENERAL

(1) Related documents

(a) Texas Department of Transportation General Provisions
(b) Special Provisions
(c) Section 01150 – Special Conditions

(2) Summary

(a) This Section specifies administrative requirements for compliance with governing regulations, codes and standards.
(b) Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.

(3) Definitions

(a) General: Definitions contained in this article are not necessarily complete but are general to the extent that they are not defined more explicitly elsewhere in the contract documents.

(b) “Indicated” refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or schedules in Special Specifications, and similar requirements in contract documents. Where terms such as “shown,” “noted,” and “specified” are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.

(c) Directed: Terms such as “directed,” “requested,” “authorized,” “selected,” “approved,” “required,” and “permitted” mean “directed by the Architect/Engineer,” “requested by the Architect/Engineer,” and similar phrases. However, no implied meaning shall be interpreted to extend the Architect/Engineer’s responsibility into the Contractor’s area of construction supervision.

(d) Approve: The term “approved,” where used in conjunction with the Architect/Engineer’s action on the Contractor’s submittals, applications, and requests, is limited to the responsibilities and duties of the Architect/Engineer stated in the Special Provisions and Special Conditions. Such approval shall not release the Contractor from responsibility to fulfill contract document requirements unless otherwise provided in the contract documents.

(e) Regulation: The term “regulations” includes laws, statutes, ordinances and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the work, whether they are lawfully imposed by authorities having jurisdiction or not.
(f) Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.”

(g) Install: The term “install” is used to describe operations at project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.”

(h) Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

(i) Installer: An “installer” is an entity engaged by the Contractor, either as an employee, subcontractor or sub-subcontractor, for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

(j) Project site is the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project. The extent of the project site is shown on the Drawings.

(k) Testing laboratories: TxDOT’s materials testing laboratory or any independent testing laboratory contracted by TxDOT engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on and, if required, interpret results of those inspections or tests.

(4) Industry standards

(a) Applicability of standards:

1. Except where contract documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into contract documents. Such standards are made a part of the contract documents by reference. Individual Sections indicate which codes and standards apply to that Section. The Contractor shall purchase and maintain available at the project site one copy of all specified standards, codes, documents or reports that have been referenced in the contract documents.

2. Referenced standards take precedence over standards that are not referenced but recognized in the construction industry as standard practice.

(b) Publication dates: Where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.

(c) Conflicting requirements:

1. Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced unless the
contract documents indicate otherwise. Refer requirements that are different but apparently equal and uncertainties as to which quality level is more stringent to the Architect/Engineer for a decision before proceeding.

2. Minimum quantities or quality levels: In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values as noted or appropriate for the context of the requirements. Refer instances of uncertainty to the Architect/Engineer for decision before proceeding.

(d) Copies of standards: Each entity engaged in construction on the project is required to be familiar with industry standards applicable to that entity’s construction activity. Copies of applicable standards, codes, documents, or reports are listed but not included with the contract documents. Also see 1.04 a (1).

(e) Abbreviations and names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in the Special Specifications or other contract documents they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable to the context of the text provision.

(f) Industry standards: In addition to federal, state and local ordinances, the latest edition of the following industry standards shall apply as referred to in the Drawings and Special Specifications and as applicable:

ACI - American Concrete Institute
ASTM - American Society for Testing and Materials
CRSI - Concrete Reinforcing Steel Institute
NEC - National Electric Code
NEMA - National Electric Manufacturer’s Association
OSHA - Occupational Safety and Health Administration
TNRCC - Texas Natural Resource Conservation Commission
UL - Underwriters Laboratories, Inc.
UPC - Uniform Plumbing Code
TxDOT - Texas Department Of Transportation

PART 2 - PRODUCTS
(1) Products (not applicable)

PART 3 - EXECUTION

(1) Execution (not applicable)

END OF SECTION
(6) Section 01100 - Permits

PART 1 - GENERAL

(1) Related documents

(a) Texas Department of Transportation General Provisions
(b) Special Provisions
(c) Section 01150 – Special Conditions
(d) Contractor-obtained permits and notifications
(e) The Contractor shall make application for and pay for any necessary permit fees, temporary or permanent utility interruption(s) and/or relocation fees.
(f) Contractor shall provide written notification of work, and how work would affect off-site activities, traffic, etc., to the cities of LaPorte, Deer Park, and Pasadena, Texas.
(g) The Contractor shall contact, as a minimum, the following persons to make the necessary arrangements for obtaining field staking of existing lines or securing the necessary permits for work at the site.

   Houston Lighting And Power
   Marshall Legarde
   (512) 228-7400

   TxDOT (For Harris County)
   Gary Hall
   (713) 635-3419

(2) Utilities

(a) Temporary utility services: Make all arrangements with the local utility companies and pay all costs associated with temporary shut-down of service, establishing and installing new temporary (during construction) and subsequent permanent utility services required to ensure permanent and uninterrupted utility service at project completion. As a minimum, utility services include electricity, water, sewer, gas, steam, telephone, and cable television.

(b) Availability of utilities including lavatory facilities: Contractor shall provide and pay for all utilities he may require during the entire life of the contract. Subject to coordination with the Owner, he shall make his own investigation and determinations as to the availability and adequacy of utilities for his use for construction purposes and domestic consumption. He shall install and maintain all necessary supply lines, connections, piping, and meters if required, but only at such locations and in such manner as approved by the Owner. All aspects of temporary utility installation must be performed by appropriately skilled and licensed personnel and in accordance with applicable codes. Before final
acceptance of work under this contract, all temporary supply lines, connections and piping installed by the Contractor shall be removed by Contractor in a manner satisfactory to the Owner.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Execution (not applicable)

END OF SECTION
PART 1 – GENERAL

(1) Related documents

(a) Refer to Section 01340 For Material Submittal Requirements.

(2) Description of Section

(a) The Special Conditions expand upon requirements covered by the General Provisions and Special Provisions for administering the contract. Categories in this Section include the following:

1.3 Historical Buildings
1.4 Contract Administration Submittals
1.5 Insurance
1.6 Meetings
1.7 State Archeological Landmarks
1.8 Coordination
1.9 Contract Time
1.10 Inspection
1.11 Testing
1.12 License Requirement
1.13 Protection of Existing Equipment, Structures, and Utilities
1.14 Misplaced Material
1.15 Physical Data
1.16 Contract Documents
1.17 Use of the Site
1.18 Protection of Job Site
1.19 Fences, Barricades, and Canopies
1.20 Scaffolding within the Museum Space
1.21 Disposal of Materials and Equipment

(3) Historical Buildings
(a) The San Jacinto Monument is a National Historic Civil Engineering Landmark as listed by the American Society of Civil Engineers. The structure is eligible for the National Register of Historic Places under National Register criteria C (as a distinctive work of architecture). The Contractor shall be familiar with the Secretary of the Interior’s Standards for the Treatment of Historic Properties and perform all work in accordance with the Standards.

(4) Contract Administration Submittals

(a) General: The General Provisions and Special Provisions provide definite times for Contractor to submit certain lists, qualifications, price breakdowns, schedules, and trench safety system for administrative procedures. The Contractor will submit the following items to TxDOT and the Owner at the preconstruction conference or by the time limits set within the General Provisions and Special Provisions or the Special Conditions, but prior to the commencement of work. The Contractor shall supply an original and four copies of each submittal, plus the number the Contractor requires.

(b) Employee records: The Contractor and each subcontractor shall keep, or cause to be kept, on the jobsite an accurate record showing names and occupations of all laborers, workmen, and mechanics employed by him in connection with the project and the sum per hour paid in dollars and cents. TxDOT and the Owner shall be allowed to inspect such records pursuant to section 2256.024, Government Code, VTCA.

(5) Insurance

(a) Minimum insurance coverage's for this project shall be as indicated on the certificate of insurance within these contract documents.

(6) Meetings

(a) Preconstruction conference: Prior to start of work, a conference between TxDOT, the Owner, and Contractor will be held to discuss provisions of the contract documents, explain administrative procedures and coordinate the work effort. Time of preconstruction conference will be stated in the notice to proceed. Attendance by Contractor and Contractor’s superintendent is mandatory.

(b) Progress meetings: Construction pre-installation meetings, coordination meetings, and/or progress meetings may be called at any time deemed necessary by TxDOT, the Owner, or the supervisor or the Contractor to review job requirements, progress or problems.

(7) State Archeological Landmarks

(a) Contractors working on public land who discover previously unknown resources eligible as State Archeological Landmark, including unknown subgrade features and artifacts, must report such discovery to the state agency or political subdivision owning or controlling the property and to the Texas Antiquities Committee. Costs involved in the proper investigation, excavation or preservation
of such landmarks will be born by the state agency or political subdivision owning or controlling the property, rather than by the Contractor.

(b) Owner will archaeologically mitigate subgrade features and artifacts within a reasonable time to minimize delays.

(8) Coordination

(a) Coordination of work: Contractor shall give full cooperation to all trades. Furnish in writing to allied trades, with copies to TxDOT and the Owner, information necessary to permit work of all trades to be installed with minimum interference and/or delay.

(9) Contract Time

(a) Refer to Item 8 – Prosecution and Progress of the General Provisions and amendments contained in Item 8 of the Special Provisions.

(b) The Contractor shall prepare and maintain a Project Schedule outlining the planned progress of the work. Submit Project Schedule within 15 calendar days after Notice to Proceed is received. Arrange schedule to consider sequence of work is affected by requirements for work by separate contractors, coordination with existing work, limitations of continued occupancies, non-interruptible services, partial occupancy prior to substantial completion, site restrictions, provisions for future work, seasonal variations, environmental control, and similar provisions of total project. Show significant stages for each category or unit of work, including (where applicable), but not necessarily limited to, subcontract lettering, submittals, purchases, mockups, fabrication, sample testing, deliveries, installation, testing, adjusting, curing, start-up and placement into final use and operation.

(c) Immediately after the development and acceptance of the fully developed progress schedule, prepare a complete schedule of work-related submittals. See Section 01300 “Submittals.”

(d) Working Hours: Construction operations may be performed 24 hours a day, 7 days a week, as approved in advance by the Owner, and except for holidays or other days designated by the Owner, and in accordance with the approved Project Schedule. Work on holidays or other days designated by Owner during which work is not permitted must be scheduled in advance, approved in writing by the Owner, and the schedule delivered to the Owner a minimum of 24 hours in advance of beginning work outside of regular hours.

(e) Sequence of Work: The Project Schedule shall include implementation of Shaft Base masonry repairs prior to implementation of full scale roofing work; and the sequence of the Museum roofing work phased in four quadrants according to the slope of the drainage pattern on the roof.

(10) Inspection:

(a) Contractor shall perform own quality control.
(b) Contractor shall provide access at all times for Project Inspectors and Architect/Engineer to observe the work. Assume that Architect/Engineer or Project Inspectors may be present at any time during performance of the work.

(c) TxDOT and the Owner will assign Inspectors to monitor the work. The designated Inspectors shall assure that all work and materials conform to requirements of the contract documents. The Inspector’s duties include the following:

1. Submits written reports concerning the current status of the work.

2. Reviews, verifies, signs, and forwards the Contractor’s construction vouchers and time extension change order requests.

3. May request and receive payroll records and material invoice figures to determine quantities for which payment is requested.

4. Observes all testing and will confirm in writing that tests have been performed.

5. Observes construction operations and installations to insure compliance with Drawings and Special Specification.

(11) Testing

(a) The Contractor shall notify the Project Inspectors when any work is ready for testing. Except when otherwise specified, the Inspectors will schedule and observe the testing.

(b) The following is an outline of material and component testing for this project. The Architect/Engineer reserves the right, at any time, to modify this schedule. Other testing not specifically mentioned in the following schedule shall be done in accordance with the Special Specifications:

1. Provide test results on Texas Cordova Shellstone quarried for this project prior to beginning fabrication work, showing that material meets requirements specified herein.

2. Perform one round of ASTM tests for every fifth block quarried for this project, showing that material meets requirements specified herein.

3. Mortar testing

4. Skylight testing

5. Lightning protection system testing

6. Drain testing

(12) License requirements
(a) Any electrical work shall be performed by skilled, licensed electricians or under the direct supervision of a licensed electrician.

(b) Any plumbing work, if requiring installation or alteration of plumbing lines or piping, shall be performed by skilled, licensed plumbers or under the direct supervision of a licensed plumber.

(13) Protection of existing equipment, structures, and utilities

(a) General:

1. Protection plan: Prior to beginning work, submit for approval a written protection plan addressing proposed methods of protection of existing equipment, structures, and utilities.

2. The Contractor shall use care during construction. Should damage occur to any equipment, structures, or utilities, the Contractor shall contact the Project Inspectors immediately. All repairs shall be at the Contractor’s expense and completed to the Owner’s satisfaction. Utility locations have not been field verified. It shall be the Contractor’s responsibility to verify existing equipment, structures, and the condition of existing utilities and locations thereof prior to bidding.

3. The Drawings show the locations of all known surface structures pertinent to the work. The locations of surface and subsurface features shown on the Drawings are not exact. In the case of underground obstructions such as existing water, sewer, storm sewer, gas, electrical lines, piling, debris, or partial structures that are not shown on the Drawings, their location is not guaranteed. The Owner assumes no responsibility for failure to show any or all these structures on the Drawings or to show them in their exact location. Failure to show will not be considered sufficient basis for claims for additional compensation for extra work in any manner whatsoever, unless the obstruction encountered is such as to necessitate substantial changes in the lines or grades, or requires the building of special work for which no provision is made in the Drawings and which is not essentially subsidiary to some item of work for which provision is made. It is assumed that as elsewhere provided the Contractor has thoroughly inspected the site, is informed as to the correct location of surface structures, and has included the cost of such incidental work in the price bid, and has considered and allowed for all foreseeable incidental work due to variable subsurface conditions, whether such conditions and such work are fully and properly described on the Drawings or not. Minor changes and variations of the work specified and shown on the Drawings shall be expected by the Contractor and allowed for as incidental to the satisfactory completion of a whole and functioning work or improvement.

4. The Contractor shall maintain sufficient clearance between his equipment and existing structures or adjacent property, or portions thereof, and utilize precautionary devices such as attenuating structures or other means as necessary. Should the Contractor allow the equipment to become in contact
with any portion of these structures, repairs to the damaged areas shall be made by the Contractor, to the satisfaction of the Architect/Engineer and the Owner of the structure, at no additional cost to the project.

5. All existing non-Contractor owned equipment and materials within the work area shall be protected by the Contractor from damage caused by construction operations. Contractor shall provide means of protection for existing construction to remain. Contractor shall protect vehicular and pedestrian paving from damage during work. Contractor shall cover all equipment, exterior plantings, and other materials in the work area with dust barriers and protect such items from any damage due to impact, dust, vibration, water, heat, or other conditions resulting from construction activities. The Contractor shall provide a proposal for means of protection for approval by the Owner prior to beginning the work. Existing work damaged by construction operations, as determined by the Owner, shall be promptly repaired by the Contractor at his own expense, and to the Owner’s satisfaction.

6. To protect Texas Parks And Wildlife Department and San Jacinto Museum of History property and to isolate his work, the Contractor shall provide, at no additional expense, drop cloths, plastic film draping, padding, taping, barriers, weatherproof closures or coverings, and temporary dust-proof enclosures and partitions. Temporary dust-proof enclosures and partitions shall be provided wherever demolition or construction operations will produce dust or dirt which would be spread by tracking or air currents beyond the immediate area of work. Such enclosures shall be erected structurally sound, and shall be maintained dust-proof so as to keep surrounding areas clean and free of dust. Where practical, dust-producing activities shall be kept dampened with water, so as to reduce the generation of dust. Provide protection for air intakes and HVAC systems.

(b) Protection of structure:

1. Do not place excessive loads on any supporting walls, floors, roofs, framing, or other structural components.
   a. For Museum roof, allowable live load limit is 40 psf.
   b. For Terrace, allowable live load limit is 100 psf, except that within 15 feet of all retaining walls allowable live load limit shall be 40 psf.

(c) Existing utilities:

1. Contractor shall request approval from the Owner in writing a minimum of 16 days in advance for shut down of any utility which will affect service to the monument and Museum. Include description of utility to be shut down, areas of site to be affected, date and hours of shutoff, and estimated length of time of service interruption.
2. Contractor shall not cut, disconnect, switch, open, or alter position of valves, or otherwise interrupt any utility systems, piping systems, electric services, etc., Without prior approval of the Owner.

3. Contractor shall be responsible for locating and preventing damage to known and unknown utilities. If damage occurs, repair utility at the Contractor’s expense and complete to the Owner’s satisfaction.

4. Protection of air intakes: Two air intakes are located on the roof of the Museum. One extends to the observation area; the other extends to the basement plenum.

5. Avoid placement of equipment and motorized work vehicles adjacent to air intakes.

6. Protect air intakes from dust, particulates, fumes, and other construction activities by temporary filtration on the exterior of the air intake. Do not restrict air intake.

7. Provide a proposal for the means of protection, including product literature and a sample of filter media, for Owner’s approval prior to installation.

8. Protect HVAC cooling tower from dust, and debris.

9. Protect temporary piping, conduits, etc., associated with the relocated HVAC units. It is presently anticipated that pipes, conduits, etc., will be run on the surface of the Upper and/or Lower Terraces.

10. During construction, open ends of all drains, piping, and conduit, and all openings in equipment, shall be closed by the Contractor before leaving the work at any time, so as to prevent the entrance of foreign matter.

(d) Protect skylights, windows, vents, and all openings into monument.

(e) Protect roofing during installation and removal of scaffolding, and during the work. Any roofing removed or affected by scaffolding bearing areas shall be protected during the work to prevent leakage, and shall be repaired upon completion of the work to the satisfaction of the Owner, and at no additional cost to the project.

(f) Disturbance of alarm systems: Notify the Owner prior to disturbing any alarm wiring, devices, or system. Planned disturbances will be coordinated at least (3) three working days in advance of when the work is scheduled. Any alarm wiring, devices, or systems that are broken or disturbed for any reason must be reported to the Owner within (5) five minutes of the occurrence.

(g) Protection of fire/smoke/heat alarm system: During the course of the work, all fire, smokes, and heat alarm and protection system components must remain operable. Coverings must be applied to protect components from coatings, hazardous operations, and damage during the operations only. Coverings must be removed immediately after the operations have concluded. Damaged system
components shall be replaced immediately by the Contractor at no additional cost to the Owner and new components tested to the satisfaction of the Owner.

(14) Misplaced material

(a) Should the Contractor, during the progress of the construction, lose, dump, or misplace any material, plant, machinery or appliance, which in the opinion of the Architect/Engineer or Project Inspectors may be dangerous to or obstruct site activities, the Contractor shall recover and remove the same with the utmost dispatch. The Contractor shall give immediate notice, with description and location of such obstructions, until the same is removed. Should he refuse, neglect or delay compliance with the above requirements, such obstructions may be removed by others, and the cost of such removal may be deducted from any money due or to become due the Contractor, or may be recovered under his bond.

(15) Physical data

(a) Contact the national weather service for historical data on the mean, normal, and extreme weather conditions for the project area. If the national weather service issues an adverse weather warning for the area, take all practical precautions to minimize danger to people, the work, and adjacent property. Precautions shall include closing openings; removing loose materials, tools, and equipment from exposed locations; and removing or securing scaffolding and other temporary work.

(16) Contract documents

(a) The contract documents are complimentary and what is called for by any one shall be as binding as if called for by all. Omissions from the Drawings or Special Specifications, or the mis-description of details of work which are manifestly necessary to carry out the intent of the Drawings and Special Specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or mis-described details of the work, but they shall be performed as if fully and correctly set forth and described in the Drawings and Special Specifications. The Contractor shall check all contract documents furnished to him immediately upon their receipt and shall promptly notify the Architect/Engineer of any discrepancies. Figures marked on Drawings shall govern over scale measurements. Large-scale Drawings shall govern over small-scale Drawings. The Contractor shall review all Drawings and verify the figures before laying out the work and will be responsible for any errors which might have been avoided thereby.

(17) Use of the site

(a) General: Refer to Items 4, 5, 7, and 8 of the General Provisions and the Special Provisions.

(b) Construction limits: The construction limits shall be the areas of work as indicated on the Drawings. All other areas of the existing facilities shall be off limits to all construction personnel without prior approval from the Owner.
(c) Park operations:

1. During construction of this project, the San Jacinto Monument site and Museum will remain open to public visitations. The work will be carried out in an active park. It is the responsibility of the Contractor to maintain safe and convenient access and egress to park facilities in a manner to be approved by the Owner. Contractor shall be responsible for the public’s safety as regards his construction sites. All temporary fencing, barricades, warning lights, signs, and flagmen shall be provided and maintained as needed. Contractor will be responsible for maintaining security of construction sites.

2. Contractor shall at all times conduct his operations to ensure the least inconvenience to the San Jacinto Museum of History, the Owner, and visitors to the monument and museum. The San Jacinto Museum of History is open to visitors daily from 9:00 a.m. to 6:00 p.m.

3. The Contractor shall execute the work as quietly as practicable to avoid unnecessary disturbance to visitors and monument personnel. Contractor shall comply with applicable laws, ordinances, and regulations relative to noise control.

4. The site of the work is at a monument owned by the Texas Parks and Wildlife Department and all rules and regulations issued by the Owner covering general safety, security, sanitary requirements, pollution control, traffic regulations and parking, shall be observed by the Contractor. Information regarding these requirements may be obtained by contacting the Owner, who will provide such information or assist in obtaining same from appropriate authorities.

5. Contractor personnel may park vehicles only within the construction limits as designated on Drawings. Contractor parking at any other locations on site requires prior approval by Owner.

(d) Entrances and access:

1. The main (west) entrance must be kept open at all times.

2. A second, emergency exit must also be maintained. As shown on Drawings, the east entrance must be kept open at all times.

3. The wheelchair ramps at the south Terraces must be kept accessible during the work, or an alternate wheelchair ramp access must be provided to the west entrance.

4. Hauling restrictions: Prevent creation of ruts or other damage to roads and adjacent site. Repair any damage immediately and at no additional cost to the project. Comply with all legal load restrictions in the hauling of materials. Load restrictions on site roads are identical to the state and local load restrictions with such additional regulations as may be imposed for the site. Information regarding rules and regulations for vehicular traffic on park

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roads may be obtained from the Owner. A special permit will not relieve Contractor of liability for damage, which may result from moving of equipment.

(e) Construction staging and storage areas:

1. The Contractor is permitted to use designated areas shown on the Drawings for staging and materials storage.

2. The Contractor is responsible for the security of the Contractor’s equipment and materials in the staging and storage areas.

3. The Contractor shall maintain areas used for construction staging and storage in a neat and clean condition at all times.

4. Contractor will provide disconnects for temporary electric power for construction trailers.

5. Contractor may not run lines from interior to exterior of the monument for power.

6. Contractor may use interior power source for incidental use for set-up purposes with prior approval from the San Jacinto Museum of History.

(f) Deliveries, storage and blockages:

1. Deliveries: All Contractor deliveries to the site shall be coordinated with the Owner and Inspectors. All deliveries to the project site shall be made to construction staging areas during regular work hours. All construction-related deliveries shall be received by the Contractor at the time of delivery. Any special requirements for deliveries must be approved by the Owner.

2. Do not block passage through sidewalks, roads, or other entranceways to the monument and site during performance of work under this contract. In addition, at all times maintain safe and clear passage through interior corridors and doorways to allow minimal disruption of normal activities within the building.

3. Maintain a clear zone around all fire exits at all times during construction. At all times, maintain a safe and clear passage from the fire exits through any staging/work areas so occupants exiting building can safely exit any staging/work zones.

4. Throughout the duration of construction, ensure that access is maintained to all areas of the monument for emergency vehicles including but not limited to fire trucks, ambulances, police vehicles, and public works vehicles.

5. Provide continuous vehicular and pedestrian access to fire hydrants at all times during construction.

(g) Hard hat area and protection for visitors: Designate a hard hat area for approval by TxDOT and the Owner. The hard hat area shall be posted by the Contractor in
conspicuous locations around the construction site. It is the Contractor’s responsibility to require all those working on or visiting the site to wear hard hats and other necessary protective equipment at all times. As a minimum, provide six hard hats for use by visitors.

(h) Signage and project identification:

1. Contractor shall provide safety signs and signs on access restrictions and parking limitations during the work. Provide specification and layout drawings, or mockup, or typical sign for approval by TxDOT and the Owner prior to fabricating signs.
   a. No project signs of any size or type by Contractor or others shall be allowed on the site or surrounding Texas Parks and Wildlife Department property at any time without prior written approval of the Owner.

(i) Explosives: Use or storage of explosives shall not be permitted on site.

(18) Protection of job site

(a) The Contractor shall be responsible for protection of the job site. The Contractor shall be solely responsible for the safety of himself, his employees and other persons, as well as for the protection of the safety of the property of himself or any other person, as a result of his operations hereunder. Drawings and specifications as well as any additional information concerning the work to be performed passing from or through the Architect/Engineer TxDOT or the Owner shall not be interpreted as requiring or allowing Contractor to deviate from the Drawings and Special Specifications, the intent of such Drawings, Special Specifications and any other such instructions being to define with particularity the agreement of the parties as to the work the Contractor is to perform. Contractor shall be fully and completely liable, at his own expense, for design, construction, installation and use, or non-use, of all items and methods incident to performance of the contract, and for all loss, damage or injury incident thereto, either to person or property, including, without limitation, the adequacy of all temporary supports, shoring, bracing, scaffolding, barricades, machinery or equipment, safety precautions or devices, and similar items or devices used by him during construction.

(b) Protect site features and plantings from damage during the work. At completion of the work, repair or replace any site features damaged or removed during the work, including building, plantings and vegetation, building contents, at no additional cost to the project.

(c) Historical artifacts: The building contains a Museum with significant historical artifacts. The Contractor shall execute the work to prevent any damage to historical artifacts.

(d) Fire protection: The Contractor shall take stringent precautions against fire. No welding, torch cutting, or other operations requiring a heat source shall be
performed unless approved in writing by Architect/Engineer and Owner, and unless adequate fire protection is provided. The Contractor shall maintain a fire watch for the duration of the operations requiring a heat source for at least 30 minutes after the "hot" work has stopped. The Contractor shall provide adequate ventilation to prevent air contamination of the accumulation of toxic materials. Schedule operations requiring a heat source with the Owner at least 24 hours in advance of the beginning of work each day.

(19) Fences, barricades, and canopies

(a) The Contractor shall protect users of the monument and site by installing fences, barricades, and canopies as applicable to prevent injury from unauthorized entry of personnel into work areas.

(b) Warning signs shall be erected as necessary to indicate construction areas or hazardous zones.

(c) Construct all protection as per requirements of state and local laws, and Williams-Steiger Occupational and Safety Act 1970, and be responsible that said regulations are maintained.

(d) Provide canopies to protect the main paths of public ingress to the monument, as shown on the Drawings. Canopies shall also protect one means of ingress for wheelchair/disabled persons. Either existing wheelchair/disabled access path shall be protected, or Contractor shall construct and protect alternate wheelchair/disabled access path. Design for canopies shall be prepared and sealed by a structural engineer licensed as a professional engineer in the state of Texas.

(e) Prior to beginning construction, submit for Owner’s approval design and description of all fences, barricades, and canopies. Also, submit proposed finished appearance of fences, barricades, and canopies to Owner for review and approval prior to installation.

(20) Scaffolding within the Museum Space

(a) Scaffolding to pass through Museum spaces shall be at approximate locations indicated on Drawings. Contractor shall submit a scaffolding plan and details to Owner for review and approval prior to installation.

(b) The Museum shall remain open to the public during regular Museum operating hours throughout entire construction project. Construction activities related to scaffolding installation and dismantlement shall not interfere with or disrupt the activities of the visiting public and Museum operations, and shall take place only in accordance with a schedule submitted in advance by Contractor and approved by Owner. Contractor should anticipate that construction activities related to shoring installation or removal will take place outside of regular Museum operating hours.

(c) Scaffolding shall be protected from the public. Scaffolding shall be finished by encasing in gypsum wallboard, taped, finished with float texture, and painted, or by similar finishes, to match Museum interior finishes and colors; Contractor shall
submit proposed protection of scaffolding and proposed finished appearance of scaffolding to Owner for review and approval prior to installation of scaffolding.

(d) Contractor is advised that extensive and ornate finishes, fixtures, and permanent furnishings exist throughout all Museum spaces, and that the theater area has been extensively renovated, and now contains a sloping floor, permanent seating, and an extensive audio-visual installation. Contractor is responsible for protection, preservation, restoration, removal, and reinstallation of these items as affected by scaffolding installation. It is intended that theater audiovisual presentations will continue throughout work, multiple times daily. Existing finishes shall be protected during the work. Contractor shall submit proposal in advance to Owner for review and approval prior to disruption of any finish, fixture, furnishing, equipment, etc. Any removal or disruption of finishes shall be as minimal as possible and cleanly cut. Existing finishes that are affected by shoring shall be restored by Contractor at no additional cost to Owner.

(e) Maintain Museum fire and emergency exits access, including necessary signage, and access for the disabled throughout the work. Contractor shall confirm that scaffolding plan is in accordance with fire and disabled access code requirements.

(f) Contractor is further advised that mechanical, electrical, communications, plumbing, and HVAC lines and equipment may interfere with scaffolding. Contractor is responsible for relocation and restoration of permanent services, or installation and removal of temporary replacement services. No service shall be interrupted or shut down at any time without prior approval by Owner.

(g) These restrictions are applicable to the full height of the Museum floor.

(21) Disposal of materials and equipment

(a) All removed, dismantled or demolished material and/or equipment including rubble, scrap and debris not specified or indicated to be salvaged for reuse, reinstalled under this contract, or otherwise retained for the Owner will become the property of the Contractor and shall be promptly removed from the site and disposed of by the Contractor at his own expense and responsibility.

(b) Salvaged material retained by the Owner shall be loaded, transported, and stored by the Contractor at a storage area/building in the park designated by the Owner.

PART 2 - PRODUCTS

(1) Products (not applicable)

PART 3 - EXECUTION

(1) Execution (not applicable)

END OF SECTION
(8) Section 01300 – Submittals

PART 1 – GENERAL

(1) Related documents

(a) Drawings and General Provisions of the contract, including the General Provisions, Special Provisions, and Division 1 Special Specification Sections, apply to work of this Section.

(2) Description of requirements

(a) Individual submittal requirements are generally specified in applicable Sections for each unit of work. Submittal data is required on all items including those furnished exactly as specified. The Contractor shall supply the original submittal plus four copies, plus the number the Contractor requires. See Section 01705 for contract close out submittal requirements.

(b) Equal materials substitution requests shall be submitted within 10 days after the effective date of the notice to proceed or on a timely basis as may be necessary for a particular submittal. Substitutions will not be given consideration on any submittals, which would delay progress or not be practical. Submittal forms will be furnished, which the Contractor will use to accompany each set of data. The procedures for making submittals will be outlined by the Owner with the Contractor at the preconstruction conference.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Submittals at site

(a) The Contractor’s superintendent will keep a complete set of all approved submittals on site at all times. No work requiring a shop drawing or sample submission shall be commenced until the submission has been approved.

(2) Weekly construction reports

(a) Prepare a weekly construction report recording the following information concerning events at the site and submit to the Project Inspectors at weekly intervals:

1. List of subcontractors at the site.

2. Approximate count of personnel at the site, broken down by subcontractor.

3. Progress of the work and percent of completion.
4. General weather conditions.
5. Accidents and unusual events.
6. Meetings and significant decisions.
7. Stoppages, delays, shortages, losses.
8. Orders and requests of governing authorities.
9. Change orders received, implemented.
10. Service connected, disconnected.
11. Equipment or system tests and startups.

(3) Shop drawings
(a) Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the contract documents. Do not reproduce contract documents or copy standard information as the basis of shop drawings. Standard information prepared without specific reference to the project is not considered shop drawings. Reproductions of the contract documents will be immediately rejected for resubmittal.

(b) Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
1. Dimensions and stone numbering system.
2. Identification of products and materials included.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet size: Except for templates, patterns and similar full-size drawings, submit shop drawings on sheets at least 8-1/2 x 11 inches, but no larger than 24 x 36 inches. Leave space for review stamp on each sheet.

(4) Final submittal: Submit one set of reproducible and five blue- or black-line sets of prints; submit six sets where required for maintenance manuals.

(5) Product data: Collect product data into a single submittal for each element of construction or system. Product data includes printed information such as manufacturer’s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where
product data must be specially prepared because standard printed data is not suitable for use, submit as “shop drawings.”

(a) Manufacturer’s printed recommendations.
(b) Compliance with recognized testing agency standards.
(c) Application of testing agency labels and seals.
(d) Notation of dimensions verified by field measurement.
(e) Notation of coordination requirements.
(f) Mill certificates.

END OF SECTION
(9) Section 01505 - Temporary Facilities

PART 1 – GENERAL

(1) Related documents

(a) Drawings and General Provisions of the contract, including the General Provisions, Special Provisions, and Division 1 Special Specification Sections apply to work of this Section.

(2) Description of requirements

(a) Definitions: Specific administrative and procedural minimum actions are specified in this Section as extensions of the General Provisions and Special Provisions of this contract. These requirements have been included for special purposes as indicated. Nothing in this Section is intended to limit types and amounts of temporary work required, and no omission from this Section will be recognized as an indication by the Owner that such temporary activity is not required for successful completion of the work and compliance with requirements of the contract documents. Provisions of this Section are applicable to, but not limited to, utility services, construction facilities, security-protection provisions, and support facilities.

(b) No separate payment will be made for the work of this Section, and all costs related to this work shall be included in the overall cost of the work unless specifically stated otherwise.

PART 2 - PRODUCTS

(3) Temporary utility services

(a) All temporary utility services required by the Contractor during the contract shall be provided by the Contractor at no cost to the project and shall be removed from the premises by the Contractor at the conclusion of the contract.

(b) Water: Contractor shall secure and pay for installation of water meter(s) in accordance with the requirements of the providing utility. Contractor shall pay for tap, meter, water system extensions, and water consumption costs and fees.

(c) Electrical service:

1. Temporary electrical service shall be in accordance with the latest edition of the National Electric Code.

2. Electrical power shall be furnished by the Contractor through temporary meter facilities. All temporary connections, extensions and power consumption shall be paid for by the Contractor.
(d) Telephone service: Contractor shall provide private lines, listed in the
Contractor’s name, to the field office, for use in temporary construction facilities
as specified herein.

(2) Temporary construction facilities

(a) Contractor’s designated space: Temporary offices shall be located in space
available at the job site, or the Contractor shall obtain space for the offices in the
immediate vicinity of the job site. The Contractor will be provided with storage
space at the job site for use during the construction. Unauthorized damage to any
existing utilities, building facilities, structures, or plant life shall be repaired by
the Contractor at no expense to the project. For the duration of construction, the
Contractor shall not allow unsafe or unsanitary conditions to develop as a result of
his operations.

1. Contractor’s on-site field office shall include the following as a minimum:
   a. Plan rack for construction drawings.
   b. Plan table.
   c. Filing system for shop drawings.
   d. Filing system for correspondence.

2. Project Inspector’s office (provided by Contractor):
   a. In field office, separated from the Contractor’s office, or in a separate
      structure adjacent to the field office, the Contractor shall provide and
      maintain the following:
         1) Minimum of 200 square feet, minimum of 8 feet wide, and
            minimum ceiling height of 7 feet.
         2) Minimum of 1/4 inch gum or fir plywood, good one side for
            walls and ceiling finish.
         3) Vinyl composition tile floor.
         4) Walls, floor and ceiling insulated with “full thick” batt
            insulation.
         5) Desk and four folding chairs.
         6) Plan table (plywood is acceptable).
         7) Adequate lighting, heating and cooling.
         8) Separate direct line telephone. Contractor shall pay for
            installation, monthly charges and removal. Long distance calls
            shall be paid for by Owner.
         9) Separate fax/modem line.
10) Locks on all doors leading to or from the office. Provide keys to the Inspector’s locks shall be separately keyed from locks for any other areas on site.

b. Office and telephone shall remain on site until Project Inspectors authorize removal.

c. General construction, arrangement and equipping of office are subject to approval by the Project Inspectors.

3. Storage and protection of materials: Material shall be so placed as to permit easy access for proper inspection and identification. All material shall be stored according to manufacturer’s recommendations. Any material that has deteriorated, become damaged or otherwise unfit for use, shall not be used in the work. At his own expense, the Contractor may provide temporary fencing for the storage area. Contractor shall install, maintain and upon completion of work, remove all such fencing. Contractor shall be responsible for securing and protecting the storage area day and night. Upon completion of all work, or when directed, the Contractor shall remove all material, debris or other foreign material from the storage area.

a. Construction fencing: Construction fences shall consist of galvanized metal chain link fence panels 6 feet high minimum. Contractor shall maintain construction fences to prevent corrosion staining onto existing materials.

b. Temporary barricades: Where Contractor operations are of a limited duration less than eight hours, temporary barricades are permissible with the prior approval of the Project Inspectors and the Owner. Temporary barricades shall consist of wood or galvanized metal chain link partitions minimum of 3 feet high. Contractor shall maintain construction fences to prevent corrosion staining onto existing materials.

c. Temporary erosion control: The Contractor shall provide temporary erosion control measures, such as hay bale barricades, erosion control fabric fences (silt fences), or other means approved by TxDOT and the Owner, throughout the duration of construction activities to prevent the deposit of silt and soil in areas outside of earthwork and construction limits.

d. Temporary toilets: The Contractor shall, at no cost to the project, provide and maintain in a neat, sanitary conditions such job site accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the state department of health or other authorities having jurisdiction. The Contractor shall provide portable chemical toilets for the workers. Locations of portable toilets are subject to Owner’s approval prior to installation.
e. Drinking water: The Contractor shall provide for all workmen drinking water that shall be cooled in warm weather. He shall provide containers for water and paper cups at various convenient places where work is being done. Each location shall also be provided a trash receptacle for used cups.

f. Signage: Refer to Section 01150.

(3) Cleaning

(a) The Contractor shall not allow trash or debris to accumulate on the site or roadways. Premises shall be maintained as clean and presentable as good construction practices will allow at all times.

PART 3 – EXECUTION

(1) Execution (not applicable)

END OF SECTION
(10) Section 01562 - Environmental Protection

PART 1 – GENERAL

(1) General: The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution during and as the result of construction operations under this contract except for those measures set forth in other technical provisions of these Special Specifications. For the purpose of this Special Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life or affect other species of importance to man. The control of environmental pollution requires consideration of air, water, and land.

(2) Applicable regulations: In order to prevent, and to provide for abatement and control of any environmental pollution arising from construction activities, the Contractor and his subcontractors in the performance of this contract shall comply with all applicable federal, state, and local laws, and regulations concerning environmental pollution control and abatement, and all applicable provisions of the Corps of Engineers Manual, EM 385-1-1, entitled “Safety and Health Requirements Manual” in effect on the date of solicitation as well as the specific requirements stated elsewhere in the specifications.

(3) Notification: TxDOT will notify the Contractor in writing of any non-compliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient notification for the purpose. If the Contractor fails or refuses to comply promptly, TxDOT or the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it was later determined that the Contractor was in compliance.

(4) Subcontractors: Compliance with the provisions of this Section by subcontractors will be the responsibility of the Contractor.

(5) Implementation: Prior to commencement of the work the Contractor will:

   (a) Submit in writing, for approval, his proposals for implementing this Section for environmental pollution control

   (b) Meet with the representatives of TxDOT and the Owner to develop mutual understanding relative to compliance with this provision and administration of the environmental pollution control program.

(6) Protection of water resources: The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acid construction wastes or other harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable federal, state, county and municipal laws concerning pollution of
rivers and streams. All work under this contract shall be performed in such a manner that objectionable conditions will not be created in streams through or adjacent to the project areas.

(7) Burning: Unless specified in writing by the Owner, no burning shall be allowed on this project or the project site.

(8) Toxic materials: No toxic materials discharge is permitted at any time on or adjacent to the project site.

(9) Asbestos: The Contractor is warned that exposure to airborne asbestos has been associated with disease. The Contractor shall immediately notify the Owner upon uncovering any material likely to contain or suspected of containing asbestos fibers. Upon such notification, the Owner will conduct preliminary tests at no cost to the Contractor. Further disturbance of the materials shall cease and the continuance of the work effort shall be subject to approval by the Owner.

(10) Dust control: The Contractor shall maintain all work areas free from dust that would contribute to air pollution. Approved temporary methods of stabilization consisting of sprinkling or other methods as approved by Owner. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

(11) Maintenance of pollution control facilities during construction: During the life of this contract, the Contractor shall maintain all facilities constructed for pollution control under this contract as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Execution (not applicable)

END OF SECTION
(11) Section 01605 – Warranties

PART 1 – GENERAL

(1) Warranties (guarantees), maintenance, service

   (a) The Contractor shall provide a warranty and guarantee of all work against defects in materials, equipment, or workmanship for a period of one year from the date of final acceptance. The Contractor shall also provide any additional warranties and guarantees of work items and components as hereinafter included in the Special Specifications. The Contractor will receive no additional compensation for work performed during the one-year warranty period.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Execution (not applicable)

END OF SECTION
PART 1 – GENERAL

(1) Description of requirements

(a) Definitions: Close-out is hereby defined to include general requirements near the end of contract time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner and similar actions evidencing completion of the work.

(2) Final acceptance

(a) On or before the date of final inspection the Contractor will turn over to Owner the following contract close-out materials, which he will have accumulated and retained during the course of the project:

1. Set of approved submittal data.

2. Record (“as-built”) drawings

   a. Submit two sets of reproducible record (“as-built”) drawings and specifications showing conditions and dimensions of all construction, which has been revised, from that indicated by original construction documents. Drawings shall include documentation of locations on the facades where the repairs are made by the prescribed numbering system shown on the drawings, including description of repairs implemented at each location.

   b. The Contractor shall set aside one set of construction drawings and specifications to be used for keeping a record of all changes made during construction. The Contractor shall be responsible for keeping these drawings and neatly noting with colored pencil or ink any changes. These drawings will be checked once each month by the Project Inspectors and partial payments will not be made to the Contractor until the check made by the Owner indicates that records are being properly kept. These construction drawings shall be turned over to the Owner at the completion of the project. Final payment will not be made until these drawings have been received and approved by the Owner.

3. Two copies of videotape prepared by Contractor during the work documenting areas of the monument not included in the work, before and after the work is performed. Areas to be documented shall include the walls of the Museum and areas above the roof but below the work.

4. Project warranty information.
5. The above materials will be reviewed by TxDOT and the Owner for completion. Final acceptance will not be approved until contract closeout materials are completed.

(b) Work requirements: Refer to individual Special Specification Sections for specific work requirements. The requirements include, but are not limited to the following:

1. Submit final pay voucher, consent of Surety Company to final payment, and Contractor’s final payment affidavit.

2. Complete work items on punch lists, if any.

3. Discontinue and remove from project site temporary facilities and services, along with construction tools and facilities, and similar items.

4. Deliver stock stone units to the Owner. Refer to Section 04461 - stone repair.

5. Complete final cleaning up requirements, including repair or replacement of site features and vegetation, site dress-up, touch-up painting, etc.

(c) Inspection procedures: Upon receipt of Contractor’s written notice that the work has been completed, TxDOT and the Owner will schedule a final inspection with the Contractor and inspect the work. After the inspection TxDOT and the Owner will either approve final payment or prepare a punch list for the Contractor listing work items not completed, incorrect or obligations not fulfilled as required for final acceptance. If necessary the procedure will be repeated. All work, including punch list items, must be completed and accepted before the contract completion date.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Final cleaning

(a) At the end of work, provide final cleaning of work area. Clean entire project area of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petrochemical spills and other foreign deposits. Sweep and hose down roadways as required to remove construction debris. Project site shall be completely cleaned up and returned to its preconstruction condition prior to final inspection.

END OF SECTION
(13) Section 02070 - Selective Demolition

PART 1 – GENERAL

(1) Description: The work of this Section consists of selective demolition and/or removal of the following:

(a) Remove distressed portions of stone units.

(b) Remove distressed stone units or partial units designated for replacement.

(c) Remove distressed stone units at ornate carved artistic and architectural features.

(d) Remove pointing mortar in designated areas.

(e) Remove pointing mortar from areas of ornate carved artistic and architectural features.

(f) Remove distressed brick masonry.

(g) Remove stone units and brick masonry to accomplish flashing.

(h) Remove stone damaged during construction.

(i) Removal and legal disposal of existing Museum roofing construction:

1. Pavers
2. Roofing membrane
3. Insulation
4. Base flashings
5. Counterflashings
6. Roof drain flashings
7. Roof projection flashings
8. Sealant materials
9. Removal of roofing materials and plywood decking over existing skylight monitors.

(2) Related work

(a) Section 01150 – Special Conditions

(b) Section 02212 – Removal of Existing Concrete and Surface Preparation

(c) Section 04460 – Masonry Repair

(d) Section 07525 – Fluid Applied Membrane Roofing

(3) Submittals: The following shall be submitted in accordance with Section 01300, Contractor submittal procedures. Submit schedule showing sequence of work and methods of demolition. Include schedule for shutting off and capping utilities, and reestablishing utility services, while maintaining current service as shown in the phasing.

(4) Project conditions

(a) Keep dust and dirt pollution to a minimum.
   1. Ensure protective canopies are in place and safety of persons in demolition area. Provide temporary barricades as required.
   3. Maintain access to exits at all times.
   4. Separate demolition area from portions of existing building to remain with temporary, dust-proof and impact-resistant partitions. All material used for temporary dust barriers shall consist of only non-combustible or fire retardant materials.
   5. Provide adequate ventilation for work. Meet all applicable codes and regulations for the work to be performed.
   6. Verify adequacy of roof and Terrace paving to support for any concentrated loadings.
   7. Salvage stone units designated for removal in accordance with Section 04460. Exercise care to protect stone units from breakage and chipping during handling.
   8. Store stone units with wood planks between units, in stacks not more than five units high. The first layer shall be on timber or platform at least 4 inches above firm and level surface. Use only non-staining wood for separators. Provide protection against moisture over stone units.
9. Protect stone units using polyethylene or other suitable plastic film to separate stone from wood or other supporting members, and as an overall protective covering. Protect stored stone units from staining and soiling.

10. Provide temporary weather protection during roof’s skylight removals.

(5) Scheduling
   (a) Complete demolition that might damage new construction before starting new work.

PART 2 – PRODUCTS

(1) Products (not applicable)

PART 3 – EXECUTION

(1) Preparation
   (a) Provide temporary supports and protection for portions of structure to remain. Protect fixtures and equipment to remain.

(2) Demolition – General
   (a) Work systematically from the top of each work area down, in accordance with approved plan.
   (b) Avoid excessive loads on walls roof slab, floors, and exterior paving.
   (c) Exercise caution so as not to damage items that are designated for reuse.
   (d) Exercise caution in performing demolition work so as not to damage surrounding surfaces.

(3) Demolition – Stone
   (a) Stone cladding units:
      1. Remove stone units designated for removal as shown on Drawings.
         a. Label each piece of stone with number on the backside with waterproof permanent marker. Do not mark on face or sides of units. Numbering system for individual stone units is provided on Drawings, and shall also be used in recording work performed on record (“as-built”) drawings.
         b. Existing sealant and backer rod shall be removed from the edges of stone units and from adjacent units by mechanical methods. Clean and prepare surfaces as recommended by sealant manufacturer based on tests performed on actual stone units.
c. After removal, the units shall be stored by Contractor at location designated by Owner. Units shall be stored in dry conditions, above ground and with proper protection from weather and to prevent damage.

d. Do not damage existing units to remain. Accidentally damaged units to be replaced at no cost to the project.

e. Remove existing units using hand-held tools and light mechanical tools only.

2. Remove pointing mortar at locations designated for removal on Drawings. Removal of existing mortar shall be through the use of hand tools. No power-operated tools will be allowed in the removal of existing mortar without prior written approval by the Architect/Engineer.

3. Provide temporary support from below for stone units to remain in place above units to be removed. Support to prevent opening of joints or displacement of units, without damaging units to remain in place. Any damage will be repaired at Contractor’s expense.

(4) Restoration and clean-up

   (a) Repair and clean adjacent surfaces soiled or damaged by demolition work. Condition shall be at least equal to that prior to beginning of adjacent demolition.

   (b) Restore utility service to normal operation.

   (c) Remove equipment, temporary protection and barriers, and debris.

END OF SECTION
(14) Section 02212 - Removal of Existing Concrete and Surface Preparation

PART 1 – GENERAL

(1) Work included: This work shall consist of providing the necessary labor, materials, equipment and supervision for the removal of the existing unsound concrete or unsound previous repairs, examination of all exposed reinforcing steel bars, sandblasting, and air blasting of existing reinforcing steel, selected replacement of deteriorated reinforcing steel with new reinforcing steel, and sandblasting and air blasting of the newly exposed underlying sound concrete.

(2) Qualifications:

(a) Contractor shall employ Subcontractor and/or tradesmen with a minimum of five (5) years experience in performing the work specified.

(3) Sample Surface Preparation

(a) Perform a sample surface preparation in approximately 10 feet by 10 feet area which, when accepted by the Engineer, shall become the project standard for: profile, roughness, soundness of exposed concrete and workmanship. Do not start surface preparation work until this sample preparation has been accepted.

(b) The location for the sample surface preparation shall be selected by the Architect/Engineer.

PART 2 – PRODUCTS

(1) Equipment

(a) Power chipping hammers of nominal 15-pound class or less for removal of concrete.

(b) Chipping hammers of nominal 15-pound class or less for removal of concrete from beneath and adjacent to reinforcing steel, and for detail work.

(c) Sandblasting equipment capable of removing all rust from the exposed reinforcement, and laitance, dirt and debris from exposed concrete surfaces.

(d) High pressure, oil-free compressed air equipment capable of removing dust and dirt from concrete repair areas, and exposed concrete surfaces.

(e) Sawing equipment shall be capable of sawcutting the concrete to the specified depth.

(f) Scarifying and steel shot blasting equipment capable of removing coatings, grease, oil, curing compound and other foreign materials and up to 1/4 inch of concrete from the surface.

(g) All equipment must operate at a noise level within the levels required by city, state and federal laws and codes.
PART 3 – EXECUTION

(1) Concrete removal

(a) Contractor shall install shoring as required to perform work.

(b) Contractor shall identify the areas, which require removal of unsound concrete subject to verification by Architect/Engineer. Unsound concrete shall be removed to sound concrete.

(c) Remove concrete in an area extending a minimum of 1 inch beyond the outer boundary mark of unsound concrete. The shape of each patch shall not be irregular. Angles between adjacent saw cuts around the perimeter of the patch shall not be less than 90 degrees.

(d) During all concrete removal (chipping) process, great care shall be exercised to avoid cracking of the underlying sound concrete or vibrating exposed reinforcing steel.

(e) During the removal of unsound concrete, if reinforcing bar or embedded steel is exposed, or if the bar is not firmly bonded to the surrounding concrete, then the remaining concrete around the bar shall be removed. The clearance between the bar and the concrete behind shall be a minimum of 3/4 inch, measured radially from the surface of the bar.

(f) Any areas of the prepared surface contaminated by oil or other materials detrimental to the bond of the new concrete as a result of the Contractor’s operations shall be removed. Such cleaning or removal work will be paid for by the Contractor.

(g) The newly exposed sound concrete shall be cleaned by blowing away loose material with a sandblast, followed by cleaning with a compressed air jet. The saw cut edges around the perimeter of the patch area shall be thoroughly sandblasted.

(h) The Architect/Engineer and Project Inspectors shall be allowed a minimum of 24 hours for the inspection of properly prepared concrete surfaces and reinforcement, before the concrete is placed.

(i) If more than 48 hours has elapsed since the patch area was sandblasted and cleaned with high pressure compressed air at the point in time when the patch material is to be placed, then the patch area must be blown clean again with high pressure compressed air immediately prior to placement of the patch material.

(2) Reinforcement cleaning and/or replacement

(a) All exposed reinforcing steel bars shall be thoroughly cleaned by sandblasting to remove all rust and concrete.

(b) Reinforcing bars that are damaged or that have lost more than 20 percent of their original cross-sectional area at any point shall be brought to the attention of the
Architect/Engineer and Project Inspectors for inspection. The Architect/Engineer will determine if the bars should be removed and replaced, or if supplemental reinforcing bars should be added.

(c) Where portions of reinforcing bars are exposed, the Architect/Engineer will determine if the embedded portion of the bar is soundly bonded to the remaining concrete. If, in the Architect/Engineer’s judgment, the bar is not soundly bonded, the Contractor shall remove concrete around and under a length as determined by the Architect/Engineer.

(d) If during removal of unsound concrete, the Contractor encounters existing reinforcing bars with less than 1/2-inch cover from the existing concrete surface he shall notify the Architect/Engineer and Project Inspectors before repairs are implemented. A decision will then be made by the Architect/Engineer on whether to remove or modify that reinforcing bar(s) or to build out the patch over the bar(s) to provide additional cover. The Contractor shall at no time remove existing reinforcing steel without the prior approval of the Architect/Engineer.

(3) Surface Preparation

(a) Take necessary precautions to protect existing material and finishes in the area. After removal of membrane, all concrete surfaces will be inspected by the Engineer.

(b) Any unsound concrete found at this time or during the roughening process will require repair before proceeding with the work, as required.

(c) Prepare and roughen the surfaces of the existing concrete slabs which are to be overlaid with new concrete slabs to a 1/8 inch profile amplitude by scarifying to expose the aggregate to provide a rough or irregular surface profile.

(d) During roughening process, great care shall be exercised to avoid cracking of the underlying sound concrete.

(e) During the removal of unsound concrete, if more than half of a reinforcing bar circumference is exposed, or if the bar is not firmly bonded to the surrounding concrete, then the remaining concrete around the bar shall be removed. The clearance between the bar and the concrete behind shall be a minimum of 3/4 inch measured radially from the surface of the bar.

(f) All exposed reinforcing steel bars shall be thoroughly cleaned by sandblasting to remove all rust and unsound concrete.

(g) The engineer shall be allowed a minimum of 24 hours for the inspection of properly prepared concrete surfaces before proceeding with the work.

(4) Preparatory Work

(a) After the Engineer has approved the scarified surface of the existing concrete slab, the work shall proceed as follows:
1. Sandblast the entire existing concrete surface to remove excess epoxy, dirt, oil, or other contaminants. During sandblasting, use positive methods to remove all dust, dirt and other debris.

2. Clean the existing concrete surface with oil-free compressed air, picking up all loose dust, dirt, and other debris.

3. From this point until time of concrete placement, the surface of the slab shall be kept clean.

4. After the sandblast described in Note 1, the work shall be done such that concrete is placed within forty-eight (48) hours.

5. At about six hours before the scheduled concrete placement, begin dampening the existing concrete surface with a mist of clean water in such a manner that free water does not accumulate on the concrete surface. The surface shall be kept continually damp until the final air blast just before concrete placement.

6. Remove excess water from the existing concrete surface. The surface of the existing concrete shall be in a saturated, surface dry condition just prior to placement of concrete. Free water shall not be acceptable.

7. Place concrete and finish as specified in Section 03300. All overlay slab concrete shall be wet cure, as specified in Section 03300.

(5) Clean-up

(a) The Contractor shall be responsible for the safe removal of all loose concrete from the building, and for proper and legal disposal of that loose concrete, off site.

END OF SECTION
(15) Section 03210 - Epoxy-Coated Reinforcing Steel

PART 1 – GENERAL

(1) Description: this work shall consist of providing the necessary labor, materials, equipment and supervision to properly install and support new epoxy-coated reinforcing steel.

(2) Submittals:
   (a) Submit samples of all plastic tie wire devices proposed for use in this project.
   (b) Mill test reports shall be submitted to the Architect/Engineer one-week prior to shipping reinforcing steel. The test reports shall include adequate information on chemical and physical properties to demonstrate conformance to ASTM 615.
   (c) Certification statement of coating process.
   (d) Certification statement of coating material.
   (e) Certification statement of coating properties.

(3) Quality assurance
   (a) Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice.
   (b) Conform to ACI standards 315 and 318.

PART 2 – PRODUCTS

(1) Reinforcing steel
   (a) Bars: All reinforcing steel bars shall be Grade 60 (60,000-psi yield strength) as defined in ASTM A615.
   (b) Plastic coated tie wires: Approved by the Architect/Engineer and shall be used to secure bars and protect the coated bars from physical damage during placement.
   (c) Reinforcing bar supports: Bar supports shall conform to the “Bar Support Specifications and Standard Nomenclature” as contained in the “Manual of Standard Practice for Reinforcing Concrete Construction” as published by the Concrete Reinforcing Steel Institute. Metal chairs and supports shall be coated with epoxy, plastic or other inert coating. The Contractor shall submit technical descriptions of the coated support chairs for the review and approval of their use by the Architect/Engineer. If the Contractor proposes the use of other support devices, he shall submit a request and technical information for the Architect/Engineer’s approval of the devices.

(2) Epoxy coating material
(a) The coating material shall be a powdered epoxy resin approved by the National Institute of Standards and Technology, Washington, D.C., 20234. Information on the proper use and application requirements of the resin to be used shall be submitted to the Architect/Engineer by the manufacturer of the resin.

(b) The manufacturer of the resin shall furnish written certification that the material furnished for the coating of the reinforcing steel is the proper formulation. Not more than ten percent reclaimed powder shall be reused with new powder.

(c) Patching or repair materials, compatible with the coating and inert in concrete, shall be supplied by the epoxy resin manufacturer. The material shall be suitable for repairs of areas of coating that have been damaged. It shall be applied as specified in this Section.

(d) All reinforcing steel bars shall be epoxy-coated. The coating shall consist of a protective coating of epoxy applied by electrostatic spray method or electrostatic fluidized-bed method in accordance with the resin manufacturer’s recommendations and these specifications.

(e) The coated bars shall be free of slivers and defects. The coated bars shall meet the physical properties herein specified and may be inspected for approval at the coating plant. All epoxy coated reinforcing bars shall be supplied by an epoxy coating application plant that is certified with the CRSI voluntary certification program for fusion bonded epoxy coating application plants. A certification statement shall be furnished with each shipment. This certification shall include, for each bar size, the preheat temperatures, cure times, thickness checks, holidays detected, and bend test results. Two copies of this certification shall be submitted to the Architect/Engineer prior to the installation of any of the reinforcing steel bars.

(3) Coating thickness

(a) A film with a thickness after curing of 8 mils, plus or minus 2 mils, shall be applied in a uniform, smooth coat. Thickness of the film will be measured on a representative number of bars from each production lot by the same method as outlined in ASTM method B499, nonmagnetic coatings on magnetic basis metals.

(4) Continuity of coating

(a) The coating shall be checked after cure for continuity of coating and shall be free from visible holes, voids, contamination, cracks, and damaged areas. In addition, there shall not be more than two holidays (pinholes not visually discernible) in each linear ft of coated bar. A holiday detector shall be used in accordance with the manufacturer’s instructions to check the coating for holidays. A 67 1/2-volt, AC powered, on-line, holiday detector shall be used.

(5) Flexibility and bonding of coating

(a) The coated reinforcing bars shall be capable of being bent 120 degrees over mandrels of the following diameters without any visible evidence of cracking or debonding of the coating. The diameter of the mandrel for Number 5, 6, 7, 8, 9,
10, and 11 bars shall be 5, 6, 7, 8, 9, 10, and 11 inch, respectively. The rate of bending shall be one minute plus or minus 15 seconds. The coating applicator shall test one sample of each bar size as prescribed above for each day’s processing. If there is any evidence of cracking or debonding of the coating, two additional test samples from different bars shall be secured and tested from the bars previously coated that day. Any evidence of cracking or debonding will be considered cause for rejection of the coated bars represented by these samples.

(b) The coating applicator shall submit certifications of compliance with the above requirements. The coating applicator shall ensure that samples removed for this type of testing shall not short the bar lengths specified on the project plans.

(6) Fabrication

(a) All bends and hooks shall conform to bend dimensions defined as “ACI Standard Hooks” in the CRSI Manual of Standard Practice unless otherwise shown on the plans.

(b) Reinforcing bars shall not be bent or straightened in a manner that will injure the coating material.

(c) Reinforcing bars shall conform accurately to the dimensions shown on the plans and within the fabricating tolerances as shown in the CRSI Manual of Standard Practice. The bars shall be fabricated as shown on the plans. The rate of bending may need to be reduced for some bar sizes to minimize cracking or debonding of the coating. Any visible cracking or debonding of the coating in the bending area of bars bent in accordance with the plan requirements shall be patched. All patching shall be done promptly after bending.

PART 3 – EXECUTION

(1) Handling

(a) In order to protect the coated reinforcement from damage, the Contractor shall use padded or nonmetallic slings and padded straps. Bundled bars shall be handled in a manner that will prevent excessive sagging of bars that will damage the coating. The bundled bars shall not be dropped or dragged and must be stored on wooden cribbing. Bars shall not be exposed to moisture at any time. If, in the opinion of the Architect/Engineer, the coated bars have been extensively damaged, the bars will be rejected. The Contractor may submit, for the Architect/Engineer’s review, alternate precautionary measures.

(2) Placing reinforcing steel

(a) The placement of reinforcing steel shall conform to the CRSI Manual of Standard Practice.

(b) Reinforcing steel should be securely tied to prevent displacement during the pouring operation and all dowels must be wired in place before depositing concrete.
(c) Before placing concrete, clean reinforcement of foreign particles and dirt and dust.

(d) All bar splices, concrete cover and bar spacings shall conform to the Drawings, and to ACI and CRSI standards and requirements.

(e) Unless permitted by the Architect/Engineer, reinforcing shall not be bent after being embedded in hardened concrete.

(f) The Contractor shall obtain approval from the Architect/Engineer as to condition and placement of reinforcing prior to ordering concrete for each separate pour.

(2) Patching of damaged epoxy coatings

(a) Patching material shall be applied to all sheared ends and contact areas for hangers or couplers. Patching materials shall be applied to all damaged areas at the points of occurrence, such as at the initial application, fabrication, destination, or installation points.

(b) Areas to be patched shall be clean and free of surface contaminants. They shall be promptly treated in accordance with the resin manufacturer’s recommendations and before detrimental oxidation occurs.

END OF SECTION
(16) Section 03310 – Cast-in-place Concrete

PART 1 – GENERAL

(1) Description

(a) This work shall consist of providing the necessary labor, materials, equipment and supervision to place, finish and cure concrete which is cast over properly prepared existing concrete and within formed surfaces.

(b) Related work specified elsewhere:

1. Section 03210 Epoxy-Coated Reinforcing Steel
2. Section 03603 Epoxied-In Anchors and Coating of Existing Reinforcing Bar with Epoxy
3. Section 07900 Crack and Joint Sealant

(2) Standards

(a) Reference Standards

1. American Society for Testing and Materials
   a. Specification for Structural Steel (A36)
   b. Specifications for Making and Curing Concrete Test Specimens in the Field (ASTM C31)
   c. Specification for Concrete Aggregates (ASTM C33)
   d. Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (ASTM C42)
   e. Standard Test Method for Slump of Portland Cement Concrete (ASTM C171)
   f. Specification for Portland Cement (ASTM C150)
   g. Specification for Sheet Materials for Curing Concrete (ASTM C171)
   h. Test for Air Content of Freshly Mixed Concrete by the Pressure Method (ASTM C231)
   i. Specification for Air-Entraining Admixtures for Concrete (ASTM C260)
   j. Specification for Liquid Membrane-Forming Compounds for Curing Concrete (ASTM C309)
   k. Specification for Chemical Admixtures for Concrete (ASTM C494)

m. Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction (ASTM E329)

2. American Concrete Institute

a. Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete, ACI Committee 211 (ACI 211.1)

b. Specification for Structural Concrete in Buildings (ACI 301)

c. Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete (ACI 301)

d. Recommended Practice for Cold Weather Concreting (ACI 306R)

e. Recommended Practice for Hot Heather Concreting (ACI 305R)

f. Building Code Requirements for Reinforced Concrete (ACI 318)

g. Standard Practice for Curing Concrete (ACI 308)

(3) Submittals

(a) Submit concrete mixture designs a minimum of fourteen days before their intended uses, in accordance with Section 01300 and as described later in this Section.

(b) Submit reports of concrete tests at the end of each day’s testing, as described later in this Section.

PART 2 – PRODUCTS

(1) Concrete Types, Strengths and Uses

(a) The strength indicated is 28-day design compressive strength.

<table>
<thead>
<tr>
<th>Use</th>
<th>Concrete</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural repair concrete</td>
<td>Normal weight</td>
<td>4,000 psi</td>
</tr>
<tr>
<td>Topping slab concrete</td>
<td>Normal weight</td>
<td>4,000 psi</td>
</tr>
<tr>
<td>Topping slab exposed aggregate concrete (Prairie Mix #S-1235 or approved similar mix)</td>
<td>Normal weight</td>
<td>4,000 psi</td>
</tr>
</tbody>
</table>

(2) Materials

(a) Portland Cement, ASTM C150, Type I. Type III cement is not permitted.
Admixtures: The following types of admixtures may be used when approved by the Owner.

1. Air-entraining Admixtures: ASTM C260
2. Chemical Admixtures: ASTM C494

Calcium chloride shall not be permitted in the concrete as an intentional additive or as an unintended contaminant on aggregates or any other concrete materials.

Fine and coarse aggregates for normal weight concrete shall conform to ASTM C33 Class 5S and shall consist of sand and gravel. Aggregate particles shall be clean, hard, tough, durable, of uniform quality, and free from soft, thin elongated pieces, disintegrated stone, dirt, organic, or other injurious materials occurring either free or as a coating. Aggregates must be supplied from a source approved by the Architect/Engineer. Aggregate gradation shall conform to ASTM C33, 5S with the following limitations:

1. Minimum percentage of coarse aggregate by weight of total aggregate shall be 55 percent.
2. Coarse aggregate gradation for structural repair concrete shall conform to gradation size number 7.
3. Coarse aggregate gradation for new topping concrete shall conform to gradation size number 57.

Water shall be potable, clean and free of injurious quantities of substances known to be harmful to Portland cement.

Compressible Filler:

2. Fiber expansion joint filler conforming to ASTM D1751, and/or Federal Specification HH-F-341-F, Type I, as manufactured by W. R. Meadows, Elgin, Illinois.

Concrete Mixture Design

The design compressive strength of the concrete shall be 4000 psi at 28 days.

Mix designs for normal weight concrete shall be proportioned in accordance with ACI 211 and this Specification. Mix designs proposed for use, when tested in a laboratory, shall have an average 28-day compressive strength in excess of design strength as required in Chapter 4 ACI 318. The cement content shall be at least 6 bags per cubic yard. Water-cement ratio shall be such as to produce a slump of...
3+1 in. without exceeding 0.40 by weight of cement for structural repair concrete and without exceeding 0.45 by weight of cement for topping slab concrete.

(c) Specified slumps shall apply at the time when the concrete is discharged at the job site. In all cases, the concrete slump shall not exceed that specified. If higher slumps are required for proper concrete placement and consolidation, such slumps shall be achieved through the use of high range water reducers without exceeding the specified water/cement ratio.

(d) The entrained air content shall be 6+1-1/2 percent and shall be measured according to ASTM C231. Whenever the temperature is above 85 degrees F, the Contractor shall provide, when required by the Owner, an approved admixture to be added to the concrete for retarding the initial set of the concrete. The admixture shall be used in strict accordance with the manufacturer’s recommendations.

(4) Testing of Concrete Mix Design

(a) Mix designs of each separate mix shall be prepared and the following data shall be submitted to the Owner for each mix design.

1. Sieve analysis for fine and coarse aggregate
2. Test for aggregate organic impurities
3. Proportions of all materials
4. Mill test certificates for cement
5. Slump, during laboratory tests
6. Air content, during laboratory tests
7. Three, seven and 28-day laboratory compression test results (Minimum three cylinders for each test age plus one extra for a total of ten cylinders)

(b) A mix design previously used that complies with the Specifications may be submitted for approval. All information noted above shall be included. During the construction, tests will be made by an approved testing laboratory to determine if the concrete complies with the quality specified. The Contractor shall cooperate in the making of such tests to the extent of allowing free access to the work for the selection of samples and the storage of specimens, and in affording protection to specimens against injury or loss through his operations. The Contractor shall furnish all concrete for testing.

PART 3 – EXECUTION

(1) Batching and Mixing

(a) Ready-mixed concrete shall be batched, mixed and transported in accordance with applicable provisions of ASTM C94.

2. Truck mixers, agitators, and non-agitating units used to mix and transport ready-mix concrete shall comply with Standards of Truck Mixers Manufacturers Bureau of National Ready-Mix Concrete Association.

3. Ready-mix concrete production facilities shall be currently certified by National Ready-Mix Concrete Association and the Contractor shall submit a copy of that certification to the Owner’s Representative.

4. Concrete shall be delivered to site and discharged within 90 minutes or before 300 revolutions of mixer drum after introduction of mixing water. Due to the nature of this work, trucks with short loads may be required. Concrete which exceeds the above specified time limitation will be rejected.

5. Indiscriminate addition of a water or a “super” water-reducing admixture to increase the slump is prohibited.

6. When a “super” water-reducing admixture is added, it shall be incorporated at the site by additional mixing as specified by the manufacturer.

7. Concrete arriving at job site with a slump exceeding the maximum specified slump shall be rejected.

(b) Air-entraining and chemical admixtures, when used, shall be incorporated into the mix in amounts and manner recommended by the manufacturer and approved by the Owner. Accuracy of measurement of any admixture shall be within + 3 percent. Two or more admixtures may be used in the same concrete provided such admixtures are added separately and that the combination is compatible and has no deleterious effect on the concrete.

(c) The temperature of the concrete, when discharged, shall be not less than 65 degrees Fahrenheit when the air temperature is below 40 degrees Fahrenheit. If heated water or aggregates are used, the water shall be combined with the aggregates in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture exceeds 70 degrees Fahrenheit.

(d) The temperature of the concrete, when discharged shall not exceed 90 degrees Fahrenheit. The Contractor is cautioned that difficulty may be encountered with concrete at temperatures approaching 90 degrees Fahrenheit and every effort should be made to maintain it at lower temperatures.

(e) Placement and curing of concrete during cold weather shall be in conformance with the requirements of ACI 306R.

(f) Placement and curing of concrete during hot weather shall be in conformance with the requirements of ACI 305R.
(2) Placing

(a) Before placing concrete, all equipment for mixing and transporting concrete shall be cleaned, vibrators shall be checked for workability, all frost, ice, mud, debris, and water shall be removed from concrete surfaces and forms, forms shall be thoroughly wetted or oiled, and reinforcement shall be securely tied in place and thoroughly cleaned of ice and other coatings which may destroy or reduce bonding with concrete. No concrete shall be placed until the Architect/Engineer has approved the forms and the condition and placement of reinforcement.

(b) At locations where new topping slab is to be installed, coordinate placement with work specified in Section 07120 regarding installation of drainage layer and plastic sheeting.

(c) Conveying the concrete from the mixer to the place of deposit shall not cause separation or loss of materials.

(d) Placing of concrete shall be such that it is deposited as nearly as possible to its final position to avoid segregation due to rehandling or flowing. Placing shall be at such a rate that at all times concrete shall be plastic and flow readily into corners of forms and into spaces between rebars. No concrete that has partially hardened or has been contaminated by foreign materials shall be deposited. Once placing concrete has begun, it shall be carried on in a continuous operation until the panel or section is completed. When being deposited, concrete shall not be allowed to fall a vertical distance greater than 4 ft from point of discharge to point of deposit.

(e) Concrete placement shall not disturb or displace reinforcing bars, floor drains, or other slab embedments.

(f) All newly placed concrete shall be consolidated by means of vibration to assure dispelling of large voids. Generally, vibration shall be accomplished by means of an internal vibrator running at a minimum speed of 7,000 rpm or higher, depending on the nature of the concrete being consolidated. Extra vibrators shall be kept at the project site to be used in case a vibrator does not work. Vibrators shall be as narrow as necessary for shallow work.

(g) Where new concrete is cast against existing concrete surfaces, wet the existing surface for one hour prior to placement but do not allow puddles to form. At time of placement of concrete, existing concrete surfaces shall be in a saturated, surface dry condition. Coat the existing surfaces with a grout of equal parts of sand and cement.

(3) Finishing

(a) Concrete surfaces to receive membrane (top of structural slab).

1. These surfaces shall be smooth and have a surface texture equivalent to a wood float finish or as per ACI 301-11.7.3 (except hand troweling is not required), left free of loose particles, and shall be without ridges, projections, voids and concrete droppings.
2. These surfaces shall conform to the finish requirements of the membrane applicator.

(b) Exposed surface of topping slab (wearing course).

1. Surfaces shall be given a fine textured broom finish after completion of one steel troweling operation. The broom marks shall run perpendicular to traffic path unless otherwise specified by the Architect/Engineer.

2. Exposed aggregate finish areas shall be muriatic acid washed and sealed.

3. Construction joints and score lines measuring 3/8 inch wide by 1 inch minimum in depth shall be sawcut into the top of the wearing course. The joints are to be oriented and spaced as indicated on the Drawings.

4. Following sawcutting the joint surfaces shall be cleaned and prepared to accept sealant materials in accordance with Specification Section 07900.

5. Compressible filler shall be installed at all curb locations and as indicated on the Drawings.

(4) Curing

(a) Concrete shall be maintained above 55 degrees and in a moist condition for at least the first seven days after placing.

(b) Concrete surfaces which are to receive a membrane shall be wet cured. Curing shall be accomplished by burlap covers kept continuously wet and covered with 4 mil polyethylene sheets conforming to ASTM C171 with edges lapped and tightly sealed by sand, wood planks, pressure-sensitive tape, mastic, or glue. Concrete topping slab shall be initially cured with curing compound until concrete surface can be covered with wet curing items without leaving marks. Throughout the curing period, concrete shall be kept moist as specified.

(5) Limitations of Operations

(a) No vehicular or construction traffic shall be permitted on the new repair concrete for at least 3 days and until the concrete has achieved at least 75 percent of its specified 28-day compressive strength.

(6) Field Quality Control

(a) Testing of Concrete

1. A set of concrete field specimens consisting of seven, 6 inch by 12 inch, cylinders shall be taken not less than once a day, nor less than once per each 20 cubic yards of concrete, whichever is smaller.

2. All cylinders shall be made and tested by a qualified approved testing laboratory, which meets the requirements of ASTM E329. Their reports will be sent to the Owner, Contractor and Architect/Engineer. Costs for these tests shall be paid by the Owner.
3. Two cylinders shall be tested at three, seven, and 28 days each in accordance with ASTM C31. The remaining cylinder shall be stored for future testing if required.

4. For each set of cylinders made, slump and air content tests shall also be made. The temperature of concrete shall be taken at the same time cylinders are made. Slump tests shall be made in accordance with ASTM C143. Air content tests shall be made in accordance with ASTM C231.

5. Samples of concrete for test specimens shall be taken from the transport vehicle or mixer during discharge. When, in the opinion of the Engineer it is desirable to take samples elsewhere, they shall be taken as directed.

6. Concrete which fails to meet the slump or air content requirements shall be tested again using a different concrete test sample from the same source. If the second series of tests reveals the concrete does not meet the slump or air content requirements, the nonconforming concrete shall be rejected and properly disposed. A new batch of concrete shall be mixed or obtained at the Contractor’s expense.

7. Test specimens shall be molded immediately after the sample is taken and then placed in site storage provided by the Contractor. Storage shall be in shed, box or other enclosure maintained at a temperature of between 60 degrees Fahrenheit and 80 degrees Fahrenheit. Specimens shall be stored not less than 16 hours prior to removal to the laboratory.

8. Testing of cylinders shall be in accordance with ASTM C39. Each test report shall contain the following information for each set of cylinders:
   a. Individual test specimen strength, type of failure
   b. Slump
   c. Air content
   d. Concrete and air temperature
   e. Specimen number
   f. Portion of structure represented by the concrete tested
   g. Date cast
   h. Date tested
   i. Concrete properties specified
   j. Note if tests indicate concrete is or is not in conformance with Specifications.
9. Cost of additional field-cured cylinders, if tests indicate compliance with the Specifications at the required 28-day compressive strength, shall be paid by the Owner. Otherwise, the cost shall be paid by the Contractor.

10. Strength of concrete shall be considered satisfactory if the average of two 28-day tests in each set of cylinders equals or exceeds the specified 28-day strength, and neither of the 28-day tests is 500 psi or more below specified 28-day strength.

11. Should results of cylinder tests not meet Specification requirements, the Contractor shall submit revised mix design data for concrete, which will conform to the Specifications. In the event of failure of test cylinders for any portions of work, the Contractor, at the Contractor’s expense, shall have core samples cut from that portion of structure represented by unsatisfactory test specimens. Three cores shall be taken from each area in question according to ASTM C42. Concrete in the area represented by core tests will be considered structurally adequate if the average of the three cores is equal to at least 85 percent of required 28-day strength, and if no single core is less than 75 percent of the 28-day strength. If these strength acceptance criteria are not met by core tests, the Contractor shall remove and replace all questionable areas of concrete at the Contractor’s expense.

END OF SECTION
(17) Section 03365 - Polymer-Modified Concrete And Patching Mortar

PART 1 – GENERAL

(1) Work included

(a) This work shall consist of providing the necessary labor, materials, equipment and supervision to place, cure and finish polymer-modified concrete and patching mortar which is placed over properly prepared existing concrete surfaces in repair areas.

(2) Submittals

(a) Submit a list of all proposed materials and material sources for the polymer-modified concrete and the patching mortar to the Architect/Engineer at the start of the job.

PART 2 – PRODUCTS

(1) Concrete types, strengths, and uses

(a) The strength indicated is 28-day design compressive strength.

<table>
<thead>
<tr>
<th>Concrete Type</th>
<th>Strength</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymer-Modified</td>
<td>4,000 psi</td>
<td>Concrete for Majority of Concrete Patches</td>
</tr>
<tr>
<td>Patching Mortar</td>
<td>4,000 psi</td>
<td>Mortar for Small Patches (approx. 1-1/2 inch in depth, and relatively small in plan area)</td>
</tr>
</tbody>
</table>

(2) Materials

(a) Portland cement, ASTM C150, Type I. Convertible Portland cements and Portland cement Type III are not permitted.

(b) Admixtures: Either of the two following types of admixtures may be used to form the polymer-modified concrete:


2. Styrene-butadiene modifier: A nontoxic film-forming, polymeric emulsion in water to which all stabilizers have been added at the point of manufacture that shall be homogeneous and uniform in composition. The latex shall be a styrene-butadiene polymeric emulsion in which the polymer comprises 46 to 50 percent of the total emulsion. The admixture shall be a product of the
Dow Chemical Company, Midland, Michigan; Reichhold Chemicals, Inc., White Plains, New York; Tex-Crete Inc., Gurnee, Illinois; Polysar Inc., Chattanooga, Tennessee, or an equivalent material. Any alternate admixture shall have received the approval of the federal highway administration for use in concrete bridge deck overlays.

(c) Calcium chloride shall not be permitted as an additive in the polymer-modified concrete or in the patching mortar or in any admixture.

(d) Fine and coarse aggregate shall be clean and conform to the requirements of ASTM C33.

(e) Water shall be potable and free from substances known to be harmful to Portland cement.

(f) Forming materials

(g) Curing compounds.

(3) Polymer-modified concrete mix design

(a) The primary requirements for the polymer-modified concrete are the compressive strength as specified herein; workability that facilitates placement and the achievement of the desired finish; and proper finishing and curing practices to ensure achievement of a low permeability.

(b) Water/cement ratio (including water in the latex emulsion and the aggregate) shall not exceed 0.40.

(c) The entrained air content shall be no more than 6.5 percent, as measured according to ASTM C231. No air-entraining agent shall be added to the mix. Defoaming agent shall be used to control air content.

(4) Patching mortar mix design

(a) The primary requirements for the patching mortar mix are a minimum compressive strength as specified herein, and workability that facilitates placement and achievement of the desired finish.

(b) The patching mortar shall not be installed in layers, and shall not be installed in depths exceeding 1-1/2 inches.

(5) Testing of polymer-modified concrete mix designs

(a) The Contractor shall submit a list of all proposed materials, and material sources, to the Architect/Engineer at the initiation of the project. The following data shall be submitted to the Architect/Engineer:

1. Sieve analysis for the fine and coarse aggregate

2. Proposed mixing methods
3. Mill certificates from the cement supplier

4. List of materials and sources

(b) At least (3) weeks prior to the start of concrete placement the Contractor shall manufacture four (4) separately mixed test batches of concrete under job conditions, in quantities large enough to accommodate production of the following samples and tests:

1. Four sets of 4 inch x 8 inch test cylinders for use in determining compressive strength of the concrete

2. Two slump tests

3. Two air content tests

(c) All samples and tests will be conducted by TxDOT’s material testing lab or an independent testing agency contracted to TxDOT. The Contractor is responsible for providing the labor and materials to manufacture the concrete for the samples, and for disposal and cleanup of surplus materials.

(d) Contractor shall be required to provide additional test batches of polymer-modified concrete if the previously provided material does not comply with these specifications.

(6) Testing of patching mortar mix designs

(a) The Contractor shall notify the Architect/Engineer at least four (4) weeks in advance of the start of placement of patching mortar, in writing, of the type of patching mortar proposed for use on the project. The following data shall be submitted to the Architect/Engineer at that time.

1. List of material sources

2. Proposed mixing methods

(7) At least (3) weeks prior to the start of placement of patching mortar, the Contractor shall manufacture four (4) separately mixed test batches of patching mortar under job conditions in quantities large enough to accommodate the following samples and tests:


PART 3 – EXECUTION

(1) Batching and mixing

(a) All batching and mixing operations shall be performed in a manner such that quality control is guaranteed, accurate mix proportions are maintained and all ingredients are combined and mixed to a uniform consistency.
(b) Mix components shall be measured and partially combined in a controlled environment prior to final mixing and placing at the repair location.

(c) No polymer-modified concrete or patching mortar shall be placed at surface and ambient temperatures lower than 40 degrees Fahrenheit, or when the temperature is projected to fall below 40 degrees Fahrenheit in the 24 hours following placement.

(d) At temperatures above 85 degrees Fahrenheit, the Architect/Engineer may require placements to be made at night or early morning hours, if in his opinion a satisfactory placement is not being achieved during normal working hours.

(e) Water may be added to the polymer-modified concrete to obtain slump within the prescribed limits. Concrete with a slump less than 3 inch may be rejected if it is not placed satisfactorily, with a closed tight surface. Retempering of concrete is not permitted.

(f) The outside bulk storage of latex modifier in the sunlight shall be limited to 10 days or as required by the manufacturer’s specifications if more stringent. The latex modifier shall not be exposed to temperature extremes and shall be agitated as required by the manufacturer.

(2) Placing and finishing concrete

(a) Placement of the polymer-modified concrete shall be a continuous operation at each patch location. Materials sufficient to complete a patch shall be available prior to commencing a repair.

(b) The concrete shall be continuously rodded or vibrated during placement to consolidate the pour and fill all corners of the patch. External vibration of the formwork may also be used (or be used in lieu of internal vibration), by placing the internal vibrators against the wood forms for short periods of time.

(3) Field quality control

(a) Testing of concrete

1. At the time of the first field placement of concrete and mortar, and at least two appropriate intervals as directed by the Architect/Engineer, four standard 4 inch by 8 inch cylinders will be made, cured and tested in accordance with ACI 301, except as noted herein.

2. All cylinders shall be tested by TxDOT materials testing laboratory. Testing reports will be sent to the Owner and the Contractor. The Contractor will be responsible for making these cylinders and for seeing that they are transmitted to a testing laboratory.

3. All four cylinders shall be handled and cured in accordance with ASTM C31. The cylinders shall then be transported to the testing laboratory and cured in air at 73 degrees F, 50 percent relative humidity. Two cylinders
shall be tested for compressive strength at seven days and two at 28 days. One cylinder shall be stored for potential future testing.

4. For each set of cylinders made, a slump and air content test shall also be made. The temperature of the concrete shall be taken at the same time cylinders are made. Slump tests shall be made in accordance with ASTM C143. Air content tests shall be made in accordance with ASTM C231.

5. Testing of cylinders shall be in accordance with ASTM C39. Each test report shall contain the following information for each set of cylinders:

(a) Individual test specimen strength, type of failure
(b) Slump
(c) Air content
(d) Concrete and air temperature
(e) Specimen number
(f) Portion of structure represented by the concrete tested
(g) Date cast
(h) Date tested
(i) Concrete properties specified
(j) Notice if tests indicate concrete is not in conformance with specifications

6. Strength shall be considered satisfactory if the average of the two 28-day tests meets or exceeds 4,000 psi, and neither of the 28-day tests is below 3,500 psi.

7. After sufficient cure time, the concrete match shall be sound tested to detect delaminations or debonding within the repair area. If a delamination or debonded area is detected, the patch shall be removed and replaced at no cost to the project.

(b) Coring

1. If test results are not in conformance with specifications, the repair concrete shall be removed and replaced at no cost to the project; alternatively, the Contractor may take 3-inch diameter core samples from completed patches. This additional testing of the concrete mortar will be performed under the direction of the Architect/Engineer. The cost of these additional tests will be borne by the Contractor. If testing results are not in conformance with the specifications, the repair concrete shall be removed and replaced at no cost to the project.
(18) Section 03603 - Epoxied-in Anchors and Coating of Existing Reinforcing Bars with Epoxy

PART 1 – GENERAL

(1) Work included

(a) This work shall consist of providing the necessary labor, materials, equipment and supervision to install epoxied-in anchors and to epoxy coat existing exposed reinforcing bars.

(b) Definition

1. Epoxied-in anchor: The completed composite of reinforcing bar or stainless steel dowel surrounded by epoxy within the drilled hole.

(2) Standards and quality assurance

(a) Applicator qualifications

1. The Contractor shall have 2 years of experience in performing work similar to that shown on the Drawings and described in these specifications.

2. An on-site supervisor shall be provided by the Contractor for the duration of the epoxied-in anchor work. This supervisor shall have had 2 years documented supervisory experience with the products to be used.

(b) Source quality control

1. The material supplier shall provide (via the Contractor) the following test data for each production run or batch of epoxy formulation to be used:

   a. Tensile strength by ASTM D638
   b. Elongation at break by ASTM D638
   c. Flexural strength by ASTM D790
   d. Flexural modulus by ASTM D790
   e. Compressive yield strength by ASTM D695
   f. Compressive modulus by ASTM D695
   g. Heat deflection temperature by ASTM D648
   h. Slant shear by AASHTO 237

(c) Allowable tolerances:
1. The epoxied-in dowels shall be installed such that the ends of dowels and the clear concrete cover fall within +0 and -1/4 inch of that specified.

(3) Submittals

(a) The Contractor shall submit the following to the Architect/Engineer:

1. Technical data sheets for each epoxy product or formulation to be used showing that his products meet the requirements of the specifications. Technical data shall include:
   a. Intended use
   b. Pot life (neat)
   c. Initial cure time (1,000 psi)
   d. Tack free (thin film)
   e. Final cure (75 percent ultimate strength)
   f. Tensile strengths by ASTM D638 (14 days)
   g. Tensile elongation by ASTM D638 modified (14 days)
   h. Flexural strength and modulus per ASTM D790 at 24 hrs, 3 days, and seven days at 77 degrees Fahrenheit
   i. 24-hr compressive strength by ASTM C109 modified (1 part epoxy to 3-1/4 parts aggregate)

(4) Product delivery

(a) The product shall be delivered and handled according to the manufacturer’s recommendations.

(b) Damaged, open containers shall not be used.

(5) Job conditions

(a) Existing and environmental conditions: The Contractor shall examine the condition of surfaces where epoxied-in anchors are required. He shall follow the recommendations of the manufacturer with regard to limitations of the materials in various moisture and temperature conditions.

PART 2 – PRODUCTS

(1) Materials

(a) Epoxy for anchors: The epoxy shall be Conressive 1420 as manufactured by Master Builders, Cleveland, Ohio, or an approved equal.
(b) Epoxy coating for steel reinforcing bars shall be “Emaco P22,” as manufactured by Master Builders, Cleveland, Ohio; “Nitroprime Zinchrich,” as manufactured by Fosroc, Inc., Georgetown, Kentucky, or an approved equal.

(c) Stainless steel anchors - Type 304 1/4-inch diameter stainless steel threaded rods cut and bent to shapes indicated on Drawings.

1. Minimum yield strength - 30 ksi
2. Minimum tensile strength - 75 ksi

PART 3 – EXECUTION

(1) Inspection

(a) Examine surfaces where epoxied-in anchors are to be installed for unsound concrete that would adversely affect the execution and quality of work.

(b) Where such conditions are found, notify the Architect/Engineer and proceed with work at other locations.

(2) Preparation

(a) Lay out the locations of epoxied-in anchors according to the Drawings and Special Specifications.

(b) The Contractor shall use a magnetic detector, (i.e., James instruments “R-meter,” or equal) to avoid drilling into existing embedded reinforcing.

(c) No existing reinforcing shall be cut or removed without written approval of Architect/Engineer.

(3) Installation of stainless steel anchors

(a) Drilling holes:

1. Holes shall be dry-drilled using either percussive or rotary machines.

2. Dry-drilled holes shall be blown out using oil-free compressed air to remove all loose concrete debris.

3. Holes shall be approximately 1/8-inch diameter larger than dowel diameter.

(b) Stainless steel anchors shall be dry and free from contaminants, such as dirt, oil, and grease.

(c) Proportioning and mixing:

1. Mix the components of the epoxy in proper proportions according to the manufacturer’s directions. Scrape out the entire contents of both cans to assure accurate proportions.
2. Mix the contents with a paint stirrer attached to a low-speed (400-600 rpm) electric or pneumatic drill for about three (3) minutes. Move the stirrer up and down and around the sides until an even streak-free color is obtained. Do not whip in air.

(d) Installation:

1. The epoxied-in anchors shall be installed by batch mixing and injection of a pre-measured quantity of epoxy to the back of the hole and insertion of the stainless steel anchor.

2. The method of installation is intended to achieve 100 percent filling of the annular space between the anchor and the drilled hole.

(4) Field coating existing reinforcing bars with epoxy

(a) Exposed reinforcing bars shall receive two coats of epoxy, which fully covers the bar with no pinholes or holidays. A touch-up coat shall be applied if pinholes or holidays remain after the second coat. The dry film thickness of the coating shall be approximately 10 to 12 mils.

(5) Clean-up

(a) The epoxied-in anchors shall be cleanly installed and squared up as shown on the Drawings. Excess epoxy shall be cleaned up. Wood shims shall be removed.

END OF SECTION
Section 04100 – Mortar

PART 1 – GENERAL

(1) Description: The work of this Section consists of furnishing and installing mortar and grout for concrete masonry, including the following:

   (a) Mortar for setting stones.
   (b) Mortar for pointing joints (two colors).
   (c) Latex-modified mortar for setting stone approach step units

(2) Related work specified elsewhere:

   (a) Section 04460 – Masonry Repair
   (b) Note that grout for setting stainless steel pins is covered in Section 04460.

(3) Submittals

   (a) The following shall be submitted in accordance with Section 01300, Contractor submittal procedures:

      1. Manufacturer’s literature: Materials description for all materials to be used for the work.
      2. Certifications: Prior to delivery, submit to the Owner manufacturer’s certification that materials and products meet specified requirements.

   (b) Submit to Owner laboratory analysis of original setting and pointing mortar selected by the Architect/Engineer identifying all components and showing composition and proportions of three representative mortar samples. Indicate in analysis the locations from which samples were removed. Information from analysis shall be used in adjusting the mortar mix.

   (c) Submit to Owner reports of tests conducted by an independent testing laboratory certifying that mortar meets specified requirements of ASTM C270-92. Testing will be at no additional expense to the project.

   (d) Samples

      1. Submit to Owner samples of dry mortar materials.
      2. Provide three (3) samples of each color of mortar, matching the existing in color, strength, and texture. Before work commences, the sample shall be approved by TxDOT and the Owner. The approved sample shall be the standard for the work.
      3. Provide a sample of preparing and pointing joints in accordance with Section 04460.
(4) Qualifications and standards

(a) Except as modified by the Special Specifications, cited reference standards or applicable portions thereof shall govern the work.

(b) Delivery, storage, and handling

1. Deliver materials to the job site in manufacturer’s sealed packaging and store unopened until required for use. All material shall be delivered, stored and handled so as to prevent deterioration or the intrusion of any foreign matter. Packaged material shall be delivered and stored in the original packages. Materials in broken packages or showing evidence of damage will be rejected.

2. Storage: Store cementitious materials in a dry area, under cover, and off the ground. Store packaged materials above ground on platforms permitting air circulation under materials. Completely cover all materials to protect from weather, moisture and neglect.


PART 2 – PRODUCTS

(1) Setting and Pointing Mortar Materials

(a) Portland cement: ASTM C 150-94, Type I, non-staining without air entrainment. White cement mixed with gray cement may be used to obtain color match of new pointing mortar to original mortar.

(b) Sand for mortar: ASTM C 144-91, to match sand in original mortar in color and texture. The original mortar tested from samples on the monument shaft was finely graded and contained quartz sand predominantly. Contractor shall confirm through mortar analysis the type of sand present at the Shaft Base, Museum Walls, Terrace Walls, and Approach Stairs.

(c) Lime: ASTM C 270-94, Type S, fine hydrated lime, non-air entrained.

(d) Water: Clean, potable.

(e) Masonry cement shall not be used.

(f) No additives or accelerators shall be used in any mortar and grout at any time.

(g) Mortar colorants: If color match to original pointing mortar cannot be obtained through mixing white and gray Portland cement, Contractor may use colorants in mortar. Prior submittal of colorant manufacturer’s literature and written certification of appropriateness of colorant for use in mortar and of proposed
proportions of colorant in mix design is required, together with approval of this
submittal by TxDOT and Owner, before beginning work. Use colored mortar
pigments made from metallic oxides. Use the minimum quantity of pigments that
will produce the desired results; an excess may seriously impair strength and
durability. The maximum permissible quantity of most metallic oxide pigments is
about 10 to 15 percent of the cement content by weight. Limit the use of carbon
black pigments to 2 to 3 percent of cement by weight. For best results, premix
color pigments with Portland cement in large, controlled quantities to obtain
uniform color.

(2) Latex-Portland Cement Mortar:

(a) ANSI A118.4, consisting of styrene butadiene rubber or acrylic latex liquid, and
manufacturer’s packaged dry mortar mix, for mixing at the job site, recommended
by manufacturer for application indicated.

(1) Shear bond strength of 500 psi minimum

(2) 28 day compressive strength of 4,500 psi minimum

(3) Water absorption 4 percent maximum

(4) Product: Subject to compliance with requirements, acceptable products
include the following:

(b) Thick bed mortar (2” nominal bed thickness)

(1) Laticrete 3701 Grout and Mortar Admix and Laticrete 226 Thick Bed
Mortar Mix by Laticrete International, Inc., or Mapei Mapecem Premix and
Kerabond with Kerlastic by Mapei Corp.

PART 3 – EXECUTION

(1) Mortar mixes

(a) ASTM C270-94 Type N mortar with the following material mix proportioned by
volume:

1. Portland cement: 1 part
2. Hydrated lime: 1 part
3. Sand: 6 parts

(b) Mortar colors: Pointing mortar shall be mixed to two colors, as determined by
samples. Color No. 1 shall match existing mortar joints, and Color No. 2 shall
match the aged appearance of the Texas Cordova Shellstone. These mortar colors
shall be used at locations as indicated on Drawings.

(c) Mortar mixing
1. Setting mortar: Mix all cementitious materials, aggregate and water in mechanical batch mixer using the amount of water to produce a workable consistency. Retemper only as necessary for the required consistency. Add water to replace that, which has evaporated. All mortar must be placed within one hour after initial mixing.

2. Pointing mortar: Pre-hydrate pointing mortar by thoroughly mixing all the dry ingredients. Then, mix again adding only enough water to produce a damp, unworkable mix, which will retain its form when, pressed into a ball. After keeping mortar in this dampened condition for one to two hours add enough water to bring it to proper consistency. Mortar may be retempered by adding water and remixing, as required for workability. Do not use mortar if more than one hour has elapsed since the pre-hydration of mortar has been completed.

(d) Do not use any admixtures or accelerators in mortar.

(e) Do not proportion mortar and grout mix by shovels. Use a 1 cubic foot box or other device to insure that mortar and grout are properly proportioned in accordance with requirements specified.

(2) Repointing

(a) All repointing shall be in accordance with the Brick Institute of America Technical Bulletin No. 7F or herein specified.

(b) Removal of existing mortar:

1. Removal of existing mortar shall be through the use of hand tools. No power-operated tools will be allowed in the removal of existing mortar without prior written approval by the Architect/Engineer.

2. At locations indicated on the Drawings, cut out and remove 100 percent of the mortar in the joints to a depth of at least 3/4-inch. Remove additional mortar, if it is found to be unsound. Mortar joints prepared for repointing shall be uniform depth and square without grooves or indentations from grinding procedures, and shall have no steps at intersection of head to bed joints. Removal of existing mortar shall not widen the existing mortar joint width or alter the joint edges. When cutting is complete, remove all loose material with a brush and compressed air. Care shall be taken during cutting not to damage the stone units.

(c) Contractor should verify relative hardness of the existing mortar prior to commencing with work. Appropriate equipment should be provided by the Contractor to properly remove the mortar without damage to adjacent units. Hand chisels and special-grinding blades may be required to remove the mortar as specified.

(d) When removal of mortar joints is complete, all of the voids in the mortar joints shall be filled solid up to the adjacent cut mortar joint or up to 3/4-inch depth.
from the face of the stone. The filled mortar joints shall be cured at least 24 hours before applications of repointing mortar.

(e) Repointing mortar shall be in compliance with the following procedure:

1. Pre-hydrate the mortar to thoroughly mixing all the dry ingredients; then, mix again adding only enough water to produce a damp, workable mix which will retain its form when pressed into a ball. After keeping mortar in this dampened condition for 1 to 1-1/2 hours add enough water to bring it to proper consistency. Mortar may be retempered by adding water and remixing, as required for workability. Do not use mortar if more than 2 1/2 hours has elapsed since the pre-hydration of mortar has been completed.

2. Do not use frozen materials mixed with or coated with ice or frost. When temperature or surrounding air is 40 degrees Fahrenheit and falling take precautions to protect masonry materials from freezing. Comply with the Article applicable to “Cold Weather Construction Recommendations” BIA Technical Note 1, March 1992.

3. Do not lower the freezing point by use of admixtures or antifreeze agents. Do not use calcium chloride in mortar. Do not add air-entraining agents or other admixtures to mortar.


5. Wet the mortar joints to be repointed thoroughly before applying fresh mortar. Allow water to soak in so there is no freestanding water. Do not wet mortar joints using pressurized water; apply water-using brush or hand held spray bottles. Contractor shall monitor interior of building for signs of uncontrolled water that enter the structure as a result of this procedure, and be responsible for repairing any damages to interior of building as a result of water damage, at no cost to the project. If water enters the interior of the structure, Contractor shall modify procedure of wetting joints as necessary to prohibit water entry into building.

6. Pack the mortar tightly into the joint in thin layers, three layers minimum (1/4-inch maximum layer thickness). Allow each layer to become thumbprint dry before applying next layer. Completely fill any voids or holes, except weepholes with mortar.

7. Tool joint to concave profile. Wipe off all excessive mortar as the work progresses. Dry brush at the end of each day. Do not allow excess mortar to harden on stone surfaces.

(3) Clean-up

(a) At the conclusion of masonry work, remove all equipment and surplus material used for mixing mortar, clean up all debris and refuse and remove same from the site.
(20) Section 04460 - Stone Repair

PART 1 – GENERAL

(a) Description:

(a) Repairs for distressed stone:

1. Repairs for distressed stone at Shaft Base
   a. Installation of stone dutchman repairs at areas of distressed stone on ashlar masonry
   b. Installation of new mortar patches on ashlar masonry
   c. Repointing of mortar joints on ashlar masonry
   d. Routing of cracks and installation of pointing mortar on ashlar masonry
   e. Installation of stainless steel anchors at areas of distressed stone on ashlar masonry
   f. Repairs to incised lettering, including the following:
      1) Stone dutchman repairs at incised lettering
      2) Installation of mortar patches at incised lettering
      3) Repointing of selected mortar joints adjacent to incised lettering
      4) Carving of existing mortar patches and mortar joints to reveal incised lettering detail
   g. Installation of stone dutchman repairs at areas of distressed stone on ornamental bas-relief frieze panels
   h. Installation of new mortar patches on ornamental bas-relief frieze panels
   i. Repointing of mortar joints on ornamental bas-relief panels
   j. Routing of cracks and installation of pointing mortar on ornamental bas-relief frieze panels
   k. Routing of cracks and installation of sealant and backer rod on ornamental bas-relief frieze panels
   l. Installation of stainless steel anchors at areas of distressed stone on ornamental bas-relief frieze panels

2. Repairs for distressed stone at Museum Walls
a. Installation of stone Dutchman repairs at areas of distressed stone on ashlar masonry
b. Installation of new mortar patches on ashlar masonry
c. Repointing of mortar joints on ashlar masonry
d. Routing of cracks and installation of pointing mortar on ashlar masonry
e. Routing of cracks and installation of sealant and backer rod on ashlar masonry
f. Installation of sealant and backer rod at stone/concrete paving joints
g. Installation of stainless steel anchors at areas of distressed stone on ashlar masonry
h. Repairs to incised lettering, including the following:
   1) Stone dutchman repairs at incised lettering
   2) Installation of mortar patches at incised lettering
   3) Repointing of selected mortar joints adjacent to incised lettering
   4) Minor carving of existing mortar patches and mortar joints to reveal incised lettering detail
i. Installation of stone dutchman repairs at areas of distressed stone on ornamental stone carvings

3. Repairs for distressed stone at Terrace Walls
a. Reset existing stone coping units at Upper and Lower Terrace Walls.
b. Installing new stone coping units at selected locations of Upper and Lower Terrace Walls.
c. Installing new stone units at selected locations at Upper and Lower Terrace Walls with new stainless steel anchor system
d. Installation of new stainless steel anchors at selected locations on the Upper and Lower Terrace Walls.
e. Installation of expansion joints at selected locations on the Upper Terrace Walls
f. Repairs to cracks in the structural reinforced concrete retaining wall at the Upper Terrace Walls.
g. Repairs to cracks in the structural reinforced concrete retaining wall at the Lower Terrace Walls.
4. Repairs for distressed stone at steps
   a. Installation of new stone units with latex-modified mortar mix.
   b. Installation of new dutchman stone units.
   c. Installation of new mortar patches.
   d. Repointing of mortar joints.

(2) Related work
   (a) Section 04100 – Mortar
   (b) Section 07600 - Sheet Metal and Flashing
   (c) Section 07900 – Sealants

(3) Quality assurance
   (a) Except as modified by the Drawings and Special Specifications, all stone material
       and installation shall be in accordance with the latest edition of Indiana Limestone

(4) Submittals and samples
   (a) In accordance with Section 01300:

1. The Contractor shall submit five (5) 12 inch x 12 inch x 2 inch thick stone
   samples and five (5) copies of stone fabricator’s literature and test results
   showing that the stone is in accordance with that specified. Samples shall
   show full range of stone color, texture, and finish, to match existing stone.
   Approved samples shall be the standard for visual appearance of new stone.
   The Project Inspectors and Architect/Engineer reserve the right to reject
   samples that do not meet approved visual appearance.

2. The Contractor shall submit five (5) sets of shop drawings for the new
   stonework. Shop drawings shall show new stone units, including joints,
   types and locations of anchorage, and installation sequence. Approval of
   shop drawings will be for details and arrangements of the various parts and
   shall include details of all anchorage methods. Contractor shall verify all
   necessary and required job dimensions. Shop drawings shall be provided for
   all stone types and sizes shown on drawings.

3. The Contractor shall submit five (5) 12 inch x 12 inch x 2 inch thick new
   stone samples with examples of incised letters similar to those present on
   the Museum Walls and Shaft Base. Samples shall show the skill of the
   masons to perform the repair work on the incised letters on the Museum
   Walls and Shaft Base. Within each sample panel there shall be a stone
   dutchman repair similar to those typically called for on the Drawings.
   Approved samples shall be the standard for visual appearance of new stone
   carving and dutchman repairs to the incised letters. The Project Inspectors
and Architect/Engineer reserves the right to reject samples that do not meet approved visual appearance.

4. The Contractor shall submit three (3) 18 inch by 18 inch by 4-inch thick new stone samples with examples of carved features present on the sculptural bas-relief frieze on the Shaft Base. The samples shall replicate three different sections of existing frieze panels based on locations selected by the Architect/Engineer and shall include such features as hands of figures, portions of faces of figures, arms or bodies of figures, and background grooving. Within each sample panel there shall be a stone dutchman repair similar to those typically called for on the Drawings. Approved samples shall be the standard for visual appearance of new stone carving and dutchman repairs to the bas-relief frieze. The Project Inspectors and Architect/Engineer reserves the right to reject samples that do not meet approved visual appearance.

5. The Contractor shall submit three (3) 12 inch by 12 inch by 2 inch thick new stone samples with examples of water blasted finishing of sawn-finish stone for used on dutchman repairs and new stone units on the approach steps.

(b) Field samples:

1. Prior to installation of the stone, install two samples of each repair type specified herein, representative of the proposed stonework in color, design and texture.

2. Samples shall be located at a location selected by the Architect/Engineer in cooperation with the Contractor.

3. Work shall not proceed prior to approval of samples has been approved by TxDOT and the Owner.

4. Protect approved samples for reference during the work. The approved samples shall be the standard for all work, and will be incorporated into the work upon completion.

5. At dutchman repairs to the sculptural frieze on the Shaft Base, Contractor shall allow the Project Inspectors to approve each fabricated stone dutchman prior to placement. This approval shall be to confirm the selection of the stone dutchman in color, design, shape, and texture.

(c) The Contractor and stone supplier shall provide TxDOT and the Owner with results of tests certifying that the stone supplied for use on the building has the required properties as specified herein.

(d) The cut stone supplier shall prepare and submit to TxDOT and the Owner for review complete cutting and setting drawings for all of the stone work. Such drawings shall show in detail the sizes, sections, and dimensions of stone, the arrangement of joint locations, anchoring and other necessary details. All jointing as shown on the Drawings shall be followed, unless modifications are agreed
upon in writing by the Owner, Architect/Engineer, and Contractor or indicated upon the approved shop drawings.

(e) For stainless steel threaded rods, submit the following:
   1. One, 1 foot long sample of each diameter of rod required for project.
   2. Manufacturer’s certification that rods are Type 316 stainless steel, meet the requirements of ASTM F 593, condition CH 1, and are suitable for project use.
   3. Manufacturer’s product literature and specifications.

(f) For stainless steel bent plate anchor assembly submit one example of each type of proposed system including anchor, bent plate and pin.

(g) For stainless steel helical anchors, one, 1 foot long sample of each diameter of anchor required for the project.

(h) For latex modified grout, submit the following:
   1. Manufacturer’s product literature and specifications.
   2. Three samples of grout installed with stainless steel rod and cured in accordance with specification, showing workmanship of installation, color match to existing stone, and visual consistency of work. Samples may be prepared on new or salvaged stone from this project. Do not proceed with grouting work prior to Owner’s approval of samples. Approved samples shall be standard for all grouting work.

(i) For latex modified mortar patching mix:
   1. Manufacturer’s product literature and specifications.
   2. Three samples of mortar patching mix installed in sample of existing flat stone unit as obtained from the Owner. Samples shall be cured in accordance with specification, showing workmanship of installation, color match to existing aged appearance of stone, and visual consistency of work. Approved samples shall be standard for all mortar patching work.
   3. Three samples of mortar patching mix, installed in mockup of incised letter as fabricated by the Contractor from existing stone units obtained from the Owner. Samples shall be cured in accordance with specification, showing workmanship of installation, color match to existing aged appearance of stone, and visual consistency of work. Approved samples shall be standard for all mortar patching work.

(j) For epoxy resin for coating existing steel to remain, submit the following:
   1. Manufacturer’s product literature and specifications.

(5) Testing
(a) General:
1. The cost of all testing is to be included in the base bid.
2. Provide one original and five copies of all test results to TxDOT and the Owner.

(b) Stone:
1. Provide test results on stone removed from quarry for use on this project, prior to beginning work, showing those materials requirements specified herein.
2. Perform one round of ASTM tests for every tenth block quarried for this project, showing those materials requirements specified herein. If less than thirty (30) blocks of stone are quarried during the project, a minimum of three rounds of testing shall be performed.

(c) New stainless steel expansion anchor shall be tested as follows prior to acceptance to use:
1. Three (3) anchors for each type and size of anchor used shall be installed into the concrete wall and tested in direct pullout to failure.

(d) New stainless steel helical anchors shall be tested as follows prior to acceptance to use:
1. Three (3) anchors for each type and size of anchor use shall be installed into new and existing stone substrates and tested in direct pull-out to failure. The stone substrates shall be representative of the size, thickness, and shell void consistency and density as the stone to receive helical anchors. New stone material shall be provided by the Contractor. Existing stone material is available from the Owner for use in testing. Existing stone material in place on the monument or to be reinstalled on the monument shall not be used for testing purposes.

(6) Delivery, storage and handling
(a) The Contractor shall take the necessary precautions to ascertain that the following conditions are met:
1. All new stone sections shall be received and unloaded at the site with necessary care in handling to avoid damaging or soiling.
2. All new stone sections and all original panels removed from the building and saved for reuse shall be stored clear of the ground on nonstaining skids (cypress, white pine, poplar, or yellow pine without an excessive amount of resin). Chemically treated wood should not be used. Do not use chestnut, walnut, oak, fir, and other woods containing tannin or that seep resins.
3. All stone sections and panels shall be covered with polyethylene.
4. All stone shall be stored in accordance with recommendations presented in the 18th edition of the Indiana Limestone Institute of America, Inc. Handbook.

5. All materials shall be delivered, stored and handled so as to prevent deterioration or the intrusion of any foreign matter. Packaged materials shall be delivered and stored in the original packages. Materials in broken packages or showing evidence of damage will be rejected.

(7) Project conditions

(a) Where conditions are uncovered that are not anticipated by the Drawings and Special Specifications, the Contractor shall notify the Architect/Engineer and Project Inspectors immediately before any repairs are initiated.

(b) Pointing shall be completed after or simultaneously with the execution of all stone installation. The finished appearance of areas where stone is replaced shall be similar and consistent.

(8) Protection of work:

(a) The Contractor shall cover all partially completed walls that are not sealed at joints, at the end of each working day or shutdown or when work is not in progress.

(b) The cover shall extend a minimum of 24 inches beyond each side of repairs.

(c) Cover shall be secured tightly in place. Fasteners shall not damage stone.

(d) Mortar and sealant shall be prevented from staining existing and new materials in adjacent to area of work.

(e) When the ambient air temperature is less than or is expected to be less than 40 degrees Fahrenheit, perform cold weather protection requirements recommended in the 18th edition of the Indiana Limestone Institute of America, Inc. Handbook.

PART 2 – PRODUCTS

(1) Stone

(a) New stone:

1. All stone used on project shall be new. Existing stone designated for removal shall be salvaged and stored as specified herein, but shall not be used for repairs.

2. New stone shall be Texas Cordova Shellstone. This stone is a Fossiliferous limestone from the cretaceous age, mapped in the walnut formation. The original source of the stone is no longer available. It was located three miles west of Cedar Park, Texas, on the Travis and Williamson County Line. The
source currently available is 15 miles north by northwest of the original
quarry and is eight miles southwest of Liberty Hill, Texas.

3. The color and finish of new stone shall be same as existing stone on the
monument. The stone supplier shall inspect monument to verify color and
finish of existing stone.

   a. New stone units on the Shaft Base, bas-relief frieze panels, and
   Museum Walls shall match the stone unit they replace in general
   appearance with regards to size and density of fossil voids. The surface
   texture on new stone units shall match the general surface texture of
   adjacent stone units.

   b. New stone units for dutchman repairs on the Shaft Base, bas-relief
   frieze panels, and Museum Walls shall match the surrounding stone
   unit into which they are to be in general appearance with regards to
   size and density of fossil voids. The surface texture on new stone units
   shall match the general surface texture of surrounding stone unit.

   c. Final shaping and finishing of dutchman repairs on the Shaft Base,
   bas-relief sculptural frieze panels, and Museum Walls is permissible
   after placement on the wall. Such finishing work shall not disturb
   surrounding adjacent stone units to remain.

   d. New stone units and new dutchman stone units on the Terrace Walls
   shall be sawn finish.

   e. New stone units, including dutchman repairs, on the approach steps
   shall be lightly water blasted with moderate pressure on the exposed
   surfaces prior to installation to achieve roughened surface texture.
   Water pressure shall not exceed 600 psi as measured at the pump of
   the pressure washer. Stone unit shall be allowed to dry adequately after
   being roughened prior to being placed. Criteria for roughness shall be
   determined from samples submitted by Contractor.

4. The new stone units shall match units to be replaced in length and height.
   Replacement stone thickness shall match the existing thickness of each
   course. Exact thickness of replacement stones to be confirmed by Contractor
   upon Contractor verification of field dimensions. Use of permanent shims
   will not be permitted.

5. The new stone used in repairs shall match units to be replaced in size,
   texture, and density of fossil voids.

6. New stone shall conform within the requirements of ASTM C568 for low-
   density limestone.

7. New limestone shall have the following properties:
a. Minimum ultimate compressive strength = 1,000 psi, parallel and perpendicular to the bedding plane, when tested in accordance with ASTM C170

b. Minimum flexural strength = 400 psi, when tested in accordance with ASTM C880

c. Minimum ultimate shear strength = 600 psi, parallel to the bedding plane, and = 450 psi perpendicular to the bedding plane

d. Minimum modulus of rupture = 700 psi parallel to the bedding plane, and = 450 psi perpendicular to the bedding plane, when tested in accordance with ASTM C99

e. Maximum moisture absorption = 6.5 to 7.5 percent when tested in accordance with ASTM C97

f. Specific gravity = 1.90 to 1.99

8. All stone shall be fabricated from stone that is removed from one bed in the same quarry.

9. The stone panels shall be cut with the grain of the stone running horizontally, so that when the panels are installed on the walls they will be set on their “natural bed.”

10. Contractor and cut stone supplier shall determine all field dimensions necessary for fabrication.

11. Provisions for the anchoring of stone units and placement of kerfs shall be clearly indicated on the cutting and setting drawings, and shall be in accordance with the Drawings and Special Specifications.

12. All stone panels shall be cut accurately to shape and dimensions and full to the square. All exposed faces shall be dressed true. Beds and joints shall be at right angles to the face, and joints shall have a uniform thickness of 3/8 inch unless otherwise shown or noted on Drawings.

13. Holes for anchors shall be shop- or field-drilled in stone panels without hammer action, at locations and sizes shown on the approved shop drawings.

14. Kerfs for anchors shall be shop-fabricated at locations and sizes shown on the approved shop drawings.

15. All stone installed on building shall be free of cracks, stylolites, chips, inclusions, and other defects.

(b) Salvaged stone:

1. During a earlier phase of work on the monument, portions of the original stone cladding were removed and retained by the Owner. Selected stone
units are to be utilized in repairs included in this contract. Only stone units
selected by the Architect/Engineer shall be allowed for use.

2. The stone panels shall be cut with the grain of the stone running
horizontally, so that when the panels are installed on the walls they will be
set on their “natural bed.”

3. Contractor and cut stone supplier shall determine all field dimensions
necessary for fabrication.

4. The salvaged stone units shall match units to be replaced in length and
height. Replacement stone thickness shall match the existing thickness of
each course. Exact thickness of replacement stones to be confirmed by
Contractor upon Contractor verification of field dimensions. Use of
permanent shims will not be permitted.

5. Salvaged stone used in repairs shall match units to be replaced in size and
density of fossil voids.

6. All stone panels shall be cut accurately to shape and dimensions and full to
the square. All exposed faces shall be dressed true. Beds and joints shall be
at right angles to the face, and joints shall have a uniform thickness of 3/8
inch unless otherwise shown or noted on Drawings.

7. Holes for anchors shall be shop- or field-drilled in stone panels without
hammer action, at locations and sizes shown on the approved shop
drawings.

8. Kerfs for anchors shall be shop-fabricated at locations and sizes shown on
the approved shop drawings.

9. All stone installed on the building shall be free of cracks, stylolites, chips,
inclusions, and other defects.

(c) Brick

1. New brick shall conform to ASTM C216-91c Type FBS, Grade SW, or as
approved by Owner.

2. Color and texture to match existing original brick masonry units as
determined from sample submittal.

(d) Mortar for stone, brick, and pointing

1. As specified in Section 04100.

(e) Mortar coating for patching stone

1. Custom System 45 masonry patching and compounds, Edison Coatings,
Inc., Of Waterbury, Connecticut:


c. Color as determined from color sample submittal and field mockup.

(f) Grout for setting stainless steel rods

1. Latex modified grout:
   a. Unsanded floor grout, TA-610 - H.B. Fuller
   b. Acrylbond acrylic latex additive TA-869 - H.B. Fuller
   c. Color of grout shall match existing stone and be as determined in approved samples.
   d. Grout curing cover shall be kraft paper.

(g) Connections

1. Stainless steel threaded rods, 1/4 and 3/8-inch diameters, lengths as shown on Drawings. Stainless steel shall be Type 316, in accordance with ASTM F 593, condition CW1 minimum $F_y = 30$ ksi.

2. Bent plate supports, bent plates, bent plate straps shall conform within ASTM A 276, Type 304. Size and thickness as shown on the Drawings.

3. Stainless steel expansion anchors: Type 304 stainless steel diameter and length as indicated on Drawings. Manufacturer: Hilti, Inc., or approved equal.

4. Stainless steel helical masonry anchors: Type 316 stainless steel dry-set masonry repair anchors, 4.5 mm and 10 mm diameters, lengths and diameters as shown on Drawings, as manufactured by Blok-Lok Ltd., Weston, Ontario, Canada.

(h) Sealants

1. As specified in Section 07900.

(i) Epoxy resin

1. For coating exposed wire ties and miscellaneous steel to remain in place: Series 50-330 Poly-Ura-Prime, as manufactured by Tnemec Company, Inc., Kansas City, Missouri.

PART 3 – EXECUTION

(1) Inspection
(a) When repairs commence in a particular area of the building, the Contractor shall notify the Architect/Engineer and Project Inspectors, who will inspect the work area with the Contractor or the Contractor’s representative. At this time, the Architect/Engineer will discuss the scope of work and review quantities, locations, and methods of the specified repairs.

(b) Field verify all dimensions for replacement stones prior to proceeding with fabrication and installation.

(2) General

(a) Installation of stone units

1. All stone units shall be installed plumb, square and true to line, with face of replacement unit flush with face of adjacent units.

2. All stone units shall be installed with anchors as shown on Drawings.

3. All stone units shall be adequately secured at the end of each working day.

4. Install and set all stone units with head and bed joints completely filled with mortar. After mortar achieves its initial set, rake all mortar joints back 3/4 inch.

5. Tolerances for new stone installation: Face of new units shall not vary more than +/- 1/8 inch from face of adjacent units.

6. Point raked mortar joints in and adjacent to newly installed stone panels with mortar as specified in Section 04100.

7. Install new compressible filler, backer rod, and sealant at locations shown on the Drawings, in accordance with Section 07900.

(b) Installation of stainless steel rods

1. Provide and install new stainless steel rods in stone units at locations shown on Drawings.

2. Shop- or field-drill holes in stone panels without hammer action, at locations and sizes shown on the approved shop drawings.

3. Thoroughly mix Acrylbond mixing liquid with dry floor grout mix in the following proportions by volume: 1 part Acrylbond mixing liquid to 4 parts dry floor grout mix. Mix only as much grout as can be used in 45 minutes.

4. If grout mix is difficult to place, do not proceed with the grouting work. Notify Architect/Engineer’s Project Inspectors immediately.

5. Do not retemper grout.

6. Discard any grout that is not used within 45 minutes of mixing.
7. Dampen stone surface in and adjacent to hole by lightly spraying surfaces with water.

8. Carefully place grout in hole until the hole is filled.

9. Install stainless steel rod in grouted hole. Adjust rod in hole to consolidate grout and prevent entrapment of air.

10. Immediately clean any excess grout from surface of stone at rod locations before grout sets.

(c) Installation of stainless steel helical anchors

1. Shop- or field-drill entry hole for helical anchor through stone dutchman repair prior to installation. Drilling shall be without hammer action. Entry holes shall be sized according to the manufacturer’s recommendations for the diameter of anchor called out on the Drawings.

2. Drill entry hole for helical anchor into stone substrate after setting stone dutchman repair. Drilling shall be without hammer action. Entry holes shall be sized according to the manufacturer’s recommendations for the diameter of anchor called out on the Drawings.

3. Install the helical anchor into entry hole according to manufacturer’s recommended procedures.

4. Prepare latex modified grout. Thoroughly mix Acrylbond mixing liquid with dry floor grout mix in the following proportions by volume: 1 part Acrylbond mixing liquid to 4 parts dry flow grout mix. Mix only as much grout as can be used in 45 minutes.

5. Dampen stone surface in and adjacent to hole by lightly spraying surfaces with water.

6. Point anchor holes in the stone using latex modified grout.

(d) Repairs for distressed stone conditions

1. Repairs for distress conditions typically include measures that repair any existing stone that is cracked, delaminated, spalled or otherwise showing signs of deterioration. The work generally involves removal and replacement of the distressed stone.

   a. Remove existing distressed stone masonry and/or existing mortar patches and install new stone Dutchman at the Shaft Base

   b. Remove existing distressed stone masonry and/or existing mortar patches at the sculptural frieze at the Shaft Base and install new stone Dutchman

   c. Remove existing distressed stone masonry and/or existing mortar patches at the Museum Walls and install new stone Dutchman
d. Remove existing distressed stone masonry and/or existing mortar patches in the region of the incised letter on the Museum Walls and install new stone Dutchman

e. Remove existing distressed stone masonry and/or existing mortar patches at the Upper and Lower Terrace Walls and install new stone Dutchman

f. Remove existing coping unit and install new stone coping unit at the Upper and Lower Terrace Walls

g. Remove existing distressed stone masonry and/or existing mortar patches at the Upper and Lower approach steps and install Type 1 (small) stone Dutchman

h. Remove existing distressed stone masonry and/or existing mortar patches at the Upper and Lower approach steps and install Type 2 (large) stone Dutchman

i. Remove existing distressed stone unit at the Upper and Lower Terrace Walls and install new stone unit

2. Crack repair

   a. Equipment/tools for crack repairs shall be limited to:

      1) Mortar repair

         a) Rout out cracks to depth of 3/4 inch.

         b) Point cracks with mortar.

3. Sealant repair

   a. Rout out cracks to depth of 3/4 inch.

   b. Install backer rod and sealant

4. Repairs at mortar patch locations

   a. Repairs for distress conditions typically include removal and replacement of existing mortar patches and installation of new mortar patches.

      1) Remove existing mortar patches at the Shaft Base and install new mortar patches

      2) Remove existing mortar patches at the sculptural frieze on the Shaft Base and install new mortar patches

      3) Remove existing mortar patches on the Museum Walls and install new mortar patches
4) Install new mortar patches at the approach steps

b. Edison coatings custom system 45

1) Bond coating mix (parts by volume):
   a) Part “A”: 1 part
   b) Potable water: 1 part
   c) This liquid mixture added at a concentration of 2 to 2 1/2 oz. per pound of Part “B” to produce a thick slurry bond coat.

2) Mortar coating mix:
   a) Part “A”: 3 oz.
   b) Part “B”: 1 lb.

3) Preparation:
   a) Stone substrate shall be sound, clean, and free of all dirt, oils, grease, fungus, biological growth, and other chemicals that could impede bond.
   b) Lightly sandblast then airblast area to receive mortar coating.
   c) Additional surface preparation as recommended by the manufacturer.

4) Application:
   a) Pre-wet stone substrate with clean, potable waters, allowing water to absorb and dry slightly so that no standing water is present.
   b) Mix bond coat liquids (Part “A” and potable water), and then mix this liquid with Part “B” powder at the ratio given in part 1 of this Section. Scrub bond coat onto substrate.
   c) Mix custom system 45 Part “A” acrylic emulsion with Part “B” cement-based blend using proportions and mixing procedures recommended by the manufacturer. Use manual or low speed mixing. Specific mix proportions shall be determined during field mockups. Recommended proportions are 3 oz. Part “A” per pound of Part “B.” Apply mortar mix to bond coat while bond coat is still semi-plastic.
d) Cure patches by covering with plastic sheeting for 48 hours. Patches that become exposed after less than 48 hours shall be redone. Allow to air cure after 48 hours.

e) Clean up any mortar droppings from surrounding surfaces and elements. Mortar droppings that land on lead coated copper flashing shall be carefully removed to prevent scratching of the lead coating.

5. Pointing

a. Removal of existing mortar shall be by the use of hand tools. Power-operated tools shall not be utilized unless approved in writing by the Architect/Engineer.

b. For joints up to 3/8 inch in width, rake out mortar joints to a depth of at least 3/4-inch. If joint width is greater than 3/8 inch, rake out joint to a depth equal to twice the width of the joint.

c. Remove additional mortar if it is found to be unsound. Report condition to Architect/Engineer and Project Inspectors.

d. Remove any traces of mortar at joint interface to be repointed.

e. When raking is complete, remove all loose material with a brush.

f. Care shall be taken during cutting not to damage the masonry units. No chipping or breakage shall occur to adjacent units, and the joint width shall not be increased, as a result of the mortar removal.

g. Dampen the joint to be repointed prior to repointing. The masonry must absorb all surface water.

h. Pack the mortar tightly into the joint in thin layers (1/4-inch maximum layer thickness). Allow each layer to become thumbprint dry before applying next layer.

i. Tool joint to profile to match adjacent existing masonry, and as shown in approved sample installation.

6. Installation of New approach Step Stone Units

a. ANSI Installation Standard: Set stone to comply with applicable parts of ANSI 108 series of tile installation standards included under “American National Standard Specifications for the Installation of Ceramic Tile”.
b. Install stone to comply with requirements of TCA “Handbook for Ceramic Tile Installation” installation method TCA F112 (bonded) to the extent applicable and with mortar manufacturer’s instructions. Tool grout to a uniform slightly concave profile.

c. Thick Bed Mortar

1) Verify that allowance for nominal bed thickness of 2 in. has been made.

2) Apply latex-Portland cement mortar with flat trowel as a slurry bond coat approximately 1/16” thick.

3) Place latex-Portland cement thick bed mortar over slurry bond coat while bond is wet and tacky.

4) Screed mortar bed level and provide correct slopes to drains and in accordance with target elevations on drawings.

5) Spread latex-Portland cement mortar with flat trowel over surface of “green”/fresh mortar as a slurry bond coat approximately 1/16 in. thick.

6) Apply slurry bond coat to back of stone paver just prior to placing each unit.

7) Place stone paver while slurry bond coats are wet and tacky.

8) Align pavers to provide a consistent 1/4 inch joint width, plus or minus 1/16 inch and beat with a hardwood block or rubber mallet to level/imbed paver before mortar bed takes initial set.

9) The paver placement shall be carefully monitored with a string line or other means to maintain straight and accurate joints. No joint shall vary from straight by more than 3/8 inch in 10 feet or 3/4 inch in 30 feet.

10) No more than 10 percent of the joints in a 30 feet line shall have widths outside of the specified range and no individual joint shall be greater than 5/16 inch.

11) Clean excess mortar/adhesive from tile surfaces with we cloth or sponge while mortar is fresh.

END OF SECTION
(21) Section 04500 – Masonry Paint Removal

PART 1 – GENERAL

(1) Work included

(a) The work in this Section includes all labor, materials, equipment, and services to complete the following:

1. Application of cleaning test samples.
2. Removal of paint from exterior brickwork.
3. Provide access to all areas of work during cleaning for inspection by Architect/Engineer.

(2) Quality assurance

(a) Contractor Qualifications:

1. Contractor performing this work must have at least five- (5) year's experience in the cleaning of masonry.
2. Supervisory personnel shall have not less than three- (3) year's experience in supervising this type of work. All apprentices shall be under the direct supervision of an experienced supervisor.
3. Contractor shall keep at the project site, during the period when work is being performed, a competent superintendent/working foreman satisfactory to the Owner.
4. The approved working foreman shall not be removed from the project without cause or upon prior notification of the Owner. If removal is for cause, Contractor shall submit justification in writing within 24 hours of the removal. All work will cease until a new working foreman is on site.

(b) Field Quality Control: Work in place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.

(c) Manufacturers: Materials shall be obtained only from manufacturers who will, if required, send a qualified technical representative to the project site, for the purpose of advising the Contractor of the procedures and precautions for the use of the materials.

(3) Submittals and samples

(a) The Contractor shall submit to the Owner and the Architect/Engineer with the Bid Form a list of similar masonry cleaning projects performed in the previous five- (5) years.

(b) Protection Plan: Submit to Owner three copies of a written plan describing all protection measures and systems proposed by Contractor for use during the work.
(c) Product Identification: Submit to Owner three copies of manufacturer's product literature, application instructions, and manufacturer's safety data sheets for all products used in cleaning before the work begins.

(d) Test Samples:

1. Contractor shall execute a test sample of each of the cleaning materials and methods specified herein. Sample for each chemical cleaning system shall be no less than a 100 square foot area each of brick.

2. Areas where samples are to be applied shall be selected by the Architect/Engineer in consultation with the Contractor, and shall be approved by the Owner.

3. Additional samples shall be made until an acceptable result is achieved on each material. Adjustments to dilutions and dwell times of products shall be made in accordance with limits defined in manufacturer's recommendations.

4. Cleaning samples shall be left two (2) weeks before examination and approval by the Architect/Engineer and Owner.

5. The cleaning sample(s) shall be approved by the Architect/Engineer and Owner before the commencement of the work.

(4) Job conditions

(a) Construction plant, including all equipment, material and appliances required for the completion of the work, shall be so located, laid out, constructed and operated as to provide for maximum efficiency, safety of the public and all persons employed at the site, and to prevent damage to all new and existing construction.

(b) Confine operations at site to areas permitted by laws, permits, contract, and the Owner.

(c) Contractor shall assume full responsibility for protection and safekeeping of products stored on premises, and for their proper use.

(d) The Contractor shall provide the Owner and Architect/Engineer with access to the building during the work at locations designated by the Owner and Architect/Engineer. Access shall be provided for random review of the work to assess quality, perform tests, and quantify repairs.

(e) Where conditions are uncovered that are not anticipated by the Specifications, the Contractor shall notify the Architect/Engineer and Owner immediately, before any repairs are initiated.

(5) Quality control

(a) Cleaning chemicals:

1. Contract shall permit the Architect/Engineer to collect samples of cleaning materials at irregular intervals, if determined to be necessary by the
Architect/Engineer. These samples will be laboratory tested to insure that the products used in the cleaning process are the same as the materials, concentrations, and solutions approved.

2. The Contractor shall provide the Architect/Engineer with access to the mixed solutions of the cleaning products at the site when so requested by the Architect/Engineer.

3. Failure to maintain the chemicals, solutions, concentrations, etc., approved shall be reason for the immediate termination of the Contract Agreement.

(b) Rinsing:

1. Contractor shall permit the Architect/Engineer to conduct tests on the cleaned and rinsed masonry surface, if deemed necessary by the Architect/Engineer. Tests will be performed at irregular intervals to determine if the Contractor is thoroughly rinsing the surface and removing all traces of the acidic and alkaline products. The pH value will be recorded before and after.

2. If the Architect/Engineer determines that the cleaning products are not being sufficiently rinsed, the Contractor shall re-rinse the effected area without any additional cost to the Owner.

(6) Protection

(a) The Contractor shall exercise caution in performing the work so as not to damage adjacent building elements. It shall be the Contractor's responsibility to protect the adjacent limestone and windows from mechanical damage due to scaffolding and other equipment.

(b) Protect windows and doors, joints, and other openings from infiltration of water into the building.

(c) In areas where chemical cleaning systems are to be applied, protect all wood and metal-framed windows and all decorative metal features include sculpture, signs, and standards from the deleterious effects of the cleaning process.

(d) Protection from chemical cleaning systems shall be by one of the following methods:

1. Polyethylene sheets, no less than 6 mil thick, taped around the entire opening to provide an impervious barrier to the chemical cleaning process. Backing for the polyethylene sheets may be necessary to secure the sheets and provide a wind-proof, watertight system.

2. An approved strippable mask of sufficient thickness and applied without bubbles, holes, or defects to adequately protect the surface underneath.

3. Other protection as proposed by the Contractor and approved by the Architect/Engineer to provide an impervious barrier.
(e) **Samples**: Prepare a mockup of every protection system of device proposed for the protection of the non-masonry elements. The mockup shall be tested to determine its vulnerability. The Architect/Engineer shall approve the samples before the cleaning work begins.

(f) **Damage**: Any damaged materials, wood, metal, or glass that has been etched, the paint removed, or otherwise damaged, shall be repaired to the satisfaction of the Architect/Engineer without additional cost to the Owner.

(g) **Removal**: All protection materials shall be carefully and thoroughly removed. Nail holes, adhesive, etc., shall be repaired to leave the wood, metal, and glass surfaces in the same condition as that previous to the cleaning operations.

(h) **Comply with all applicable safety codes and regulations that govern the work**, including OSHA and EPA regulations covering waste water disposal.

(i) **Take any additional precautions deemed necessary by the Architect/Engineer or Owner to insure the safety of pedestrians and those working in the building.**

(j) **Paving and Sidewalk**:
   1. Protect stone steps, terraces, and concrete sidewalk same from staining or damage by the cleaning operations. Caulk or protect the joints to prevent water from penetrating the basement.
   2. If the sidewalks are damaged by the work specified herein, the Contractor shall repair it without any additional cost to the Owner.

(k) **Mechanical Damage to Masonry**:  
   1. Exercise caution in performing the work so as not to damage the masonry elements. Protect the masonry from mechanical damage due to the scaffolding, other equipment, and the cleaning operation.
   2. If any masonry elements are damaged by the execution of the work, replace the damaged units at no additional cost to the Owner.

(l) **Workers, Pedestrians, Animals, Plants, Automobiles, other property, etc.**  
   1. The work required herein includes the use of caustic and acidic materials that can harm workers and pedestrians, animals, plants, and damage other automobiles, other buildings, street furniture, etc.
   2. The Contractor shall be responsible for protecting workers, pedestrians, animals, plants, adjacent buildings, parked or moving automobiles, other buildings, street furniture, and other persons and objects that are vulnerable to damage by the cleaning operations.
   3. Any damage to adjacent buildings, automobiles, etc., caused by the cleaning operation shall be the responsibility of the Contractor and shall result in no additional cost to the Owner.
(7) Storage
(a) All cleaning products stored and used on the site shall be clearly labeled with proper warning to prevent any accidental use of the products by unauthorized persons.

(8) Scaffolding
(a) The Contractor shall be responsible for providing all scaffolding, staging, etc., required for the proper execution of the work specified herein.
(b) All scaffolding and safety equipment and their operation must comply with applicable requirements of all laws, codes, ordinances and regulations of federal, state and municipal authorities having jurisdiction over this work. The most stringent requirements shall apply.

PART 2 – PRODUCTS

(1) Materials for paint removal from exterior brick masonry:
(a) Clean, potable water. Water used for prewetting, mixing, and rinsing must have an iron content of less than two (2) parts per million, or 0.0002 percent (by weight).
(b) For paint removal: Peel-Away 7, manufactured by Dumond Chemicals, New York, New York

PART 3 – EXECUTION

(1) General
(a) The purpose of the cleaning process is to remove paint and associated dirt and contamination without damage to or disintegration of the masonry surface.
(b) The level of cleaning shall be as approved in the test samples as specified herein.
(c) The cleaner shall not damage, burn, bleach, streak, or discolor the brick surface. Cleaning shall not etch the surface or cause efflorescence of the surface.
(d) No cleaning shall take place when the surface temperature of the specific areas of the building to be cleaned is less than 50 degrees Fahrenheit.
(e) It is recognized that variations of the cleaning materials and their application may be required as the job proceeds. However, no variation will be acceptable without written approval of the Architect/Engineer.

(2) Procedure for paint removal using Peel-Away 7
(a) Application:
1. Apply Peel-Away 7 paste evenly to a thickness of 1/16 inch to 1/8 inch, using a roller and nylon brush.
2. Cover applied paste with Peel-Away fibrous laminated cloth, with printed polyethylene side facing out. Use as many one square meter cloths as required to cover test sample area.

3. Rub gently to create adhesion between cloth and paste.

4. Leave in place for 2 to 48 hours, as determined by test samples. Contractor may permit different portions of sample area to dwell for different times to evaluate required dwell time to successfully remove paint. Coordinate length of dwell times with Architect/Engineer.

(b) Removal, Rinsing, and Collection:

1. Remove by sliding Peel-Away tool or putty knife into dried paste around edges of cloth, easing paint, paste, and cloth away from the surface in one piece. Remove as much of remaining residue as possible with Peel-Away tool.

2. Collect Peel-Away cloth with paste, paint, and residue, and place in plastic bags. Properly dispose of all debris in compliance with local regulations. Retain approximately one square foot of debris (paste, paint, and residue with cloth) and provide in plastic bag to Architect/Engineer for laboratory analysis to evaluate composition of paint.

3. To remove remaining residue, mist surface lightly (50 psi or less) with water spray. Scrub with nylon bristle brush to loosen remaining residue. Rinse with low-pressure water (50 psi or less) to remove any remaining residue. Collect and dispose of residue

(3) Clean-up

(a) The premises shall be kept in clean and orderly condition at all times during the progress of the work. Rubbish, barriers, dirt, debris, tools, equipment, and unused materials shall be removed from the site each day.

(b) The sidewalk shall be thoroughly rinsed of all chemicals, dirt, pollutants, and other materials washed off the building each day.

(c) The Contractor shall remove all empty drums, cleaning materials, and the like from the site.

(d) After cleaning has been completed, remove all protection including all tape, polyvinyl sheets, strippable mask, etc. Clean all glass. Replace any glass damaged or etched during the cleaning process at no cost to the Owner.

END OF SECTION
(22) Section 05520 – Handrails and Railings

PART 1 – GENERAL

(1) Work includes

(a) Furnish all labor, materials, tools, equipment and supervision to perform all Work necessary and incidental to install new railing systems as shown on the Drawings and specified herein. Perform all Work in accordance with the provisions of the Contract Requirements and completely coordinate with the Work of other trades.

(2) References

(a) ASTM B241: Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
(b) ASTM E935: Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
(c) ASTM E985: Permanent Metal Railing Systems and Rails for Buildings.
(d) SSPC: Steel Structures Painting Manual.

(3) Design Requirements

(a) Railing assembly, wall rails, and attachments to resist current code design load requirements without damage or permanent set. Test in accordance with ASTM E935.

(b) Fabricate railing assembly, wall rails, and attachments to ASTM E985.

(4) Submittals for Review

(a) Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

(b) Samples:

1. Submit two 24 inches long samples of new handrail section

PART 2 – PRODUCT

(1) New Exterior Aluminum Railing System

(a) Rails and Posts: Extruded tubing conforming to ASTM B241.

(b) Fittings: Elbows, T-shapes, escutcheons; machined aluminum.

(c) Splice Connectors: Concealed spigot, welding collars; machined aluminum.

(d) Exposed Fasteners: Flush countersunk screws or bolts.

(e) Finish coatings to conform to AAMA 608.1.
(f) Exterior Aluminum Surfaces: power coat, color as selected by Owner

(g) Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitous or dissimilar materials.

(h) Apply thread-locking compound.

(2) Fabrication

(a) Fit and shop assemble components in largest practical sizes for delivery to site.

(b) Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

(c) Provide anchors, plates, and angles, required for connecting railings to structure.

(d) Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; except where specifically noted otherwise.

(e) Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

(f) Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

(g) Interior Components: Continuously seal joined pieces by continuous welds.

(h) Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

(i) Accurately form components to each other and to building structure.

(j) Accommodate for expansion and contraction of members and building movement without damage to connections or members.

PART 3 – EXECUTION

(1) Examination

(a) Verify that field conditions are acceptable and are ready to receive work.

(2) Installation

(a) Install in accordance with manufacturer’s instructions.

(b) Install components plumb and level, accurately fitted, free from distortion or defects.

(c) Anchor railings to structure as shown on Drawings.

(d) Assemble with spigots and sleeves to accommodate tight joints and secure installation.
(23) Section 07310 – Fiberglass Shingles

PART 1 – GENERAL

(1) Work includes

(a) Contractor shall furnish all items, materials, operations or methods listed, mentioned, indicated or scheduled in these Specifications, including all labor, materials, equipment transportation and incidentals necessary and required to perform the Work and to bring the project to completion.

(b) Base Bid:

1. Contractor shall furnish and install steep-sloped roofing consisting of fiberglass shingles and related roofing components as specified and shown on the Drawings and in this Project Manual. Work to include but is not limited to:
   a. Remove existing skylight enclosures
   b. Install new:
      1) Felt underlayment
      2) Ice and water membrane
      3) Fiberglass shingles
      4) Wood decking

(2) Related Work

(a) Specified Elsewhere:

   1. Section 07600 – Sheet Metal and Flashing
   2. Section 07900 – Sealants

(3) Qualifications of Installers

(a) Employ only experienced workmen, skilled in the installation of the specified shingles.

(4) References

(a) Cited Standards and specified manufacturer’s catalogs, current at the date of bidding documents, are incorporated herein by reference and govern the work. If conflict is discovered between the Standards or catalogs and the project specifications, request written clarification from the A/E, do not proceed with the work until receiving such clarification.

(b) Asphalt Roofing Manufacturer’s Association (ARMA), Rockville, MD 20852. “Residential Asphalt Roofing Manual”

(d) American Society for Testing Materials (ASTM)

(e) Underwriters Laboratories, Inc. (UL)

(f) APA The Engineered Wood Association, Tacoma, WA 206-565-6600

(g) Factory Mutual (FM), Norwood, MA


(5) Submittals

(a) Make all submittals in accord with Section 01300.

(b) Product Data:

1. Four (4) copies of the manufacturer’s literature for product data and showing application instructions for the specified shingles, felt underlayment, and ice and water membrane.

2. Four (4) copies of the manufacturer’s standard warranty.

(c) Samples:

1. Four (4) – 12 inch (long minimum) manufacturer’s samples showing color, texture, and construction of the specified shingles.

2. Four (4) samples each of roofing nails and other fasteners having exact gauge and length to be used.

3. Four (4) – 6 inch by 6 inch (minimum) samples of the ice and water membrane and felt underlayment to be used

(6) Delivery, Storage & Handling

(a) Deliver materials requiring fire resistant classifications packaged with labels intact and legible.

(b) Protect existing building construction and all work in place from damage resulting from the storage, preparation, handling and application of roofing materials.

(c) Keep all material dry while they are transported, stored and installed. Do not allow materials to be exposed to any moisture anywhere, at any time, during transportation, storage, handling and installation. Reject and remove from the site any new materials, which exhibit evidence of moisture during application, or have been exposed to moisture. Reject and remove from the site any material, which has moisture content more than 10 percent greater than the Equilibrium Moisture Content (EMC) at 90 percent relative humidity.
(d) Store all materials on raised platforms with weather protective coverings. The manufacturer’s standard packaging and covering is not considered adequate weather protection. Tarpaulins are preferred for protection of all roof materials. If visqueen coverings are used, venting of each package is required. Material storage procedures will be constantly monitored and strictly enforced.

(e) Handle all materials to avoid damage. Store rolled goods on ends only. Discard rolls that have been flattened, creased or otherwise damaged. Unroll membrane and allow flattening out before application.

(f) Storage of all materials shall conform to the limitations recommended by the material manufacturer including restrictions on ambient temperatures and shelf life.

(g) Materials stored on roofs shall be limited to the safe loading of structural framing, and only at locations designated and approved by the A/E and/or TxDOT. Storage of materials shall not be allowed at any locations where new roofing insulation or roofing membrane materials have been installed.

(7) Job Conditions

(a) Environmental Requirements:
   1. Perform all work under temperatures and climatic conditions recommended by materials manufacturer.
   2. Install roofing components only in dry weather.
   3. Remove only as much existing roofing material as can be protected or have new materials installed on the same day.

(b) Protection:
   1. Protect existing roof membrane, building surfaces, paving, and landscaping from traffic and roofing equipment.
   2. Restore to original condition, or replace with like materials, all work or materials damaged by the roofing operation.
   3. Remove protection materials upon completion of the work.

(8) Warranty

(a) Contractors:
   1. Two (2) years on workmanship in accordance with the Standard Document for Construction, Section 01740.
   2. Terms: Include all labor, materials and tools, equipment and service necessary for proper repair, restorations, or replacement of all new work damaged as a result of defects, imperfections, or faults in materials or workmanship.
3. Corrections of defects, imperfections, and faults shall not relieve the Contractor from his responsibility for additional corrective work during the remaining time period.

(b) Manufacturer’s Warranty: Twenty-five (25) years standard prorated.

PART 2 – Products

(1) Materials

(a) Roofing Shingles:

1. Fiberglass shingles, 3-tab, self-sealing, 12 inch by 36 inch, with a UL Class “A” and Wind Resistant label.

   a. Acceptable Manufacturers & Products:

      1) Certain Teed “XT25”
      2) GAF “Royal Sovereign”
      3) Globe “25”
      4) Owens Corning “Supreme 25 yr. Traditional”
      5) Tamko “Elite Glass Seal”

(2) Miscellaneous Sheet Metal Items: (Refer to Section 07600)

   (a) Drip Edge & Rake Edge Metal

   (b) Gutter & Downspouts: (Refer to Section 07600)

(3) Ice & Water Dam Sheet

   (a) Acceptable Manufacturers and Products:

      2. GAF “Weather Watch”
      3. Globe “Eave & valley Shield”
      4. Owens Corning “Weatherlock”
      5. Tamko Co., “Moisture guard”

(4) Roofing Felt

   (a) 30 pound asphalt felt paper complying with ASTM D226.

(5) Nails: (Note: Staples are not permitted. Pneumatic nailing maybe permitted by the A/E after A/E has witnessed and approved the nailing machine’s ability to consistently drive
nails flush, and after approval and appropriate credit is issued. A/E will review the quality and approve coil nails before installation)

(a) Galvanized roofing nails, 12-gauge minimum, 3/8-inch diameter head, barbed or deformed shank, and 2-inch minimum length for total penetration through the deck.

(6) Other Materials

(a) Asphalt Plastic Cement, ASTM D4586, Type II.

PART 3 – Execution

(1) Remove Existing Construction

(a) Remove existing modified bitumen membranes from the skylight enclosures to remain as indicated on the drawings.

(b) Remove deteriorated wood decking and framing as needed.

(2) Inspection

(a) Inspect all surfaces to receive new shingles and accessory items, and report to the Architect/Engineer in writing, all conditions that could adversely effect their correct installation and longevity.

(b) Do not proceed with the work until all deficiencies have been corrected to the satisfaction of the roofing manufacturer and the A/E. Proceeding with work shall signify Contractor’s acceptance of the substrate and conditions being covered with new work.

(3) Installation

(a) Install all roofing components in accordance with the membrane manufacturer’s current printed instructions. All minor repair locations shall be performed in strict accordance with membrane manufacturer’s requirements.

(b) Install drip edge over the ice and water dam at the eave. Install drip edge on top of the felt underlayment and ice and water dam sheet along the rakes.

(c) Unroll the ice and water dam sheet, cut into two nearly equal length pieces and reroll. Remove approximately 3 feet of the release paper and align the edge with the lip of the drip edge, sticky side down. Continue to peel the release paper and adhere the membrane without stretching membrane. Membrane shall be rolled to provide smooth and uniform contact with deck surface. Nail along the upper edge 18 inches on center (at 1-inch minimum and 2 inch maximum in from the edge). Overlap vertical and horizontal joints at least 4 inches. Install ice water sheet over the entire enclosure surface. Wrinkles, fishmouths, and blisters shall be cut out and patched with membrane extending a minimum of 6 inch beyond the edges of the repair area.
(d) Install felt underlayment over the entire roof area. Install with a 2-inches horizontal lap, and a 4-inches vertical lap, including at the valley ice and water dam sheet. Nail with roofing nails to hold in place until the shingles are applied.

(e) Install the drip edge metal on the rakes over the felt, overlapping joints 1-1/2 inches with the water flow.

(f) Install shingles with a 1/4-inch overhang at both the eaves and the rakes.

(g) Install shingles with the tabs cut off for starter strips.
   1. Do not invert these strips to avoid mispositioning and the self-sealant asphalt strips.
   2. Cut 3 inches from the left end for left rake start or right end for right rake start of the first starter shingle.

(h) Start the first course with a full shingle placed over the starter strip at the far left for left rake start or far right side of the roof area.

(i) Start the second course by cutting either 6 inches (or as recommended on the package for laminated shingles), from the left end for left rake start or right end and installing the remaining portion at the far left side or far right side of the roof area.

(j) Start the third and succeeding courses with shingles cut either 6 inches progressively narrower (or as recommended on the package for laminated shingles), from the left or right side as appropriate.

(k) STACK BONDING IS NOT PERMITTED.

(l) Use minimum of 4 nails per shingle, placed 5/8 inch above the top of each cut-out, and 1 inch in from each side (or as recommended on the package). STAPLES ARE NOT PERMITTED.

(m) Replace all shingles with exposed nails. Drive nails flush, but do not overdrive nails or crush the shingle.

(n) Cut hip and ridge shingles from those being applied (or as recommended on the package). Cut off a triangular shaped piece from each side of the headlap portion so that the headlap will not protrude beneath the next overlaying shingle. Use two nails, placed 5 1/2 inches in from the butt end, and 1 inch in from each edge (or as recommended on the package). If the temperature is less than 50 degrees F, store the shingles for hip and ridge use in a heated area for a sufficient time to allow them to be formed without cracking.

(o) The installation (or reinstallation) of gutters and downspouts, including hanger and fastener spacing shall be as specified in Section 07600.

(4) Adjust And Clean
(a) Thoroughly inspect all completed work. Replace all shingles or other work that is damaged and correct all other defects.

(b) Remove from the job site and legally dispose of rubbish and debris.

END OF SECTION
(24) Section 07500 - Fluid Applied Membrane Roofing

PART 1 – GENERAL

(1) Work includes

(a) The work of this Section consists of furnishing all items, materials, operations or methods listed, mentioned, indicated or scheduled in these Special Specifications, including all labor, materials, equipment transportation and incidentals necessary and required to perform the work and to bring the project to completion.

(b) Contractor to remove existing construction including but not limited to:

1. Gravel ballast
2. Precast concrete pavers
3. Filter fabric
4. Loose laid, extruded polystyrene insulation
5. Protection course
6. 4-Ply coal tar pitch membrane

(c) Contractor to provide and install new fluid applied membrane roofing system including but not limited to:

1. Reinforced hot rubberized asphalt membrane
2. Protection course
3. Prefabricated drainage mat
4. Insulation
5. Filter fabric
6. Precast concrete pavers
7. Gravel ballast
8. Modified bitumen flashings
9. Roof projection flashings
10. Roof drain flashings
11. Termination bars

(2) Related work

(a) Specified elsewhere
1. Section 07550: Modified Bitumen Roof Membrane
2. Section 07600: Sheet Metal and Flashing
3. Section 07900: Sealants

(3) Standards
   (a) Reference standards: Except as modified by the Drawings and these Special Specifications cited reference standards, or applicable portions thereof, govern the work. These include the latest editions of:
   1. American Concrete institute (ACI)
   3. The NRCA Roofing and Roofing Manual (NRCA)
   4. Canadian General Standards Board (CGSB)
   5. Underwriters Laboratories (UL)

(4) Quality assurance
   (a) Qualifications:

1. Contractor: Have successful installations of specified materials in local area in use for a minimum period of five years and shall be authorized by membrane manufacturer for application of specified system.

2. The Contractor shall have a minimum of five (5) years of experience in performing work similar to that shown in this Special Specification Section. The foreman of the crew shall have a minimum of five (5) years of experience in performing work similar to that shown in this Special Specification Section.

3. The Contractor shall submit a list of five projects on which similar work was successfully completed. This list shall contain the following for each of the three projects:
   a. Project names.
   b. Owner of the project.
   c. The name of the Owner’s representative, his address and phone number.
   d. A brief description of the work performed by the Contractor.
   e. The cost and square footage of the portion of work which was similar.
   f. Total restoration cost of the project.
   g. Date of completion.
(b) Source quality control

1. Manufacturer’s products: Obtain roofing materials from only one manufacturer. Provide materials not available from the manufacturer from sources, which are recommended and approved, by the membrane manufacturer.

2. The membrane manufacture’s technical representative shall have a minimum of five (5) years experience reviewing the installation of the products specified in this Special Specification Section.

3. Membrane manufacture quality control: Membrane manufacturer shall provide a technical representative to be on site at beginning of installation of the membrane system to establish the standard quality to be used on the remaining portion of the membrane work. The standard of quality shall be as agreed upon between the technical representative and the A/E. Technical representative shall perform periodic site visit throughout remainder of membrane installation work at intervals that allow for adequate monitoring of the Contractor’s work but at not less than once every two weeks. A written report shall be submitted to the A/E for each day or visit to the site and shall be submitted within 14 days of the visit.

4. UL listed products: Provide materials which have been tested and listed by UL, and bear UL label on each package, or are shipped to the project with a UL certification of compliance.

5. CGSB listed products: Provide materials, which have been tested and listed by CGSB that meet the CGSB-37.50-M89 standard.

6. Thermostatically controlled kettles are to be used for heating of all bituminous materials. Bitumen heating temperatures will be closely monitored.

(5) Submittals

(a) Membrane materials: For information only, submit two copies of specifications, installation instructions and recommendations from the materials manufacturer for product to be used. Include manufacturer’s data substantiating that the materials comply with the requirements.

(b) Written certification (in time to prevent delay of the work) by the manufacturers of the membrane materials that all materials supplied for this job comply with the applicable requirements of the ASTM, CGSB and related standards cited.

(c) Endorsement of roofing firm: Within 15 days of receiving the notice of award, submit the manufacturer’s endorsement of the installing firm.

(d) Shop drawings:

1. Submit shop drawings to the manufacturer for review.
2. Submit six (6) copies of manufacturer reviewed shop drawings to the Architect/Engineer.

3. Minimum scales for drawings:
   a. Roof plan: 1/8” = 1'-0”
   b. Details: 1” = 1'-0”

4. Submit the following:
   a. Base flashing
   b. Membrane terminations
   c. Roof projection flashings
   d. Roof drains, including resetting of drain heads
   e. Mechanical equipment curbs

   (e) Samples:
   1. Reinforcing sheet, 8 inches by 10 inches, 6 pieces.
   2. Modified bitumen flashing sheet, 8 inches by 10 inches, 6 pieces.
   3. Neoprene flashing sheet, 6 inches by 6 inches, 6 pieces.
   4. Preformed drainage mat, 6 inches by 6 inches, 6 pieces.
   5. Protection layer, 8 inches by 10 inches, 6 pieces.
   6. Sample copy of Contractor’s warranty, 6 copies.
   7. Sample copy of Manufacturer’s warranty, 6 copies.

(6) Work sequence
   (a) Perform all work under temperature and climatic conditions recommended by materials manufacturer.
   (b) Do not install membrane materials when precipitation is imminent.
   (c) Remove existing materials and install only as much membrane system as can be completed by the end of each workday.
   (d) Submit proposed cold weather construction procedures and methods of protection in writing which will be initiated, provided and maintained when the ambient temperature falls below 45 degrees F, to ensure proper application of the work, per the requirements of the material manufacturers.

(7) Delivery, storage, handling and protection
(a) Deliver materials requiring fire resistant classifications packaged with labels intact and legible.

(b) Materials stored on site shall be at locations designated by the Owner and shall be limited to the safe loading of existing materials, structural framing or existing substrate as required. Storage of materials shall not be allowed at any locations where new membrane materials have been installed.

(c) Protect remaining areas, building surfaces and all work to remain in place from damage resulting from the storage, preparation, handling and application of roofing materials. The Architect/Engineer shall approve all protective coverings.

(d) Keep all materials dry while they are transported, stored and installed. Do not allow materials to be exposed to any moisture anywhere at any time, during transportation, storage, handling and installation. Reject and remove from the site any new felts which foam, froth or otherwise exhibit evidence of moisture during application, or any felts which have moisture content more than ten (10) percent greater than the equilibrium moisture content (EMC) at 90 percent relative humidity.

(e) Store all materials on raised platforms with weather protective coverings. The manufacturer’s standard packages and covering is not considered adequate weather protection. Tarpaulins are preferred for protection of all membrane materials. If visqueen coverings are used, venting of each package is required. Material storage procedures shall be monitored and strictly enforced.

(f) Handle all materials to avoid damage. Store rolled goods on ends only. Discard rolls that have been flattened, creased or otherwise damaged. Place rolls on pallets on clean rigid floors.

(g) Locate bitumen kettles away from flammable materials. Observe all fire safety and pollution regulations of governing authorities. Contractor shall have appropriate type fire extinguishers present at all times when kettle is in operation.

(h) Kettles shall be equipped with properly working temperature gauges. Additionally, a stick thermometer shall be available for periodic measurements during applications.

(i) Take all necessary care to ensure the safety of personnel at the work area.

(8) Job conditions

(a) Existing construction: The existing roofing membrane system on the museum roof level consists of the following from top to bottom:

1. Gravel ballast
2. Precast concrete pavers
3. Filter fabric
4. Loose laid, extruded polystyrene insulation
5. Protection course
6. 4-Ply coal tar pitch membrane

(9) Warranty

(a) Contractor’s Warranty. Applies to all areas to where the waterproofing membrane system is installed.

1. Paid by the Contractor.
2. Time period: Two (2) years after date of completion and acceptance by TxDOT and the Owner.
3. Terms: Include all labor, materials, tools, equipment and service necessary for proper repair, restoration or replacement of all damages, to property, resulting from defects, imperfections, or faults in all materials and workmanship.
4. Corrections of defects, imperfections and faults shall not relieve the Contractor from his responsibility for additional corrective work during the remaining time period.

(b) Manufacturer’s Warranty

1. Paid by the Contractor
2. Time period: Ten- (10) years after date of completion and acceptance by TxDOT and the Owner.
3. Terms: Manufacturer’s non-prorated, no dollar limit watertightness warranty covering defects in materials and workmanship.

PART 2 – PRODUCTS

(1) Manufacturers and systems

(a) General description: The new roofing system shall be an inverted roofing membrane assembly (IRMA), and shall be compromised (from bottom to top) of a hot, fluid applied, reinforced rubberized asphalt membrane, including mineral surfaced flashing sheets, protection layer, preformed drainage mat, insulation, a filter fabric separator, gravel ballast and pavers.

(b) Acceptable manufacturers and systems:

2. Ram-Tough 250 DM (reinforced) as manufactured by Barrett Company, Wilmington, Delaware.
3. Elasto-Seal 790-11 Hot Rubberized Asphalt Membrane as manufactured by Henry Company, Huntington Park, California.
(2) Components of acceptable membrane systems

(a) MM6125-FR Membrane System

1. Monolithic membrane 6125 as supplied by the manufacturer ready for melting and application.
2. Surface conditioner, asphalt based for concrete surfaces and meeting the requirements of ASTM D41.
3. Flex flash UN, uncured neoprene flashing reinforcing sheet, 60 mil thick.
5. Hydroflex 30 protection layer, heavy-duty fiberglass reinforced, rubberized asphalt sheet, for horizontal surfaces.
6. Liquid Membrane 6090, two component, disfunctional poly-butadiene rubber.
7. Flex-Flash MB, a mineral surfaced modified bitumen sheet as supplied by the manufacturer to be used as a flashing sheet in exposed areas.
8. Mastic, as supplied or recommends by membrane manufacturer.

(b) Ram-Tough 250 DM (Reinforced) Membrane System

1. Ram-Tough 250 Flexible Membrane, as supplied by the manufacturer ready for melting and application.
2. Ram-Tough Primer, asphalt based for concrete surfaces and meeting the requirements of ASTM D41.
3. Ram-Flash 327 HDR, neoprene-flashing reinforcing sheets.
4. Poly Felt 125 VP, spunbound polyester, 4.5 oz. per sq. ft. with heat resistant resin binder.
5. Barrett #203 Protection Course is to be used for as the protection layer for horizontal surfaces.
6. Ram-Flash 306-G, mineral surfaced modified bitumen sheet as supplied by the manufacturer to be used as a flashing in exposed areas.
7. Ram-Mastic, as supplied by membrane manufacturers.

(c) Elasto-Seal (Reinforced) 790-11 Hot Rubberized Asphalt Membrane System.

1. 790-11 Hot Rubberized Asphalt Membrane, as supplied by the manufacturer ready for melting and application.
2. 930-18 primer, meeting the requirements of ASTM D41.
3. NP180gM4 SBS modified bitumen, exposed flashing sheets.
4. Neoflash, uncured 60 mil thick neoprene reinforcing sheet.
5. Polyester Fabric, reinforcement as supplied by membrane manufacturer.
6. Modified Plus G100 s/s sheet, protection sheet.
7. Mastic, as supplied or recommended by membrane manufacturer.

(3) Prefabricated drainage mat
(a) Contractor shall select a brand supplied or as recommended and acceptable to the roofing membrane manufacturer and meeting the following performance properties:
1. Assembly shall be a high-performance, high-strength drainage composite consisting of a three-dimensional, high-impact core and a woven filter (geotextile) fabric.
2. Core Compressive Strength: 18,000 psf per ASTM D1621
3. Core Flow Rate: 3.8 gpm/ft as per ASTM D4716 (installed horizontally)
4. Fabric Apparent Opening Size: 40 U.S. Standard sieve (min.) As per ASTM D4751
5. Fabric Water Flow Rate: 100 gpm/ft2 as per ASTM D4491
6. Fabric Grab Tensile Strength: 365 lbs. per ASTM D4632
7. Fabric Puncture Resistance: 105 lbs. as per ASTM D4833

(4) Insulation: Extruded closed cell polystyrene insulation boards conforming to ASTM C578, Type VI. Contractor shall select a brand supplied, or as recommended and acceptable to the roofing membrane manufacturer and meeting the following material properties:
(a) Thickness: 2-inch minimum, 48-inch wide by 48-inch length.
(b) Thermal resistance: R=5.0 per inch thickness at 75 degrees Fahrenheit mean temperature, as per ASTM C518.
(c) Compressive strength: 40-lb/inch² minimum, as per ASTM D1621.
(d) Flexural strength: 60 lb/inch² minimum, as per ASTM C2032
(e) Water Absorption: 0.1 percent maximum by volume, as per ASTM C272
(f) Water vapor permeance: 0.3 – 0.8 perms, as per ASTM E96
(g) Dimension stability: 2.0 percent maximum linear change, as per D2126

(5) Filter Fabric Separator Sheet: As supplied by one of the following or recommended by the membrane manufacturer:
(a) Rufon P3B
(b) Confil D689H
(c) Fabrene VIE

(6) Concrete Pavers: Hydraulically pressed, precast concrete pavers having nominal dimensions of 24” x 24” x 2” minimum thickness, and having the following characteristics:

(a) Compressive strength: 7,000 psi minimum per ASTM C140
(b) Water absorption rate: 5 percent maximum per ASTM C140
(c) Density: 150 pcf minimum
(d) Freeze thaw: 1 percent maximum loss of dry weight (50 cycles) per ASTM C67
(e) Flexural strength: 600 psi minimum per ASTM C293
(f) Color and finish shall be selected by Architect/Engineer from manufacturer’s standard selection
(g) Acceptable manufacturers:
   1. Hanover Architectural Products, Hanover, Pennsylvania
   2. Wausau Tile, Wausau, Wisconsin

(7) Gravel Ballast: Clean, rounded stones conforming to ASTM D448-86 (93) No. 4.

(8) Roof Drain: Drains shall be sizes shown on the Drawings. Provide deep seal “P” traps unless shown otherwise on the Drawings. Drain casting types and outlets shall match pipe connections serving casting.

(a) To replace original drains:
   1. Josam 21500, -2, -22, -30, -X
   2. Zurn ZC-100, -R, -VP, -IC
   3. Smith 1015, -R, -CID, U

(b) To replace previous repair drains:
   1. Josam 21500-IRMA, -2, -22, -30, -X
   2. Zurn ZC-100, -85, -R, -VP, -IC
   3. Smith 1017, -R, -CID, U

(9) Miscellaneous material
(a) Termination bars: 1/8 inch thick by 1 inch wide, type 304 stainless steel with prepunched holes at 4 inches on center.

(b) Fasteners (stone/masonry):
   1. Tapcon anchors, 3/16-inch diameter with 1-1/4 inch minimum embedment and with protective corrosion resistant coating.
   2. Zamac Nailin, 3/16 inch diameter with 1-1/2 inch minimum embedment and made of stainless steel.

(c) Fasteners (metal):
   1. Tek screws, No. 8-18 by 1-1/4 inch long, corrosion resistant materials or plating.
   2. Retrofit Cap and Adapter: Neoprene retrofit stepped pipe boot adapter rings, and stainless steel drawband sized to fit penetration and to be flashed to roofing system.
   3. Drawbands: Adjustable stainless steel draw bands and clamping rings for penetrations conforming to ASTM A167, Type 304 or Type 316.

PART 3 – EXECUTION

(1) General
   (a) Carefully inspect all surfaces upon which work is to be applied. The installation of any material will be considered as acceptance of the surfaces covered. Failure of work because of subsurface or surface defects will require removal of work, which becomes defective and replacing with work conforming to the specifications at no additional cost to the contract.
   (b) Unless higher standards are indicated or specified, work shall comply with applicable requirement published by the approved materials manufacturers and best standards of practice in the industry.
   (c) Install materials securely in place, flat, even, continuous and free from wrinkles or buckling.
   (d) The components of the total system shall be installed in sequence and in such quantities that the entire membrane system in the work area is completed by the end of the workday.
   (e) No work shall be covered over or concealed by new subsequent work until the work already in place has been completed, inspected and approved by the General Contractor and membrane manufacturer.
   (f) Apply materials over smooth, dry surfaces that are free from dirt, debris and other coatings that may prevent adhesion of materials to be applied. Have all temporary structures, tools, equipment, loose rubbish and debris removed from areas to be covered. Do not apply materials over wet, damp, frosty or frozen surfaces. Do not
apply materials when the effects of low temperature or excessive moisture would prevent bonding of materials or would incorporate moisture into the system component materials.

(2) Preparation of substrate

(a) Existing surfaces shall be cleaned of coal tar pitch residue such that no thickened sections or residue of pitch remain that may adversely affect the bond of the new membrane system. Membrane manufacturer’s technical representative and Architect/Engineer will inspect surface preparation at first area of new material installation to establish the standard of care. This acceptance will be the quality level of surface preparation for remainder of work.

(b) Surfaces shall be free of voids, spalled areas, loose aggregate and sharp protrusions with no coarse aggregate visible. Concrete surface shall be dry.

(c) Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form joint lines. Voids, cracks and holes shall be filled with an approved material and struck flush with adjoining surfaces. Remove grease, oil and other contaminant from all surfaces to be roofed or waterproofed. Clean surface (broom, vacuum cleaner or compressed air) to remove dust, loose stones and debris.

(d) Patches in concrete shall be allowed to cure for 28 days prior to beginning installation of roofing membrane. Alternatively, membrane can be applied sooner if concrete is found to be dry by performing a dry-patch tests (refer to ASTM D4263) and membrane drop tests and the substrate is accepted by the membrane manufacturer and Architect/Engineer as suitable for installation of the membrane. Under no circumstances shall membrane be applied prior to 14 days minimum cure unless approved by Architect/Engineer in writing.

(e) All existing concrete surfaces shall be smooth and have a surface texture equivalent to a wood float finish or as per ACI 301-11.7.3. In the case of sandblasted surfaces, concrete shall be smooth enough to accept roofing membrane, as established by test area.

(f) All horizontal concrete surfaces to receive new membrane shall be shot blasted to remove all dust, debris, and all other contaminants that may effect the bond.

(g) If during application, membrane material exhibits blistering or frothing from moisture drive from the substrate, all additional membrane application shall cease until substrate has dried to the appropriate level to accept application without evidence of entrapped moisture.

(h) Field measurements and material quantities: Installer shall have sole responsibility for accuracy of all measurements and estimates of material quantities and size.

(i) Proceeding with work shall signify the Contractor’s acceptance of the substrate and conditions being covered with the new work.
(j) Do not remove existing roofing materials when rain or precipitation is imminent. Do not remove excessive quantity of existing roofing membrane ahead of reroofing.

(k) Once the roofing membrane system has been installed, the installation shall be fully protected from all construction traffic until installation of protection layer and drainage mat as applicable. Protection shall be acceptable to Architect/Engineer.

(3) Membrane Application

(a) Surface Conditioner Application.

1. Apply the surface conditioner to the substrate using a hand-held sprayer, or a short nap roller, evenly at a rate of 300 to 600 square feet per gallon.

2. Allow sufficient time for the surface conditioner to thoroughly dry prior to the membrane installation. Protect surface conditioner from rain or frost until dry.

3. If more than 24 hours has passed since application of primer without installing membrane system, substrate shall be cleaned and reprimed as noted above.

(b) Membrane preparation

1. Cakes of membrane material shall be heated in double jacketed, oil bath or hot air melter with continuous mechanical agitation, specifically designed for the preparation of a rubberized asphalt membrane.

2. Heat membrane material until the material can be drawn free flowing and lump-free at a temperature range between 350 degrees and 425 degrees Fahrenheit (400 degrees F maximum for Henrys).

3. Application of membrane shall be at temperatures of 350 degrees Fahrenheit to 400 degrees Fahrenheit, and shall allow for uniform application.

4. Contractor shall monitor temperatures at kettle and mop buckets. Temperature readings shall be taken once every hour during times of application and recorded.

(c) Detailing and flashing

1. At cracks over 1/16 inch and at construction joints, apply membrane layer 90 mils (125 mils for Henrys) thick, then center a 6 inches wide strip of neoprene flashing over the joint or crack and fully and uniformly embed into the warm membrane. Avoid air pockets and allow assembly to cool.

2. Carry neoprene reinforced roofing membrane up junctions of horizontal and vertical surfaces a minimum of 3 inches or as indicated on the Drawings and cover with hot liquid membrane.
3. Flashing and detail work shall be installed and completed before the continuous, unbroken bottom layer of membrane is applied over the entire substrate surface and flashing areas, unless otherwise indicated in these Special Specifications or on the Drawings.

4. At pipe or similar penetrations, embed a layer of neoprene flashing in hot membrane and extend vertically a minimum of 4 inches or within 1 inch of the finished surface of the pavers or gravel ballast and shall be secured with a stainless steel drawband.

(d) Membrane Application

1. Apply membrane evenly at a rate to provide a continuous, monolithic coating of 90-mil minimum (125 mils for Henrys).

2. While hot, embed a continuous layer of spunbound polyester reinforcing felt with a minimum 2 inch side laps and 8 inch head laps. Broom into place.

3. Apply a second continuous coating of membrane at an even rate to achieve a 125 mil minimum thickness. (Total thickness shall not be less than 215 mils, 250 mils for Henrys).

(e) Wall Flashing

1. Flashing at walls shall be installed by applying a 90 mil (125 mils for Henrys) thick layer of membrane fully and uniformly, embedding a layer of neoprene flashing and covering with a 125 mil layer of membrane.

2. The wall and curb neoprene flashing shall extend a minimum of 3 inches onto the horizontal surface of the substrate and covered by the membrane system.

3. The wall neoprene flashing shall be secured with a continuous termination bar and fastener at the height indicated on the Drawings.

4. The termination bar shall be completely covered with a layer of liquid membrane. (Liquid Membrane 6090 is acceptable for this location with the MM 6125-FR System). Termination bars shall be primed in accordance with membrane manufacturer’s requirements.

(f) Drain Flashing at Previous Repair Drains

1. Drain shall be slumped a minimum of 1 inch below adjacent concrete surface.

2. Apply a layer of hot membrane material at drain and extend a minimum of 9 inches beyond edges of drain flange. Membrane shall be applied to drain flange.

3. Install a target sheet of neoprene centered over drain in hot membrane and extending a minimum of 6 inches beyond the edges of drain flange and
slightly into drain bowl. Trim off excess. Reinforcement shall be secured by clamping ring.

4. Install complete membrane system over top of reinforcement except below clamping ring. Drain must be maintained free to weep at membrane level.

(g) Drain Flashing at Original Drains

1. Drains shall be installed in existing sumps.

2. Apply a layer of hot membrane material at drain and extend a minimum of 9 inches beyond edges of the existing sump. Membrane shall be applied to drain flange.

3. Install a target sheet of neoprene centered over drain in hot membrane and extending a minimum of 6 inches beyond the edges of the existing sump and slightly into drain bowl. Trim off excess. Reinforcement shall be secured by clamping ring.

4. Drain must be maintained free to weep at membrane level.

5. Install lead coated copper sump in a layer of hot membrane material. Fasten lead coated copper sump liner to top surface of structural slab at 3 inches on center.

6. Embed 12 inches wide neoprene flashing strips in hot membrane at the leading edges of the lead coated copper sump.

7. Lap protection layer from field of roof over neoprene flashing strips around perimeter of new lead coated copper sump.

(h) Protection Layer

1. Embed protection layer sheets into the top of the membrane while it is still hot to achieve a good bond between the membrane and the protection layer.

2. Adjacent sections of protection layer shall be lapped a minimum of 3 inches.

3. The protection layer may be installed following the successful completion of the water test.

(i) Mineral Surfaced Modified Bitumen Sheet

1. Install mineral surfaced modified bitumen sheets at all locations where roofing membrane system is to be exposed. Application of mineral surfaced membrane shall follow system manufacturer’s installation procedure to ensure full bond to substrate.

2. Adjacent sections of mineral surfaced shall be lapped a minimum of 4 inches. Head laps shall be staggered 12 inches minimum.
3. Top edge shall be secured with a termination bar fastened to substrate at 8 inches on center, and the leading edge of the membrane shall be sealed with liquid membrane or mastic.

(4) Installation of Preformed Pipe Boots
   (a) The boot shall be fitted over or around the roof penetration with the top cut to form a tight fit.
   (b) The preformed boot shall be set in a bed of hot membrane applied to the surface of the roof deck surface and secured in place.
   (c) The reinforced membrane system shall be applied and lapped onto the flanges of the preformed boot.
   (d) If required, install cap on top of cover and engage fitting.
   (e) Install drawbands and seal top of cover and engage fitting.

(5) Installation of Insulation Boards
   (a) Overlay insulation boards onto drainage mat. All boards shall be laid with joints tightly butted.
   (b) Trim ends of boards to have 1/4-inch maximum gap at vertical surfaces and penetrations.
   (c) Install boards with end joints staggered at mid-point.
   (d) Board sizes shall not exceed 4 feet by 4 feet maximum. Largest appropriate sized board shall be installed where possible. Using multiple smaller sized sections of insulation where larger sections would be more appropriate shall not be allowed.

(5) Installation of Pavers and Gravel Ballast
   (a) Pavers and gravel ballast shall be installed in conjunction with installation of the insulation and filter fabric or protection.
   (b) Pavers and gravel ballast shall be carefully placed directly on surface of filter fabric or protection layer as indicated on the Drawings. Filter fabric or protection layer shall be turned up at penetrations and roof edges.
   (c) Pavers shall be installed at locations indicated on the Drawings.
   (d) Full size units shall be installed wherever possible. Pavers that are required to be cut to fit adjacent to openings shall not be less than 1/2 size of full unit.
   (e) Pavers are to be set abutting each other.
   (f) Install and evenly distribute specified gravel at all horizontal surfaces not covered with pavers. Gravel ballast shall be applied at a rate of 15 psf to 20 psf and such that no separator sheets are exposed.
(7) Water Cut-Offs

(a) Water cut-offs shall be provided where and when a danger exists that water caused by precipitation may get under the new membrane or existing membrane system that has yet to be removed. Water cut-offs shall be installed at the end of each workday and completely removed prior to beginning new membrane installation work the following work day if necessary to provide access to roof. Correct all defects noted during the inspection. Specific materials to be used shall be as per the membrane manufacture’s requirements.

(8) Water Test

(a) Contractor shall perform a water test of the area to clearly demonstrate that the completed membrane system is leak-free. Contractor shall notify Architect/Engineer and Project Inspectors a minimum of 24 hours prior to starting water test.

(b) Test area shall be filled with water to the level of 2 inches below flashing edge at walls and curbs but shall be no deeper than 4 inches at low point of test area. Water level shall be maintained a minimum of 48 hours. Water level shall be monitored during test period.

(c) Following removal of water from the test area, Contractor shall carefully inspect the entire test area for any pockets of water trapped in the membrane system.

(d) If leaks should occur the water must be drained completely and the membrane installation repaired. Water test shall be repeated in its entirety following any repairs.

(9) Clean up

(a) Perform final clean up.

(10) Completion

(a) Upon completion or when directed, conduct careful inspection and correct all defective work.

(b) Remove scrap, litter and debris resulting from operations specified herein, and leave work and the premises in clean satisfactory condition, ready to receive subsequent work.

END OF SECTION
(25) Section 07550 - Modified Bitumen Roofing Membrane

PART 1 – GENERAL

(1) Work includes

(a) The work of this Section consists of furnishing all items, materials, operations or methods listed, mentioned, indicated or scheduled in these Special Specifications, including all labor, materials, equipment transportation and incidentals necessary and required to perform the work and to bring the project to completion.

(b) Contractor to remove existing construction including but not limited to:

1. Built-up membrane with flood coat and gravel

(c) Contractor to provide and install new modified bitumen membrane roofing and flashing systems including but not limited to:

1. Tapered wood fiberboard
2. 2-ply modified bitumen membrane with a granular surfaced cap sheet

(2) Related work

(a) Specified elsewhere:

1. Section 07500 – Fluid Applied Membrane Roofing
2. Section 07600 – Sheet Metal and Flashing
3. Section 07900 – Sealant

(3) Standards:

(a) American Society for Testing and Materials (ASTM)

(b) Factory Mutual Laboratories (FM)


(d) Cited standards and specified manufacturer’s catalogs, current at date of bidding documents, unless otherwise specified, are incorporated herein by reference and govern the work. If conflict is discovered between referenced standards or catalogs and these Special Specifications, request written clarification from the Architect/Engineer. Do not proceed with the work until receiving clarification.

(e) Underwriters Laboratories (UL) listed products: Provide materials which have been tested and listed by UL, and bear UL label on each package, or are shipped to the project with a UL certification of compliance.

(f) Fire and insurance ratings: Comply with ratings as required by governing authorities and codes, and comply with the following:
1. Underwriters Laboratories requirements for “Roof Deck Constructions” which are rated “Fire-acceptable,” Class “A,” and “UL 90” fire and wind ratings.

2. Factory Mutual 1-90 rating. Must be an FM approved roofing membrane system and meets design intent for FM 1-90 wind uplift rating for use with the specified roofing membrane system.

(4) Quality Assurance

(a) Qualifications:

1. The installing Contractor must be authorized by the roofing system manufacturer to install the specified membrane system.

(b) Source quality control:

1. Manufacturer’s product: Obtain roofing materials from only one membrane manufacturer. Provide materials not available from the membrane manufacturer from sources that are recommended and approved by the membrane manufacturer.

2. Written approval by the membrane manufacturer for use and performance of the membrane system over the specified substrate including that all materials supplied for this job comply with the applicable requirements of the ASTM standards cited, and that materials are suitable for a UL Class A and UL 90 roof. Written approval shall indicate that the use of the material as specified for this project is an FM approved roofing membrane system and meets the design intent and capabilities associated with an FM 1-90 wind uplift rating for the roofing membrane system as specified.

3. Manufacturers: Materials shall be obtained only from manufacturers who will, if required, send a qualified technical representative to the project site for the purpose of advising the Contractor of the procedures and precautions for use of the materials.

(5) Submittals:

(a) Make all submittals in accordance with the Standard Document for Construction, Section 01300.

(b) Endorsement of Roofing Firm: within 15 days of receiving the Notice of Award, submit the manufacturer’s endorsement of the installing firm.

(c) Shop drawings:

1. Submit shop drawings to the manufacturer for review.

2. Submit six (6) copies of manufacturer reviewed shop drawings to the A/E.

3. Minimum scale for drawings:
a. Roof plans: 1/8” = 1’-0”
b. Details: 1” = 1’–0”

4. Submit the following:
   a. Base flashings.
   b. Membrane terminations.

(d) Samples:
   1. Modified bitumen cap sheet, 6 pieces.
   2. Modified bitumen base plies, 6 pieces.
   3. Base flashing layers (base sheet and cap sheet), 6 pieces each type.
   4. Sample copy of the Contractor’s warranty, 6 copies.
   5. Sample copy of the manufacturer’s warranty, 6 copies.

(e) Product data:
   1. Manufacturer’s product data and installation specifications for roofing membrane and base flashing, 6 sets each.

(f) Required after completion of the work:
   1. Record “as-built” drawings for variations from the Drawings.
   2. Contractor’s warranty per paragraph 1.8.a of this Section.
   3. Manufacturer’s warranty per paragraph 1.8.b of this Section.

(6) Work sequence
   (a) Perform all work under temperature and climatic conditions recommended by materials manufacturer. Do not install roofing materials when rain or precipitation is imminent.
   (b) Installation of vapor retarder membrane and of new roofing membrane system shall be coordinated with removal operations as defined in Special Specification Section 02070 – Selective Demolition.
   (c) Installation of new membrane flashings shall be coordinated with sheet metal operations defined in Special Specification Section 07600 Sheet Metal and Flashing.

(7) Delivery, storage, handling and protection
   (a) Deliver materials requiring fire resistant classifications packaged with labels intact and legible.
(b) Protect existing building construction and all work to remain in place from damage resulting from the storage, preparation, handling and application of roofing materials.

(c) Keep all materials dry while they are transported, stored and installed. Do not allow materials to be exposed to any moisture anywhere, at any time, during transportation, storage, handling and installation. Reject and remove from the site any new materials, which exhibit evidence of moisture during application, or have been exposed to moisture. Reject and remove from the site any material, which has moisture content more than 10 percent greater than the equilibrium moisture content (EMC) at 90 percent relative humidity.

(d) Store all materials on raised platforms with weather protective coverings. The manufacturer’s standard packaging and covering is not considered adequate weather protection. Tarpaulins are preferred for protection of all roof materials. If visqueen coverings are used, venting of each package is required. Material storage procedures will be constantly monitored and strictly enforced.

(e) Handle all materials to avoid damage. Store rolled goods on ends only. Discard rolls that have been flattened, creased or otherwise damaged. Unroll membrane and allow flattening out before application.

(f) Storage of all materials shall conform to the limitations recommended by the material manufacturer including restrictions on ambient temperatures and shelf life.

(g) Materials stored on roofs shall be limited to the safe loading of structural framing, and only at locations designated and approved by the Architect/Engineer and/or Owner. Storage of materials shall not be allowed at any locations where new roofing insulation or roofing membrane materials have been installed.

(8) Job conditions

(a) Existing construction:

1. The existing roofing membrane system (at the statue bases) consists of from bottom to top: A multiply coal tar pitch membrane with a flood coat and gravel.

(b) Protection:

1. Protect museum roof membrane and building surfaces, from traffic and roofing equipment.

2. Restore or replace all work or materials damaged by the roofing operation.

3. Remove protection materials upon completion of the work.

(9) Warranty

(a) Contractor’s Warranty: Applies to all areas where the roofing membrane system is installed.
1. Paid by Contractor.

2. Time period: Two (2) years after date of completion and acceptance by TxDOT and the Owner.

3. Terms: Include all labor, materials and tools, equipment and service necessary for proper repair, restorations, or replacement of all damaged defects, imperfections, or faults in all materials and workmanship.

4. Corrections of defects, imperfections, and faults shall not relieve the Contractor from his responsibility for additional corrective work during the remaining time period.

(b) Manufacturer’s Warranty:

1. Paid by Contractor.

2. Time period: Ten- (10) year after date of completion and acceptance by TxDOT and the Owner.

3. Time period: Manufacturer’s standard fifteen- (15) year, nonprorated, and NDL system warranty covering defects in materials and workmanship.

PART 2 – PRODUCTS

(1) General description: The roofing system shall be a two-ply modified bitumen membrane system. The second ply shall be a mineral surfaced cap sheet. Color of cap sheet and flashing shall be as selected by the Architect/Engineer from manufacturer’s standard colors.

(2) Acceptable Manufacturers

(a) Siplast, Irving, Texas.

(b) Johns Manville Corporation, Denver, Colorado.

(c) Soprema, Inc. Wadsworth, Ohio.

(3) Materials and Components

(b) Siplast Roofing System:

1. Bottom ply, and base flashing: Paradiene 20 HV, fibrous glass mat impregnated and coated with SBS modified bitumen, meeting the requirements of ASTM D5147.

2. Cap sheet: Paradiene 30 FR, fibrous glass mat impregnated and coated with SBS modified bitumen and surfaced with ceramic granules, meeting the requirements of ASTM D5147.

3. Base flashing cap sheet: Parafor 50 LT, fiberglass-reinforced polyester mat impregnated and coated with SBS modified bitumen and surfaced with ceramic granules, meeting the requirements of ASTM D5147.
(b) Johns Manville Roofing System:

1. Bottom ply base flashing: DynaBase, a SBS modified bitumen coated fiber glass reinforced base sheet, meeting the requirements of ASTM D5147.

2. Cap sheet: Dynalast 180 FR, a SBS modified bitumen coated polyester reinforced, granular surfaced cap sheet, meeting the requirements of ASTM D5147.

3. Base flashing: Dynaflex, a SBS modified bitumen-coated polyester/fiberglass reinforced, flexible, granular surfaced flashing sheet, meeting the requirements of ASTM D 5147.

(c) Soprema Roofing System:

1. Bottom ply, field and base flashing: Elastophene Sanded, a SBS modified bitumen coated polyester reinforced base sheet, meeting the requirements of ASTM D 5147.

2. Cap sheet: Sopralene 180 FR, a SBS modified bitumen coated fiberglass reinforced, granular surfaced cap sheet, meeting the requirements of ASTM D5147.


(4) Miscellaneous materials

(a) Asphalt: Asphalt conforming to ASTM D312, Type III or Type IV as required by the membrane manufacturer of the selected system.

(b) Concrete/metal primer: Conforming to ASTM D41, as supplied or recommended by the roofing manufacturer.

(c) Tapered wood fiberboard: High density fiberboard or Perlite, conforming to ASTM C612, 1/4 inch minimum thickness, 4’ x 4’ maximum board size, 1/8 inch per foot minimum slope.

(d) Treated Wood Framing, Blocking, Cants and Curbs “Wolmanized” pressure treated dimensional lumber.

1. Lumber: Southern Pine, Hem-fir, #2 grade; free from warping and decay, nominal 2 inch thick members.

2. Wood preservative treatment: Chromated copper arsenate (CCA) to meet WPB, LP-22 and marked.
   a. Southern Pine: 0.40 retention
   b. Hem-fir: 0.40 retention
3. Alternate wood preservative treatment: ACQ preserve by Chemical Specialties, Inc. to meet ACQ-94 quality control standard.

(e) Fasteners (cants to concrete)
   1. Stainless steel sleeve anchor bolts, 1/4 inch diameter by 2-1/2 inch long, Type “HX 304SS 516-212” as manufactured by Hilti, Tulsa, Oklahoma.

(f) Plastic cement: conforming to ASTM D4586, Type II, as supplied or recommended by the roofing manufacturer.

(g) Loose granules to match modified bitumen cap sheet.

(h) Fiberglass mesh fabric for sealing of termination bar and top edge of base flashing.

PART 3 – EXECUTION

(1) Preparation of substrate
   (a) Remove all existing roof membrane, flashing, and related components, down to the roof deck on the areas indicated on the Drawings.
   (b) Examine all surfaces for inadequate anchorage, foreign material, moisture, unevenness, or other conditions, which could prevent the best quality installation and longevity of the roofing, flashing, and accessory components. Notify the Architect/Engineer and Project Inspectors of all deficiencies.
   (c) Do not proceed with the work until all deficiencies have been corrected to the satisfaction of the Architect/Engineer, and the roofing manufacturer.
   (d) Field measurements and material quantities: Installer shall have sole responsibility for accuracy of all measurements and estimates of material quantities and sizes.
   (e) Proceeding with work shall signify the Contractor’s acceptance of the substrate and conditions being covered with the new work.
   (f) Do not remove existing roofing materials when rain or precipitation is imminent. Do not remove excessive quantity of existing roofing membrane ahead of reroofing.

(2) Bitumen heating:
   (a) Thermostatically controlled kettles shall be used for heating of all bituminous materials. Bitumen heating temperatures will be closely monitored. Kettles shall have operating thermometers to properly indicate operating temperatures.
Contractor shall have available on site, hand-held thermometers capable of verifying mop bucket temperatures.

(b) Bitumen heating shall be in accordance with the equiviscous temperature (EVT) range concept (NRCA Technical Bulletin No. 2-91, December, 1991).

(c) Asphalt temperature at the point of embedding modified bitumen sheets shall be a minimum of 400 degrees F. Manufacturer shall submit letter recommending the minimum asphalt application temperature of the point of application. Follow manufacturer’s recommendations for mop lead distances.

(d) Asphalt to be applied no more than 5 feet ahead of modified bitumen membrane installation.

(3) Tapered Insulation Installation

(a) Discard any wet or damaged insulation.

(b) Install units of insulation with long joints continuous and short joints staggered. All boards shall be laid with joints tightly butted. Mop full width under each insulation unit with asphalt at a minimum rate of 25 pounds per square per layer of insulation. Apply asphalt at temperatures between 375 degrees Fahrenheit and 425 degrees Fahrenheit. Stagger joints at least 6 inches.

(c) Lay down insulation as smoothly as possible to eliminate irregularities from board to board.

(d) Install insulation boards in courses parallel to roof edges, mopping surface up.

(e) Firmly butt each insulation board to surrounding boards. Do not jam or deform board.

   1. Maximum elevation between boards at joints: 1/8 inch


(4) Membrane installation

(a) Install all roofing and flashing systems and all accessory components in accordance with the manufacturer’s printed instructions.

(b) Starting at low point, install the bottom ply and cap sheet in shingle fashion with laps installed so that water flows over laps toward drainage points. Broom plys into full and uniform contact.

(c) Apply mineral-surfaced cap sheet asphalt so that a small amount is visible the full length of each lap.

(d) As the mineral-surfaced cap sheet is installed and while the exposed asphalt at each lap in the cap sheet is still hot, cover with loose granules.
(e) Install the bottom ply, and cap sheet all in the same day. Phasing is not permitted, unless prior approval is given by Architect/Engineer to allow a later installation of cap sheet only.

(f) Install with 4-inch minimum side and end laps. Stagger end laps a minimum of 12 inches.

(g) Extend all field plies to top edge of cants and cut off evenly.

(h) Align the surfacing ply membrane so that the side laps do not coincide with the side laps of the base ply sheets. Ideally the side laps of the base ply sheet should be positioned under the middle of the succeeding layer of membrane. At a minimum, seams in the base plies shall be staggered 12 inches from top ply.

(i) Avoid walking on plies until membrane has cooled.

(5) Membrane flashing installation
   (a) Install wood fiber cants at locations indicated on Drawings. Wood fiber cants shall be trimmed to fit and anchored to substrate or wood framing members.

   (b) Install specified fasteners 2 feet on center, with two fasteners minimum per blocking section. Within 8 feet of outside corners, spacing shall not exceed 18 inches. Countersink heads. Offset blocking layers 12 inches and weave corners.

   (c) Install flashing base ply and top flashing membrane layer following the manufacturers recommended procedures.

   (d) Extend base ply and top membrane layers out past toe of cant onto flat roof surface a minimum of 4 inches and 8 inches, respectively, and provide side laps of 4 inches minimum. Stagger joints in base ply and top layer a minimum of 12 inches.

   (e) Avoid excessive asphalt seepage at seam. At exposed portions of mineral surfaced top layer system, cover exposed hot asphalt seepage with a full sprinkling of loose granules.

(6) Water Cut-Offs: Water cut-offs shall be provided where and when a danger exists that water caused by precipitation may get under the new roof membrane. Water cut-offs shall be installed at the end of each workday and completely removed prior to beginning new membrane installation work the following work day if necessary to provide access to roof. Correct all defects noted during the inspection.

(7) Field quality control
   (a) The Architect/Engineer and Project Inspectors will provide periodic on-site observation during installation.

   (b) The roofing manufacturer will provide qualified technical personnel for onsite observation and instruction full time at beginning of membrane installation to establish project standard and thereafter as the manufacturer deems necessary.
Written reports for each day or site visit shall be submitted to the A/E within 14 days of the site visit.

(8) Adjust and clean

(a) Carefully inspect all completed work and correct all defects.

(b) Remove from the job site and legally dispose of all debris.

(c) Accompany the manufacturer’s technical inspector, and assist with equipment and workmen.

(d) Repair damage and remove stains caused by the work.

(e) At completion of the work, remove all equipment and supplies.

END OF SECTION
(26) **Section 07600- Sheet Metal and Flashing**

(1) **General**

(a) The work in this Section includes, but is not limited to, all labor, materials, equipment, and services to complete the following:

1. Removal metal flashings at locations designated on Drawings.

2. Furnish and install new metal flashings, counterflashings, and metal trim at the locations designated.

3. Furnish and install new sheet metal coping cap or wall cladding for parapet wall.

4. Furnish and install miscellaneous sheet metal and related items.

(2) **Related work:**

(a) Section 04460 - Masonry Repair

(b) Section 07500 - Fluid Applied Membrane Roofing

(c) Section 07550 - Modified Bitumen Roofing Membrane

(d) Section 07900 – Sealants

(3) **References:**


(b) “Copper and Common Sense,” by Revere Copper Products, Inc.

(c) American Society for Testing and Materials (ASTM).

(d) Sheet Metal Welding Code.

(4) **Submittals:** In accordance with Section 01300:

(a) **Shop drawings:** Submit six (6) copies of shop drawings and any additional copies Contractor may require. Shop drawings shall show sheet metal items, including joints, types and locations of fasteners, accessories, and special shapes. Include assembly sequence drawings. Approval of shop drawings will be for details and arrangements of the various parts and shall include details of all erection and connection methods. Contractor shall verify all necessary and required job dimensions. Shop drawings shall be provided for all flashing shown on Drawings.

(b) **Samples:** Submit two 12-inches by 12-inches samples of each sheet metal element. Show configuration, thickness, and finish.
(c) Sample Installation: Furnish and install a sample installation of each sheet metal elements sample location shall be selected by Architect/Engineer in consultation with Contractor. Sample shall be approved by Architect/Engineer prior to beginning sheet metal and flashing work. Approved sample shall be standard for all work.

(d) Manufacturer’s literature: Submit three copies of sheet metal manufacturer’s welding instructions, printed instructions, and recommendations for installation.

(5) Coordination

(a) Conduct all work under temperature and climate condition as recommended by reference standards cited above. Do not install new sheet metal and flashings when rain or inclement weather is imminent.

(b) Coordinate installation of new sheet metal with stone repairs and roofing replacement.

(6) Warranty

(a) Provide a ten-year warranty on labor and materials.

(b) Terms: All materials, labor, tools, and equipment necessary for repair, restoration, or replacement of all new work damaged as a result of defects, imperfections, or faults in materials or workmanship.

(c) Corrections of defects, imperfections, and faults shall not relieve the Contractor of his responsibility for additional corrective work during the remaining time period.

PART 2 – PRODUCTS

(1) Flashings, cladding, cleats, and metal accessories:

(a) Lead-coated copper for flashings, cladding, cleats and accessories: 20 ounce copper. Coated in accordance with ASTM B101. Class A. Lead coating on both sides shall be 12 to 15 pounds per 100 square feet. (Color is dull grey.)

(b) Lead-coated copper for gutters and downspouts: 24 ounce copper. Coated in accordance with ASTM B101. Class A. Lead coating on both sides shall be 12 to 15 lbs. Per 100 square feet. (Color is dull gray.)

(c) Fasteners: All fasteners shall be non-corrosive metal, compatible with material being fastened or anchored.

(d) Solder: In accordance with ASTM B32-91, Alloy Grade 50a. For lead-coated copper, use a solder with higher percentage of lead, 40 percent tin and 60 percent lead.

(e) Flux: FS O-F-596, rosin, muriatic acid neutralized with zinc or approved equal.

(f) Termination bar: 1/8 inch thick by 1 inch wide, Type 304 stainless steel with prepunched holes at 4 inches on center.
(g) Materials for cleaning lead-coated copper:

1. A mild, non-ionic detergent such as Triton X-80 N, or approved equal.
2. Clean, potable water.

(h) Non-corrosive metal, compatible with material being fastened or anchored. Spacing as noted on Drawings.

(i) Metal to concrete or masonry: Concrete/masonry screw fasteners 1/4 inches by 1-3/4 inches long with integral neoprene head sealing washers for predrilled holes. Masonry anchors type fasteners ¼ inch by 1-½ inch (minimum) long stainless steel (passive) pin and zinc alloy insert with integral neoprene head sealing washers. (All fasteners to have a 1 inch minimum and 1-3/4 inch maximum embedment in the concrete substrate and 1-¼ inch minimum embedment into masonry substrate.)

(i) Metal to metal: Metal fasteners, No. 3 point, 10 - 16 x 3/4 inches (minimum length) having a corrosion resistant coating and with an integral neoprene sealing washer.

(j) Expansion inserts: lead.

PART 3 – EXECUTION

(1) Inspection and preparation

(a) Remove existing sheet metal counterflashing and wall flashing as required to perform repair work at base flashings.

(b) Examine the surface condition of the substrate under which sheet metal is to be installed. Any surfaces, which are found to be unsuitable for installation of the sheet metal, shall be brought to the attention of the Architect/Engineer and Inspectors for resolution. Application or installation of the material constitutes acceptance of the surface of the substrate.

(c) Clean the substrate of obstructions and substances detrimental to the work.

(d) Before commencing work, verify shapes and dimensions of surface to be covered. Coordinate sheet metal work with masonry work to be performed in areas where flashing is to be installed.

(e) Proceeding with the work shall signify the Contractor’s acceptance of the substrate being covered by the new sheet metal installation.

(2) Fabrication

(a) Field document the required configuration and measurements of all new flashings prior to fabrication.

(b) Shop fabricate new sheet metal shapes in lengths appropriate for building and wall configurations, or as long as practical to adequately provide for expansion
and contraction; finish water and weather-tight throughout. Lines, rises and angles shall be sharp and true. Plain surfaces shall be free from waves or buckles.

(3) Installation

(a) General:

1. Install work watertight, without waves, warps, buckles, fastening stresses, or distortion. Allow for expansion and contraction. Angle bottom edges of exposed vertical surfaces to form drips. Hem exposed edges.

2. Sheet metal shall be carefully fabricated and installed making adequate provision for movement due to thermal expansion or contraction without damage to appearance or watertightness.

3. Free edges of all sheet metal shall be hemmed or doubled back for stiffness or to engage cleats. Hemmed edges shall have 3/4-in. minimum engagement to cleat. No nails or other fasteners shall remain exposed in finished sheet metal work, except as indicated on Drawings.

4. Shop soldering shall be expertly done at proper temperatures, using methods and materials compatible with base metal. All joints shall be filled solid, uniform, and watertight. No field soldering will be performed without prior approval by Architect/Engineer.

5. Shop fabricate all corner sections. Provide shop-soldered flat lock joints in corners, and other single-component sections.

(b) Seams:


2. Flat lock seams: Finished width, 3/4-inch four ply flat lock, malleted tight. Field installed seams shall have sealant between center plies before folding. Shop-soldered seams shall be sweat full with solder.

3. Lap seams: Finished width, 7/8-inch overlap 4-inch minimum unless otherwise noted on Drawings. Lap seams shall be installed only at locations where flat lock seams cannot be made.

4. Soldered lap seams: Finished width, 1-inch sweat full with solder unless otherwise specified.

(c) Soldering: Clean and flux metals before soldering. Sweat solder completely through seam width.

(d) Drips: Form drips at lower edge of flashing sections by folding back and bending out 45 degrees from vertical to carry water away from wall. Stiffen lower edge of counterflashing or edge sections by 3/4-inch minimum hem formed by folding edge of sheet metal back on itself.
(e) Cleats and wind clips: For continuous cleats, secure to substrate with fasteners spaced 8-in. on center. Wind clips shall be 2-inch minimum in width and spaced at 12-in. on center.

(f) Sealant installation (for lap seams): Apply 1/4-inch diameter continuous beads, set back 1 inch from each edge. Two (2) minimum beads per section.

(g) Bituminous plastic cement: Trowel 1/8-inch thick.

(h) Wall counterflashing and receivers: Install in reglets to full depth and in brick bed joints a minimum of 2 inches back edge. All reglets, counterflashing and receivers shall be provided with 1/2-inch fold to accept lead wedge for securement. Wedges shall be spaced 12 inches on center. Bed joint and embedded top surface of receivers shall be filled with sealant and backer rod. Outside edge of receivers shall be provided with 3/4-inch fold to accept counterflashing section. Adjacent sections of receivers shall be lapped a minimum of 4 inches.

(i) Roof counterflashing: Overlap base flashing four (4) inches minimum, unless existing conditions prohibit installation. Provide 3/4 fold for drips along bottom edge and install against base flashing. Lap seam vertical joints 4 inches minimum. Apply sealant. Miter, lap seam, and close corner joints with solder or sealant. Breaks shall be provided as shown on the Drawings.

(j) Wall panels: Install wall panels on inside of parapet wall and as noted on Drawings (Alternate No. 3). Wall panels shall be fabricated in widths to accommodate joint connectors at eighteen (18) inches on center and depths appropriate for height above finished roof. Panels shall be placed in joint connectors as shown on Drawings. Joint connectors shall be secured to walls at twelve (12) inches on center staggered at each side. A continuous bead of sealant shall be installed in the fold of the joint connector prior to placement of panel. Panels shall be fabricated to accept counterflashing using fasteners that will not penetrate the existing wall as shown on the Drawings.

(k) Gutters

1. Fabricate 3 inch deep by 4 inch wide gutter profiles to comply with standard industry details as shown by SMACNA in the “Architectural Sheet Metal Manual.”

2. All gutters shall be made completely watertight with seams in adjacent sections being riveted and soldered. All joints shall be in the direction of waterflow.

3. Lap joints for sections of gutters shall be a minimum of 1 inch with rivets at 2 inches on center and soldered.

4. Downspout inlet shall be 1/8 inch less than size of connecting downspout and shall be set a minimum of 6 inch into connecting downspout. Inlet shall be riveted to connecting downspout. Inlet flanges shall be riveted and soldered to bottom of gutter.
5. New gutters shall be supported using 1/8 inch by 1-inch minimum copper brackets spaced 24 inches on center maximum. Brackets shall be secured concrete statue supports using two fasteners.

6. All gutter ends shall be completely closed and sealed with soldered units.

7. Gutters shall extend a minimum of 4 inches beyond the edge of the roofs.

(l) Downspouts

1. Fabricate 3 inch by 4 inch corrugated rectangular downspout profiles to comply with standard industry details as shown by SMACNA in the “Architectural Sheet Metal Manual.”

2. Anchor straps for new downspouts shall be fabricated from flat stock copper. New straps shall be anchored to wall surface with sleeve type expansion anchors. Straps shall be riveted to downspout sides (with minimum penetration beyond inside face) for support.

3. Anchor straps for downspouts shall be located as close as possible to gutter inlets.

4. Downspouts shall have an elbow transition that directs water away from the statue base.

(m) Repairing: Repair or replace damaged work.

(n) Cleaning: As work progresses, neutralize excess flux with 5 to 10 percent washing soda solution and thoroughly rinse. Leave work clean and free of stains and debris.

1. Cleaning of lead-coated copper:
   a. Dilute non-ionic detergent solution, one teaspoon detergent per one (1) gallon of clean, potable water.
   b. Prewet sheet metal surface and apply cleaning solution with soft, natural bristle brush. Allow to dwell 3 to 5 minutes. Gently scrub surface with soft brush.
   c. Rinse thoroughly with low-pressure (no greater than 100 psi, measured at the tip) warm water (no greater than 190 degrees), at a flow rate of four (4) gallons per minute. Use a stainless steel spray tip giving a 45 degrees fan spray, held at least 12 inches from the wall surface.

(o) Adjust and clean

1. Carefully inspect all completed work and correct all defects.

2. Repair damage caused by the work.

3. At completion of the work, remove all equipment and supplies.
(27) Section 07820 - Metal-Framed Skylights

PART 1 – GENERAL

(1) Related Sections

(a) Section 07600 - Flashing and Sheet Metal.

(b) Section 07900 - Sealants.

(2) References

(a) Aluminum Association Incorporated (AA): SAS-30 Specifications for Aluminum Structures

(b) American Architectural Manufacturers Association (AAMA):

1. 501.1: Standard test method for metal curtain walls for water penetration using dynamic pressure

2. 501.2: Field check of metal curtain walls for water leakage

3. 501.3: Field check of water penetration through installed exterior windows, curtain walls and doors by uniform air pressure difference

4. 607.1: Voluntary guide specification and inspection methods for clear Anodic finishes for architectural aluminum


(d) American Society for Testing and Materials (ASTM):


2. B209: Specification for Aluminum and Aluminum-Alloy Sheet and Plate


5. B316: Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods


7. C794: Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants

8. C1036: Specification for Flat Glass
9. C1048: Specification for Heat-Treated Flat Glass-Kind Hs, Kind Ft Coated and Uncoated Glass
10. D395: Test Methods for Rubber Property -Compression Set
12. D1171: Test Method for Rubber Deterioration -Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
14. E283: Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors
17. E773: Test Method for Seal Durability of Sealed Insulating Glass Units
18. E774: Specification for Sealed Insulating Glass Units
19. E783: Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors


(f) Flat Glass Manufacturers Association (FGMA): Glazing Manual

(g) Insulating Glass Certification Council (IGCC): Classification of Insulating Glass Units

(3) System description

(a) Design requirements:

1. Extruded aluminum members
2. Condensation guttering system integral with skylight framing members for positive drainage of condensation

(4) Performance requirements:

(a) Framing system including glazing material shall be designed to support the following load requirements:

1. 115 pounds per square foot uplift wind load
2. 60 pounds per square foot downward wind load + dead load
3. Concentrated live load of 250 pounds applied to any framing member at a location that will produce the most severe stress or deflection.

4. The deflection of the framing member in a direction normal to the plane of glass when subjected to a uniform load deflection test in accordance with ASTM E330, and per the above-specified loads, shall not exceed l/240, up to 1-inch maximum.

5. The deflection of a framing member in a direction parallel to the plane of glass, when carrying its full dead load, shall not exceed an amount which will reduce the glass or panel bite below 75 percent of the design dimension and the member shall have a 1/8-inch minimum clearance between itself and the edge of the fixed panel, glass, or component immediately adjacent, nor shall it impair the function of or damage any joint seals.

6. Water penetration: No water penetration shall occur when the system is tested in accordance with ASTM E331 using a differential static pressure of (20 percent of the inward acting design wind load pressure, but not less than (12 psf). Water penetration is defined as the appearance of uncontrolled water other than condensation on the interior surface of any part of the skylight.

7. Drain water penetrating at joints, as well as condensation occurring within the system to exterior face of the work.

8. Air infiltration: Allowable air infiltration shall not exceed 0.06 CFM of total glazed surface area when tested in accordance with ASTM E283 at a static pressure of 6.24 psf.

9. Thermal movement: Provide for such expansion and contraction of component materials as will be caused by a surface temperature range of +/-75 degrees F. Ranging from 0 to 150 degrees F. Without causing buckling, stress on glass, failure of seals, undue stress on structural elements, reduction of performance or other detrimental effects.

10. Compression flanges of flexural members may be assumed to receive effective lateral bracing only from anchors to the building structure and horizontal glazing bars or interior trim which are in contact with 50 percent of the member’s total depth.

11. The skylight framing is designed to be self-supporting between the support construction. The skylights will impose reactions to the support construction. All adjacent and support construction must support the transfer of all loads including horizontal and vertical, exerted by the skylights.

12. The skylight framing is to be designed to exert no horizontal reactions under vertical gravity type loads, (dead, snow, live). Unbalanced live loads, (wind, seismic, etc.), acting upon the skylight will produce horizontal reactions that cannot be controlled by the skylights, but must be resisted by the support structure.
13. The skylight framing shall include an integral track or frame to allow the installation of temporary plywood covers by Owner.

(5) Submittals

(a) Submit five (5) sets of reproducible shop drawings showing plans, elevations and sections as required to fully describe the skylight construction for the Architect/Engineer’s approval prior to starting fabrication.

(b) Submit sealed structural calculations of all components of the system.

(c) Submit one 12-inch x 12-inch sample of each type of glass.

(d) Submit three samples of each type of sealant.

(e) Submit one 6-inch long sample of each extrusion (with appropriate finish).

(f) Submit three sets of record “as-built” drawings and cleaning and maintenance manuals upon completion of skylight installation.

(g) Certification that insulating glass units will withstand specified design loads.

(6) Quality assurance

(a) Work of this Section, including design, engineering, fabrication, finishing, preparation at the job site, erection and glazing of the skylight system shall be the responsibility of the skylight manufacturer. The manufacturer shall be regularly engaged in the preceding phases of construction of skylights and able to demonstrate that he has performed successfully on comparably sized projects and of comparable design complexity over at least the previous ten years.

(7) Warranty

(a) Submit manufacturer’s warranty certifying that skylight work was furnished and installed in accordance with the contract documents.

(b) Certify that skylight frame is free of defects in design, material, and construction for a period of ten (10) years from the date of skylight completion.

(c) Warrant glass against defective materials, delamination, seal failure, and defects in manufacture per the glass manufacturer’s standard warranties.

PART 2 – PRODUCTS

(1) Materials

(a) Framework:

1. Principal supporting members: 0.125-inch minimum thickness extruded aluminum, alloy 6063-T6 per ASTM B221. Sizes, shapes and profiles.

2. Snap on covers and miscellaneous non-supporting trim: 0.062-inch minimum thickness extruded aluminum, alloy 6063-T5 per ASTM B221.
3. Supporting aluminum gutters: Thickness as prescribed by skylight engineer, based on skylight reactions and applied design loads.

4. Principal formed metal members: 0.125-inch minimum thickness aluminum, alloy (5052)(6061-T6) per ASTM B209.

(b) Glazing strips:
1. Extruded EPDM rubber designed to comply with the following specifications:
   a. Hardness: ASTM D2240 Type A. 50 (+/-5) Durometer
   b. Tensile strength: ASTM D412. 800 psi (min.)
   c. Elongation: 300 percent (min.)
   d. Color: Black

2. Compression set: ASTM D395 Method B, 22 hours at 212 degrees F: 25 percent (max.)

3. Heat aging characteristics:
   a. 70 hours @ 212 degrees F
   b. ASTM D2240 hardness change: +5 Durometer
   c. ASTM D412 tensile change: -10 percent
   d. ASTM D412 elongation change: -20 percent
   e. ASTM D1171 weather resistance at 1 part ozone per million, 500 hours at 20 percent elongation: no cracks

4. No visual checks, cracks or breaks after completion of tests.

(c) Setting blocks:
1. Extruded Type II silicone rubber designed to permit adhesion and comply with the following specifications:
   a. Hardness: ASTM D2240 Type A 80 (+/-5) Durometer
   b. Color: Black

(d) Fasteners:
   a. For exterior cap retainers: ASTM A193 B8 316 series stainless steel screws
   b. For framework connections: ASTM A193 B8 316 series stainless steel
c. For anchoring skylight to support structure: ASTM A193 B8 316 series stainless steel

(e) Flashing:

1. Stainless steel, 20 gauge minimum thickness

2. Sheet metal flashing/closures/claddings are to be furnished shop formed to profile in minimum 10-foot lengths. When lengths exceed 10 feet, field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap 8-inch minimum, set in a full bed of sealant and riveted if required.

(f) Finish requirements:

1. Anodized coatings:
   a. Class II clear anodized Type AA-M10C22 A-31: 204-RL.

(g) Glass:

1. Standard certification requirements:
   a. Heat treated glass: ASTM C1048, with surface stress of 5,000 +/- 1500 psi
   b. Laminated glass: Two lights interleaved with Polyvinyl Butyral (PVB). Units must meet criteria of ANSI Z97.1- 1984 and CPSC 16 CFR 1201 for safety glazing. Provide PVB layer of 0.030-inch for all glass units unless a coating, and/or FRIT is applied to the inside face of the laminate thereby necessitating a 0.060-inch PVB layer.
   c. Insulating glass: CBA rated by the insulating glass certification council (IGCC) when tested in accordance with ASTM E773 and ASTM E774. Dual edge seals with the secondary seal being silicone. Exterior light of fully tempered glass and interior light of laminated glass.

2. Performance requirements:
   a. Probability of breakage not to exceed 8/1000 for vertical glass and 1/1000 for sloped glass upon first application of design wind and live load pressures. For glass selection, design wind pressure for a one-minute duration. For loads of longer duration use standard engineering practices for glass selection.
   b. Probability of breakage due to anticipated thermal stress not to exceed 8/1000 for vertical glass and 1/1000 for sloped glass.

(h) Sealants:
1. Non-structural joints and weather seal joints: Silicone sealants applied in accordance with manufacturer’s recommendations

(i) Treated Wood Framing, Blocking and Curbs: “Wolmanized” pressure treated dimensional lumber.

1. Lumber: Southern Pine, Hem-fir, #2 grade; free from warping and decay, nominal 2 inch thick members.

2. Wood preservative treatment: Chromated copper arsenate (CCA) to meet WPB, LP-22 and marked.
   a. Southern Pine: 0.40 retention
   b. Hem-fir: 0.40 retention

3. Alternate wood preservative treatment: ACQ preserve by Chemical Specialties, Inc. to meet ACQ-94 quality control standard.

(2) Fabrication

(a) Construct skylight(s) using extruded aluminum members.

(b) Construct skylight(s) using a continuous aluminum curb with expansion joints as required.

(c) Insofar as practicable, fit and assemble work in the manufacturer’s shop. Work, which cannot be permanently assembled, shall be shop-assembled, marked, and disassembled before shipment to the jobsite.

(d) Design rafter bars for slide-in type spline glazing strips.

(e) Design glass retainer fasteners to resist uplift loading. Spacing to be determined by structural calculations, when applicable.

(f) Use snap on caps to conceal glass retainers and glass retainer fasteners.

(g) Shop locate drill and bolt, or weld aluminum clips to framing members.

(h) Set glass with interior and exterior EPDM glazing strips.

(i) Use silicone setting blocks to support glass and to provide edge clearances and glass bites as outlined below, in accordance with FGMA recommendations:
   1. Set blocks not less than 6-inch from edge of glass for support unit.
   2. Glass bite: not less than 1/2-inch or more than 5/8-inch on any side of glass unit.
   3. Maintain 1/4-inch edge clearance between glass and adjacent metal framework.
4. Use rubber spacers to maintain separation of glass and adjacent metal framework.

(j) Locate weepholes in curb to positively drain condensation to exterior of skylight at each rafter connection.

PART 3 – EXECUTION

(1) Examination

(a) Upon arrival to the jobsite for installation of the specified work, the manufacturer’s erector is to examine the structure and substrate to determine that they are properly prepared, dimensionally accurate, and ready to receive the skylight work included herein. Report any discrepancies to the Architect/Engineer and Project Inspectors.

(2) Preparation

(a) Contact between aluminum and dissimilar metals shall receive a protective coating of asphaltic paint for the prevention of electrolytic action and corrosion.

(b) Skylight manufacturer and manufacturer’s erector excludes all field measuring, demolition, removal, replacement, or re-work of any existing material.

(3) Installation

(a) Install skylight frame, glass and accessory items as needed in accordance with manufacturer’s instructions.

(b) Install skylight system under the direction of the skylight manufacturer’s designated erector.

(c) Erect system plumb and true, in proper alignment and relation to established lines and grades as shown on approved shop drawings.

(d) Anchor skylight to structure in strict accordance with approved shop drawings.

(e) Apply sealing materials in strict accordance with sealant manufacturer’s instructions.

(4) Tolerances

a. All parts of the work, when completed, shall be within the following tolerances:

1. Maximum variation from plane or location shown on approved shop drawings: 1/8-inch per 12-foot length, or 1/2-inch in total length.

2. Maximum offset from true alignment between two members abutting end-to-end, edge-to-edge in line or separated by less than 3-inch: 1/32-inch.

(5) Field quality control
(a) Water leakage: Field check in accordance with AAMA 501.2 in proportionate areas. There shall be no uncontrolled water leakage as defined in AAMA 501.2. Water supply to the skylights, with adequate water pressure, is to be furnished by the general Contractor. Tests are to be conducted upon completion of the installation. Testing is to be performed by the manufacturer’s authorized personnel. Independent laboratory testing and reports, if required, are to be ordered and directed by the Architect/Engineer.

(b) Air leakage: Field check in accordance with ASTM E283. Tests are to be conducted upon completion of the installation. Testing is to be performed by the manufacturer’s authorized personnel. Independent laboratory testing and reports, if required, are to be ordered and directed by the Architect/Engineer.

(6) Cleaning

(a) Install skylight frame and associated metal to avoid soiling or smudging the finish.

(b) Clean glass and frame at time of installation. Final cleaning, if required, subsequent to completion of project, is not to be performed by the manufacturer.

(7) Protection

(a) The skylight manufacturer does not provide, nor does it include, any temporary protection to the skylight and its materials after the installation is complete. Protection of the skylight from ongoing work by other trades shall be the responsibility of the Contractor. The manufacturer is responsible only for the damage caused by the personnel under its control and responsibility.

(b) Contractor to provide temporary protection to skylight openings during the installation of skylights to prevent any damage to the skylight wells and the museum interior.

END OF SECTION
(28) Section 07900 – Sealants

PART 1 – GENERAL

(1) Description of work

(a) Provide and install sealants at stone joints as indicated on Drawings.

(b) Provide and install sealants at flashing edges as indicated on Drawings.

(c) Provide and install sealants at exposed aggregate concrete paving joints as indicated on the Drawings.

(2) Quality assurance

(a) Except as modified by the Drawings and Special Specifications, all sealant work shall be in accordance with American Society for Testing & Materials (ASTM) standards and sealant manufacturer’s recommendations and guidelines. Pertinent ASTM standards include:

1. ASTM C 920 – Specification for Elastomeric Joint Sealants

2. ASTM C 1193 – Guide for Use of Joint Sealants

(b) Submittals: In accordance with Section 01300:

1. Sealants:
   a. One unmixed container of the size to be used on the project, of all required sealants with sealant manufacturer’s recommendations, specifications and color charts.

   b. Sealant manufacturer’s written approval or endorsement of the sealant’s use for all conditions specified, including compatibility of sealant with all materials that are in contact with sealant; whether priming of the surfaces to receive sealant is required; and whether existing conditions will adversely affect the new sealant in any way.

   c. Sealant manufacturer’s product descriptions with instructions, including limitations for storage, joint opening preparation, and installation of sealants and joint components.

   d. Sealant backing and bond breaker manufacturer’s product description with instructions, including limitations for storage, handling, and installation.

   e. Sealant manufacturer’s standard color range for color selection, with samples made up of actual sealant for approval.

   f. Sealant manufacturer’s stain and adhesion test reports indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include
sealant manufacturer’s interpretation of test results relative to sealant performance, and recommendations for primer and substrate preparation needed to obtain adhesion.

2. Backer rods: One (1) foot section of each size of backer rod, with copy of manufacturer’s printed information.

3. Compressible filler: One (1) foot section of closed cell polyethylene

4. Primer, if recommended by sealant manufacturer.

(3) Delivery, storage, and handling

(a) Deliver products to site in their original, unopened containers, bearing the name of the manufacturer and brand.

(b) All materials received at the site shall be unloaded with care and handled to avoid any damage or contamination of the materials.

(c) All materials shall be stored, covered and protected from the weather in strict compliance with the manufacturer’s recommendations. The location for storage shall be approved by the Owner.

(4) Guarantee

(a) Provide installation guarantee for a period of five (5) years against defective materials or workmanship.

PART 2 – PRODUCTS

(1) Sealant for vertical joints:

(a) Sealant for joints adjacent to stone units and to sheet metal units shall be Sonneborn “NP-2” or equal as approved by Architect/Engineer.

1. The Architect/Engineer shall select the colors of the sealant used based upon sample test areas installed on the building by the Contractor.

2. Primer at sealant contact surfaces shall be as recommended by sealant manufacturers.

3. The Contractor shall consult with the sealant manufacturer, and sealant manufacturer shall perform necessary tests to verify compatibility of sealant with all materials that are in contact with sealant; to determine if priming of the surfaces to receive sealant is required; and to determine if the existing conditions will adversely affect the new sealant in any way.

(2) Sealant for horizontal joints:

(a) Sealant for joints between stone coping and Terrace paving shall be one-part Nonsag urethane sealant, traffic grade: ASTM C-920, Type S (single-component), Grade NS (Nonsag), Class 25; uses T (traffic) Sikaflex 1a or 15lm or equal.
1. The Architect/Engineer shall select the colors of the sealant used based upon sample test areas installed on the building by the Contractor.

2. Primer at sealant contact surfaces shall be as recommended by sealant manufacturers.

3. The Contractor shall consult with the sealant manufacturer, and sealant manufacturer shall perform necessary tests to verify compatibility of sealant with all materials that are in contact with sealant; to determine if priming of the surfaces to receive sealant is required; and to determine if the existing conditions will adversely affect the new sealant in any way.

3. Backer rod: Closed cell non-gassing polyethylene, compatible with sealant used.

4. Compressible filler: Closed cell polyethylene, compatible with sealant and backer rod used.

5. Weeps: Cotton weep cord in plastic tubes.

6. Open cell filter: Reticulated flexible polyester urethane foam having 30 pores per inch, of cross section to provide 15 to 25 percent compression for friction fit, and as manufactured by Foam Division, Scott Paper Co., H-O Products Co., or approved equal.

PART 3 – EXECUTION

1. General
   (a) Protect work in progress from weather damage.
   (b) Prevent sealant from staining existing and new materials in and adjacent to area of work.
   (c) Do not perform any work when the ambient air temperature is less than or is expected to be less than 45 degrees F.
   (d) Install sealant only at joints designated on Drawings to receive sealant.

2. Sample of work
   (a) Perform the preparation and joint sealant work specified below on representative sample areas of the building.
   (b) Sample area shall be selected by Architect/Engineer. Sample size shall be approximately 50 linear feet for each joint type to be sealed.
   (c) The trial repair when approved by the Architect/Engineer for quality, material and workmanship, will become the standard for the duration of the contract.
   (d) No work shall be performed on the building until the above specified sample work is performed by the Contractor and is accepted by the Owner and Architect/Engineer.
(3) Installation

(a) Remove all dirt, debris, and existing sealant from joint to be sealed. Depth of existing sealant may vary from that shown on Drawings.

(b) Do not install sealant over porous substrates that are wet. Allow sealant contact surfaces to thoroughly dry.

(c) Clean all sealant contact surfaces with sealant manufacturer’s approved solvent and cleaner. Do not allow spillage or seepage onto adjacent surfaces.

(d) For coated metal and other non-porous substrates, clean the substrate surface using the two-cloth system. Wipe with clean white cloth soaked in solvent recommended by sealant manufacturer for preparation of substrate. Solvent should be poured, not dipped onto the cloth. Wipe substrate surface dry with second dry, clean, lint-free white cloth before solvent evaporates. Change to clean cloths frequently. Brush application of solvents is not permitted. Do not permit spillage of solvent.

(e) Apply sealant primer recommended by sealant manufacturer to sealant contact surfaces.

(f) Apply primer with clean cloth for non-porous substrates and with clean, natural bristle brush for porous substrates. Apply primer to cloth or brush by pouring; dipping is not permitted. Take adequate measures, such as masking joint opening edges, to prevent primer from being applied to the face of adjacent surfaces. Masking must not leave residue on substrate. Allow primer to cure as recommended by sealant manufacturer before installation of sealant.

(g) Prime only those substrate surfaces that can be sealed immediately after the recommended primer-curing period to preclude dust, oil, rain, condensation, or other deleterious conditions to contaminate primer.

(h) Place backer rod in joint at stone to stone joints only. Install backer rod at proper depth in joint to provide specified joint dimension. Place sealant backing into the joint to avoid lengthwise stretching, twisting, braiding, or lapping. Provide continuity with tight butt joints. Install dry sealant backing immediately prior to installing sealant. Apply sealant with sealant backing in place unless otherwise indicated.

(i) Mix and place two-part urethane sealant in joints according to sealant manufacturer’s recommendations.

(j) Dry-tool exposed sealant surface immediately. Do not use soap, water, or other lubricant for tooling. (Concealed sheet metal joints do not need to be tooled.)

(k) Clean excess primer or sealant from units immediately after application, using solvents or cleaners recommended by sealant manufacturer.

(l) Cure sealant in accordance with manufacturer’s instructions to attain maximum durability and adhesion to units as soon as possible.
(4) Clean-up

(a) Remove waste materials, debris and rubbish from site at the end of each working day.

(b) Any existing sealant, which is removed from joints, shall be collected from building, ground, walks, and site and properly disposed of at the end of each working day.

END OF SECTION
(29)  **Section 08815 – Lay-In Light Glazing Repairs**

PART 1 – GENERAL

(1)  Description

(a) The work of this section involves the restoration of existing lay-in light glazing components and installation of new additional lay-in light glazing layers, including the following:

2. Stripping of existing interior paint coatings from existing lay-in light diffuse glazing.
3. Provide new lay-in light diffuse glazing to match existing sections that are cracked.
7. Provide removable ultra-violet (UV) filters for new wire glazing panes.

(b) Related Sections

1. Section 07820 – Metal-framed Skylights
2. Section 09920 – Paint Coatings

(2) References

(a) Aluminum Association Incorporated (AA): SAS-30 specifications for aluminum structures


(d) American Society For Testing And Materials (ASTM):

1. ASTM B209: Specification For Aluminum and Aluminum-Alloy Sheet and Plate
2. ASTM B221: Specification For Aluminum And Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

4. ASTM C1036: Specification for Flat Glass

5. ASTM D2240: Test Method for Rubber Property –Durometer Hardness


(f) Flat Glass Manufacturers Association (FGMA): Glazing Manual

(g) Illuminating Engineering Society of North America: Rp-30-96, Museum and Art Gallery Lighting: A Recommended Practice.


3) Performance requirements:

(a) Remove paint coatings and associated dirt utilizing specified cleaning chemicals from existing patterned glazing so that paint and paint residue is no longer visible and translucence of glazing panels is restored.

(b) Fabricate and install lay-in assemblies with UV filters so that transmission of UV radiation at 400 nm shall be less than 50 percent of transmission at 550 nm. Transmission at 320 to 280 nm shall be less than 1 percent of transmission at 550 nm.

4) Submittals and samples:

(a) Paint stripping:

1. Protection plan: Submit to Owner five (5) copies of a written plan describing all protection measures and systems proposed by Contractor for use during the work.

2. Product identification: Submit to Owner five (5) copies of manufacturer’s product literature, application instructions, and manufacturer’s safety data sheets for all products used in cleaning before the work begins.

3. Test Samples:

   a. Contractor shall execute a test sample of each of the paint stripping materials and methods specified herein. Sample shall be no less than five- (5) full panels of existing patterned glazing.

   b. Areas where samples are to be applied shall be selected by the Architect/Engineer in consultation with the Contractor.

   c. The paint stripping sample(s) shall be approved by the Architect/Engineer and owner before the commencement of the work.
(b) The Contractor shall submit five (5) complete sets of shop drawings for the lay-in light assemblies showing production details, construction of the glass and extrusions, dimensions, sizes, relationship of the lay-in assemblies windows to adjacent existing construction, finishes, and other information in sufficient detail to cover manufacture, handling, and installation. Drawings shall show details of sections and connections for fastening the aluminum extrusions, and shall identify anchorage and accessory items. Details shall be at least 1/2 full size scale.

(c) The Contractor shall submit two (2) samples of existing patterned lay-in light glazing 8 inch by 8-inch minimum with existing paint coatings removed using specified paint removal methods. These samples shall be cut from existing panels of patterned glazing that are cracked and will not be reused in the restoration.

(d) The Contractor shall submit two (2) lay-in light sample assemblies 14 inch by 14 inch (outside dimensions of aluminum frame) complete with new patterned glazing unit, new wire glazing, and new UV filter. Samples shall include all features specified and shown on the Drawings.

(e) The Contractor shall submit five (5) copies of product data and five (5) samples of new patterned glazing 8 inch by 8-inch minimum in size.

(f) The Contractor shall submit five (5) copies of product data and five (5) samples of new wire glazing 8 inch by 8-inch minimum in size.

(g) The Contractor shall submit five (5) copies of product data, including technical and testing information and five (5) samples of UV filter 8 inch by 8 inch minimum in size.

(5) Job conditions:

(a) Construction plant, including all equipment, material and appliances required for the completion of the work, shall be so located, laid out, constructed and operated as to provide for maximum efficiency, safety of the public and all persons employed at the site, an to prevent damage to all new and existing construction.

(b) Confine operations at site to areas permitted by laws, permits, contract, and the Owner.

(c) Contractor shall assume full responsibility for protection and safekeeping of products stored on premises, and for their proper use.

(d) The Contractor shall provide the project Inspectors and Architect/Engineer with access to the building during the work. Access shall be provided for random review of the work to assess quality, perform tests, and quantify repairs.

(6) Protection:

(a) The Contractor shall exercise caution in performing the work so as not to damage adjacent building elements. It shall be the contractor’s responsibility to protect interior finish and exterior materials from damage due to the paint stripping operation or the scaffolding and other equipment. Any damaged materials, wood,
metal, or glass that has been etched, the paint removed, or otherwise damaged, shall be repaired to the satisfaction of the Project Inspectors and Architect/Engineer without additional cost to TxDOT.

(b) Protection from chemical cleaning systems shall be by one of the following methods:

(c) Polyethylene sheets, no less than 6 mil thick, taped around the entire opening to provide an impervious barrier to the chemical cleaning process. Backing for the polyethylene sheets may be necessary to secure the sheets and provide a wind-proof, watertight system.

(d) Other protection as proposed by the Contractor and approved by the Architect/Engineer to provide an impervious barrier.

(e) Comply with all applicable safety codes and regulations that govern the work, including OSHA and EPA regulations covering waste water disposal.

(f) Take any additional precautions deemed necessary by the Project Inspectors, Architect/Engineer, or Owner to insure the safety of pedestrians and those working in the building.

(7) Scaffolding:

(a) The Contractor shall be responsible for providing all scaffolding, staging, etc., required for the proper execution of the work specified herein.

(b) All scaffolding and safety equipment and their operation must comply with applicable requirements of all laws, codes, ordinances and regulations of federal, state and municipal authorities having jurisdiction over this work. The most stringent requirements shall apply.

(8) Quality assurance:

(a) Stripping of paint coatings from existing patterned glazing:

1. Contractor shall have at least three- (3) year's experience in the repair and restoration of art glass windows.

2. Work shall be subject to inspection by the Project Inspectors and Architect/Engineer. Paint stripping found to be unacceptable shall be repeated at no additional cost to TxDOT.

3. Where conditions are uncovered that are not anticipated by the specifications and Drawings, the Contractor shall notify the Project Inspectors and Architect/Engineer immediately, before any repairs are initiated.

4. Contractor shall permit the Project Inspectors or Architect/Engineer to collect samples of cleaning materials at irregular intervals, if determined to be necessary by the Project Inspectors or Architect/Engineer. These samples
will be laboratory tested to insure that the products used in the cleaning process are the same as the materials, concentrations, and solution approved.

5. The Contractor shall provide the Project Inspectors or Architect/Engineer with access to the mixed solutions of the cleaning products at the site when so requested by the Project Inspectors or Architect/Engineer.

(b) Lay-in light assemblies: Manufacturers shall have regularly engaged in the manufacture of aluminum-framed windows for not less than five (5) years. Further, manufacturer shall have been continuously in the sales and service of aluminum-framed windows for that period, and shall demonstrate financial strength consistent with the size of this project.

PART 2 – PRODUCTS

(1) Materials for paint removal from existing patterned glass panels:

(a) Clean, potable water. Water used for prewetting, mixing, and rinsing must have an iron content of less than two (2) parts per million, or 0.0002 percent (by weight).

(b) For paint removal: Peel-Away 7, manufactured by Dumond Chemicals, New York, New York.

(2) Materials for lay-in light assemblies:

(a) Aluminum framing:

1. Aluminum extrusions: Shapes as required, that will fulfill performance requirements, but not less than 0.125 inch thick. Extruded aluminum shall be prime allow No. 6063-T5.

2. Aluminum finish: Class II clear anodized Type AA-M10C22 A-31: 204-RL.

3. Fasteners: Mechanical fasteners shall be 300 series non-magnetic stainless steel and of sufficient strength for the application.

(b) Setting blocks, edge blocks, and spacers:

1. Setting blocks used to support glass shall be neoprene of 85 ± 5 Shore A durometer hardness. Block thickness shall be sized to allow a nominal 1/4-inch clearance between the edge of glass and the rabbet, except where the bite is likely to become less than 3/8 inch, provide 3/16-inch clearance. Setting block length per block shall be 0.1 inch per square foot glass area but not less than 4 inch.

2. Edge blocks used for centering the glass and preventing lateral “walking” shall be neoprene of 65 ± 5 Shore A durometer hardness. Blocks shall be 4-inch minimum in length and sized to allow a nominal 1/8-inch clearance between the edge of the glass and the block.
3. Spacers used for holding the glass in the proper plane shall be neoprene of
hardness necessary for intended use. Spacers shall be continuous at each
face of glass to provide a uniform cushion all around the perimeter of the
glass.

4. Blocks and spacers shall meet the requirements of ASTM C864, and Glass
Unit Manufacturer and shall be compatible with glazing compound specified
herein.

(c) Patterned glazing:
   1. New patterned glazing to match existing patterned glazing in translucency
      and thickness as supplied by one of the following:
      a. AFG Industries, Inc., Kingsport, TN.
      b. Guardian Industries, Auburn Hills, MI.
      c. Pilkington, Toledo, OH.
      d. Pulp Studio, Inc., Los Angeles, CA.
      e. Rudy Art Glass Studio, York, PA.

(d) Wire glazing:
   1. New 1/4 inch thick wire glass as supplied by one of the following:
      a. AFGD, Inc., Atlanta, GA.
      b. Milgard tampering, Inc., Tacoma, WA.
      c. Guardian Industries, Auburn Hills, MI.

(e) UV filters:
   1. Acrylic sheet UV filters with the following minimum characteristics:
      a. Transmission of UV radiation at 400 nm shall be less than 50 percent
         of transmission at 550 nm.
      b. Transmission at 320 to 380 nm shall be less than 1 percent of
         transmission at 550 nm.
   2. Acrylic sheet UV filters as supplied by the following:

(2) Fabrication:
   (a) Make provisions in the framing for minimum edge clearance, nominal edge cover,
       and nominal pocket width for the thickness and type of glass specified and shown
       on the Drawings, in accordance with the recommendations of the glass
manufacturer, the aluminum fabricator, or the FGMA Glazing Manual, whichever is greatest.

(b) Provide uniform support with setting blocks to new and reused existing glass panels in new aluminum frames.

(c) Components to comply with performance requirements specified.

(d) Allow for the removal of the acrylic UV filter from the lay-in light assembly through the access slot as shown on the Drawings.

(e) Dissimilar metals: Provide adequate separation between dissimilar metals to prevent galvanic corrosion. Provide separation by suitable high-density plastics or similar materials.

(f) Accessories: Provide plastic or aluminum marking tag affixed to the frame of each lay-in light unit with a matching tag affixed to the existing wood support framing of the lay-in lights.

PART 3 – EXECUTION

(1) Paint stripping:

(a) The purpose of the cleaning process is to remove paint and associated dirt and contamination without damage to or etching of the patterned glass surface.

(b) The level of cleaning shall be as approved in the test samples as specified herein.

(c) The cleaner shall not damage, etch, burn, bleach, streak, or discolor the patterned glass.

(d) No cleaning shall take place when the temperature in the area where work is performed is less than 50 degrees Fahrenheit.

(e) It is recognized that variations of the cleaning materials and their application may be required as the job proceeds. However, no variation will be acceptable without written approval of the Architect/Engineer.

(2) Procedure for paint removal using Peel-Away 7

(a) Application:

1. Apply Peel-Away 7 paste evenly to a thickness of 1/16 to 1/8 inch, using a roller and nylon brush.

2. Cover applied paste with Peel-Away fibrous laminated cloth, with printed polyethylene side facing out. Use as many one square meter cloths as required to cover test sample area.

3. Rub gently to create adhesion between cloth and paste.

4. Leave in place for 2 to 48 hours, as determined by test samples. Contractor may permit different portions of sample area to dwell for different times to
evaluate required dwell time to successfully remove paint. Coordinate length of dwell times with Architect/Engineer.

(b) Removal, Rinsing, and Collection:

1. Remove by sliding Peel-Away tool or plastic putty knife into dried paste around edges of cloth, easing paint, paste, and cloth away from the surface in one piece. Take care not to scratch or damage glass surface. Remove as much of remaining residue as possible with Peel-Away tool.

2. Collect Peel-Away cloth with paste, paint, and residue, and place in plastic bags. Properly dispose of all debris in compliance with local regulations. Retain approximately one square foot of debris (paste, paint, and residue with cloth) and provide in plastic bag to Architect/Engineer for laboratory analysis to evaluate composition of paint.

3. To remove remaining residue, mist surface lightly (50 psi or less) with water spray. Wipe glass surface with sponge to loosen remaining residue. Rinse with low-pressure water (50 psi or less) to remove any remaining residue. Collect and dispose of residue.

(3) Clean-up from paint removal operation:

(a) The premises shall be kept in clean and orderly condition at all times during the progress of the work. Rubbish, barriers, dirt, debris, tools, equipment, and unused materials shall be removed from the site each day.

(b) All chemicals, dirt, pollutants, and other materials shall be washed from the area of work each day.

(c) The Contractor shall remove all empty drums, cleaning materials, and the like from the site.

(d) After cleaning has been completed, remove all protection including all tape, polyvinyl sheets, strippable mask, etc.

(e) Replace any glass damaged or etched during the cleaning process at no cost to the Owner.

(4) Installation of lay-in light assemblies:

(a) Examination: During removal of existing patterned glass panels. Contractor shall examine the existing support framing for the lay-in lights to determine if any conditions exist that will prevent the new lay-in light assemblies from being installed. If such conditions exist, the Contractor shall notify the Project Inspectors and Architect/Engineer immediately.

(b) Sequence: Installation of new lay-in light assemblies shall follow installation and testing of the metal-framed skylights and the application of coatings to the skylight well areas.
(c) Install marking tags to existing framing for lay-in lights. Tags to be mounted above the level of the lay-in lights so as to be visible only when the lay-in light assemblies are removed.

(d) Install new lay-in light assemblies into existing wood framed openings. Set lay-in lights with minimum bearing of 3/4 inch on each side of aluminum frame on existing wood framing.

(e) Contractor shall install lay-in light assemblies to allow for future removal by owner without the use of special tools. Field modification of the lay-in light assemblies or existing support framing shall not be allowed without prior written authorization by the Architect/Engineer.

(5) Cleanup from lay-in light installation:

(a) Clean exterior face of glazing on lay-in light assembly with household glass cleaner prior to installing new units.

(b) Remove all debris from the work area following the completion of work.

END OF SECTION
(30)  **Section 09200 - Portland Cement Plaster**

**PART 1 – GENERAL**

(1) Work included

(a) Work under this Section is subject to the requirements of the contract documents.

(b) The work shall include the following:

1. Repair of existing distressed areas of Portland cement plaster wall cladding with new Portland cement plaster.

(2) References

(a) ASTM 926 - Application of Portland cement-based plaster.

(b) Portland Cement Association (PCA) - plaster (stucco) manual.

(3) Quality Assurance

(a) Applicator: Company specializing in exterior cement plaster work with at least five years experience.

(b) Apply cement plaster in accordance with ASTM C 926 and Portland Cement Association Plaster (Stucco) Manual.

(4) Submittals

(a) Provide product data on metal framing and lath, sheathing, building paper and plaster materials, including characteristics and limitation of products specified.

(b) Submit manufacturer’s installation instructions.

(5) Field sample

(a) Construct a field sample panel at least 4 square feet illustrating surface finish, color of finish coat, and sealed control joints.

(b) Accepted sample shall serve as the standard for the remainder of the work, and shall remain as part of the work.

(6) Environmental requirements

(a) Do not apply plaster when substrate or ambient air temperature is less than 50 degrees Fahrenheit nor more than 80 degrees Fahrenheit.

(b) Maintain minimum ambient temperature of 50 degrees Fahrenheit during and after installation of plaster

**PART 2 – PRODUCTS**

(1) Plaster materials
(a) Cement: ASTM C150, normal - Type I Portland
(b) Lime: ASTM C207, Type S
(c) Aggregate: in accordance with ASTM C897
(d) Water: clean, fresh, potable and free of mineral or organic matter which can affect plaster

(2) Other materials
(a) Metal lath: ASTM C847; 2.5 pounds per square yard expanded metal diamond lath; self-furring Type G-90 galvanized finish
(b) Corner mesh: Formed steel, minimum 26 gage thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2-3/4 inches wide Type G-90 galvanized finish.
(c) Casing bead: Formed steel; minimum 26 gage thick 7/8 inch ground expanded metal flanges, with (square) edges; Type G-90 galvanized finish.
(d) Anchorages: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place.

(3) Plaster mix
(a) Mix and proportion cement plaster in accordance with ASTM C926, for three-coat work.
(b) Scratch (first) coat: One part Portland cement; minimum 0 to maximum 3/4 parts lime; and minimum 2 1/2 to maximum 4 parts sand per sum of cementitious material (Portland cement and lime combined).
(c) Brown (second) coat: Scratch (first) coat: one part Portland cement; minimum 0 to maximum 3/4 parts lime; and minimum 2 1/2 to maximum 4 parts sand per sum of cementitious material (Portland cement and lime combined). The same or greater sand proportion shall be used in the brown coat, than used in the scratch coat, within the specified limits.
(d) Job-mixed finish coat: One part Portland cement minimum 3/4 to maximum 1 1/2 parts lime; and 3 parts sand per sum of cementitious material (Portland cement and lime combined).
(e) Prior to installing the plaster, prepare trial mixes within the above-specified limits. Select a suitable proportion mix to meet all specified requirements of the plaster material. Provide the determined mix ratio to the Architect/Engineer for review. All mixing of plaster shall conform within the approved mix.
(f) Mix only as much plaster as can be used in one hour.
(g) Mix materials dry, to uniform color and consistency, before adding water.
(h) Protect mixtures from frost, contamination, and evaporation
(i) Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

(1) Inspection
   (a) Verify that surfaces and site conditions are ready to receive work.
   (b) Beginning of installation means acceptance of existing conditions.

(2) Installation
   (a) Install sheathing board in place over substrate. Securely anchor at no less than 24 inches on center into masonry back up or metal studs.
   (b) Apply building paper over substrate; weatherlap edges (upper sheet laid to exterior of lower sheet) 6 inches minimum. Fasten in place.
   (c) Apply self-furring metal lath taut. Lap ends and sides minimum two inches. Secure end laps with tie wire where they occur between supports. Attach metal lath to sheathing using nails at maximum 12 inches on center.
   (d) Continuously reinforced internal and external angles with corner mesh.
   (e) Place casing beads at terminations of plaster finish, where shown on Drawings. Secure rigidly in place.
   (f) After initial set, scribe joints in exterior plaster as indicated on Drawings, by cutting through 2/3 of the cement plaster depth, neatly, in straight lines.
   (g) Establish control joints with back to back casing beads, set 1/2 inch apart where shown on Drawings.

(3) Plastering
   (a) Apply plaster in accordance with ASTM C926
   (b) Apply scratch coat to a nominal thickness of 3/8 inch brown coat to a nominal thickness of 3/8 inch and a finish coat to a nominal thickness of 1/8 inch total thickness of 7/8 inch should be measured to plane of metal lath.
   (c) Moist cure scratch and brown coats.
   (d) After curing, dampen base coat prior to applying finish coat.
   (e) Apply finish coat and (wood float) steel trowel to a smooth and consistent finish.
   (f) Avoid excessive working of surface. Delay trowelling as long as possible to avoid drawing excess fines to surface.
   (g) Moist cure finish coat for minimum period of forty-eight (48) hours
(4) Tolerances

   (a) Maximum variation from true flatness: 1/16 inch in any direction.

END OF SECTION
(31) Section 9920 – Paint Coatings

PART 1 - GENERAL

(1) Work Included

(a) The work of this Section includes all labor, materials, equipment, and services to complete the following:

1. Application of coating to brick masonry in sample areas.
2. Application of coating to brick masonry.
3. Application of coating to interior concrete and interior plaster in sample areas.
4. Application of coating to interior concrete and interior plaster.

(2) Related Work

(a) Section 04460 – Masonry Repair
(b) Section 04500 – Masonry Paint Removal
(c) Section 07820 – Metal-framed Skylights
(d) Section 08815 – Lay-in Light Glazing Repairs

(3) References

(a) Code Of Federal Regulations


(b) The Society for Protective Coatings (SSPC)

1. SSPC PA Guide 3-82, “Guide to Safety in Paint Applications”

(4) Submittals

(a) Before the work begins, submit to Architect/Engineer a complete list of all materials to be used for approval. Listed materials shall be identified by manufacturer’s name, product name or stock number, and shall indicate the surfaces to which they are to be applied. Maintain one copy of list at the project site.

(b) Manufacturer’s product data sheets for all coatings, solvents, and cleaning materials.
(c) Manufacturer’s mixing, handling, and application instructions for all coatings and
related materials.

(d) Manufacturer’s material safety data sheets (MSDS) for all coatings, colvents,
cleaning materials, and potentially hazardous materials as defined in Federal
Standard 313.

(e) Safety Plan: A written plan of action which covers all operational requirements
for safe preparation of the surfaces, application of the coatings, means of
protection of surrounding areas from overspray, rebound, etc., and handling,
storage, and disposal of all hazardous and toxic materials. Plan requirements will
comply with applicable governments regulations and the most stringent
requirements of the following:

1. Manufacturer’s Material Safety Data Sheets

2. SSPC-PA Guide 3-82

3. Toxic material exposure limits, per 29 CFR 1910.1000 and 29 CFR
   1910.134.

(f) Contractor’s statement of proposed procedures for execution of the work,
inecluding operations that will require entry into or interfere with the interior and
exterior operation of the building.

(g) Detailed statement of procedures to accomplish the work, including cleaning,
priming, taping, and painting as recommended by the coating manufacturer after
preconstruction testing.

(h) Manufacturer’s certifications to show compliance with the requirements of this
specification.

(i) Color and texture samples on brick masonry for selection by the Owner.

(j) All warranties agreed upon by the coating manufacturers, applicator, and TxDOT.

(k) Coating manufacturer’s approved list of application equipment to be used on this
project.

(l) Applicator information:

1. Written approval as an applicator of the specified materials by the
   manufacturer(s) of the coating materials.

2. A list of projects of similar scale completed during the past five years,
   including a description of each project, surface area, coating system
description, and Owner contact with address and telephone number.

3. Documentation that the applicator has previously applied the specified
   manufacturer’s coating systems of similar systems in production quantities
   similar to this project. Include a list of such projects with description,
surface area, coating system description, and Owner contact with address and telephone number.

4. Documentation of how long the applicator has been continuously in the coating application business under the current name and organization.

5. Documentation that the job foreman has a minimum of five years experience as a foreman.

6. Documentation that the painters have a minimum of three years experience as painters.

(m) Manufacturer’s decoding information so field personnel can verify shelf lives and other coded information.

(n) Inspection plan including hold points and frequency of measurements for application of each layer of the coating system. The plan shall include a list of testing and inspection equipment to be used. It shall also include, but is not limited to:

1. Presurface preparation for obvious defects and contamination to have been removed in accordance with the specified preparation.

2. Measurement of ambient conditions of temperature, humidity, and dew points. Maximum dew point temperatures, and minimum and maximum temperatures, during application must be met.

3. Evaluation of surface preparation, application, and compressor equipment to verify cleanliness and avoid contamination.


5. Observe coating mixing and coating application for adequacy.

6. Determination of dry film thickness of each coat applied for conformance to specification.

7. Monitor cleanliness and time between coats. Each coat shall be inspected for cleanliness before application of subsequent coats.

(o) For each batch of coating to be used, submit a one-quart minimum sample of thoroughly mixed single component coating, or thoroughly mixed coating components of multiple component coatings. Identify sampled materials by manufacturer, product name, batch number, and date of manufacturer. Submit components of multi-component coatings in separate containers: do not mix components together.

(5) Closeout submittals

(a) Furnish one quart of each type and color of paint used.
(b) Submit maintenance data.

(6) Field samples

(a) Prepare at the job site samples of each coating specified herein, applied to surface prepared in accordance with this specification. Each sample shall be not less than 60 square feet in size. Sample locations shall properly characterize differences in configuration and exposure of the structure. Do not proceed with work prior to approval of sample by Project Inspectors and Architect/Engineer. Approved sample shall be the standard for all work.

(7) Job conditions

(a) All equipment, material, and appliances required for the completion of the work, shall be so located and operated as to provide for maximum efficiency, safety of the public and all persons employed at the site, and to prevent damage to all new and existing construction, in accordance with the approved safety plan.

(b) Confine operations at site to areas permitted by laws, permits, contract, the Owner as represented by the Project Inspectors, and the approved safety plan.

(c) Contractor shall assume full responsibility for protection and safekeeping of products stored on premises, and for their proper use.

(d) The Contractor shall provide the Architect/Engineer with access to the work at locations designated by the Architect/Engineer.

(e) Where conditions are uncovered that are not anticipated by the specifications, the Contractor shall notify the Project Inspectors and the Architect/Engineer immediately, before any repairs are initiated.

(f) Apply finish material when temperature is above 50 degrees Fahrenheit but below 95 degrees Fahrenheit. Do not apply materials in damp, rainy weather, or when rainy conditions are imminent. Do not apply paint to surfaces in direct sunlight. Apply finishes only when air is free of dust that would speck the finish.

(g) Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below 12 percent.

(h) Keep fire hazard to a minimum; remove from the area daily all oily rags, waste, and other combustibles not in covered metal containers.

(i) Do not apply coatings when the relative humidity exceeds 70 percent or when the surface of the brick masonry is less than 5 degrees Fahrenheit above the dew point, or when these conditions are anticipated. Maximum relative humidity shall be as permitted by the coating manufacturer.

(j) Cease exterior painting when the wind velocity exceeds 10 mph.

(8) Protection
(a) Remove or protect by covering all materials not to be painted as indicated on the Drawings.

(b) The Contractor shall exercise caution in performing the work so as not to damage other building elements. It shall be the Contractor’s responsibility to protect the other building elements from mechanical damage due to scaffolding and other equipment.

(c) Protect windows and doors, joints, and other openings from infiltration of water into the building.

(d) In areas where coating systems are to be applied, protect all building features from drippage or other effects of coatings.

(e) Any materials damaged by the coating process shall be repaired to the satisfaction of the Project Inspectors and Architect/Engineer without additional cost to TxDOT.

(f) All protection materials shall be carefully and thoroughly removed upon completion of the work. Nail holes, adhesive, etc., shall be repaired to leave the wood, metal, and glass surfaces in the same condition as that previous to the coating operations.

(g) Comply with all applicable safety codes and regulations that govern the work, including OSHA and EPA regulations covering wastewater disposal.

(h) Protect paving and sidewalks from staining or damage by the coating operations. Protect joints to prevent water from penetrating below-grade spaces.

(9) Workers, pedestrians, animals, plants, automobiles, other property, etc.

(a) The work required herein includes the use of chemicals that can harm workers, pedestrians and other persons, animals, plants, and damage automobiles, other buildings, street furniture, etc.

(b) The Contractor shall be responsible for protecting workers, pedestrians and other persons, animals, plants, adjacent buildings, parked or moving automobiles, other buildings, street furniture, and other persons and objects that are vulnerable to damage by the coating operations.

(c) Any damage to adjacent buildings, automobiles, etc., caused by the coating operations shall be the responsibility of the Contractor and shall result in no additional cost to TxDOT.

(10) Delivery, storage, and handling

(a) Protect existing construction and all work in place from damage resulting from the storage, preparation, handling, and application of the coating materials.

(b) Deliver materials to the job site in the original, new, and unopened packages and containers bearing the manufacturer’s name and label, with name of material and color; manufacturer’s name, stock number, and date of manufacture; contents by
volume for major pigment and binder constituents; thinning and application instructions; all safety label requirements; and batch numbers.

(c) Store coating materials, thinners, solvents, and elements in tightly closed containers in a covered, well ventilated area where they will be protected from exposure to direct sunlight, heat, sparks, flames, weather, or temperatures below 50 degrees Fahrenheit or above 95 degrees Fahrenheit, and in accordance with the manufacturer’s directions, the approved safety plan, and in an area approved by the Project Inspectors.

(d) All coating products stored and used on the site shall be clearly labeled with proper warning to prevent any accidental use of the products by unauthorized persons.

(e) Store coating products in secure location designated by the Project Inspectors.

(11) Job site references

(a) Maintain at least one copy of each reference standard of this specification at the job site and make available to the Architect/Engineer prior to any surface preparation of coating application work.

(b) Maintain on site a complete file of MSDS and manufacturer’s product and application data sheets for each coating material, thinner, cleaner, and solvent intended for use.

(12) Regulatory requirements

(a) Conform to all federal, state, and local ordinance regarding the use of, exposure to, and disposal of coatings, coating systems, solvents, thinners, cleaners, and related materials.

(13) Sequencing and scheduling

(a) Schedule installation of coatings so that all other work on the building that may affect the performance or final appearance is complete and properly cured.

(14) Warranty

(a) The manufacturer and installer shall jointly warrant that the coating will not crack, check, peel, excessively chalk, or allow exterior water to penetrate the coating for a period of ten (10) years.

PART 2 – PRODUCTS

(1) Coating for exterior brick masonry, interior concrete, an interior plaster.

(a) Thorosheen, as manufactured by Harris Specialty Coatings, Jacksonville, Florida; or Elastowall 351, as manufactured by Edison Coatings, Plainville, Connecticut.

(b) Wall cleaners and primers as determined by the coating manufacturer during the preconstruction testing.
(2) General: Provide primers and other undercoat paint produced by the same manufacturer as finish coats. Paint products shall be fresh and well ground; shall not settle readily, cake, or thicken in the container; shall be broken up readily with paddle to a smooth consistency; and shall have easy application properties. Provide solvents and other materials incidental and required for proper coating system application as approved by the coating manufacturer.

(3) Colors: Color shall be as selected by the Owner and Architect/Engineer based on the field samples.

PART 3 – EXECUTION

(1) Examination

(a) Contractor shall inspect all surfaces to receive coating to ensure that all required work is complete and the surfaces are ready for the installation of the coatings as specified and as required by the coating manufacturers. Installation of the coating shall be deemed to be acceptance of the substrate by the contractor and manufacturer.

(2) General

(a) Cover and protect finished work and surfaces not to be painted. Use drop cloths of adequate size to protect adjacent areas.

(b) Mix and prepare painting materials in accordance with manufacturer’s directions.

(c) Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be painted, or provide surface applied protection. Reinstall removed items when final coat is thoroughly dry.

(d) Do not paint over dirt, rust, scale, grease, moisture, voids and blemishes, or other conditions detrimental to formation of a durable paint film.

(e) Apply paint in accordance with manufacturer’s directions. Use techniques best suited for substrate and type of material being applied.

(f) Secure approval of each coat from Project Inspectors before proceeding with the next.

(g) Apply material evenly without runs, sags, or other defects. Leave moldings, trim, and edges clean and true to details without excess paint in corners or depressions. Make edges of paint adjoining other materials or color sharp and clean, without overlaps.

(h) Sanding: Lightly sand between coats to ensure that surface finish is smooth to the touch.

(i) Apply additional coats when undercoats, stains, or other conditions show through final coat of paint. Final finish shall have uniform color and appearance.

(3) Application of coating:
(a) Preparation:
1. All surfaces must be dry, clean, and free of dust, oil, cleaners, and other contaminants.
2. Mortar at new brick masonry work must be completely cured prior to coating application.
3. Prepare surface in accordance with coating manufacturer’s recommendations.

(b) General:
1. Apply materials at manufacturer’s recommended spreading rate to establish a total dry film thickness as recommended by the manufacturer.
2. Work the material into small surface voids.
3. Cut in edges clean and sharp where work joins other materials or color.
4. Make finish coat uniform in texture and color with no streaks, laps, heavy build-ups, runs, pinholes, or missed areas.

(c) Coating Application:
1. Surface to be coated must be thoroughly dry when tested in accordance with ASTM D4263-83.
2. Stir coating well in its container. Apply at a spreading rate as recommended by the manufacturer. Apply by brush or roller. Before applying, dampen brushes or rollers with water.

(d) Clean-up
1. Protect adjacent surfaces from the accidental application of coating or other materials.
2. As work progresses visually inspect adjacent surfaces and remove all traces of spilled and splashed coating or other materials used.
3. At the conclusion of coating work remove all scaffolding and equipment used in the work, clean up all debris and surplus materials and remove same from the premises.

END OF SECTION
(32) Section 16610 - Lightning Protection System

PART 1 - GENERAL

(1) Description

(a) The work of this Section consists of furnishing and installing a lightning protection system including:

1. Air terminals
2. Conductors
3. Roof penetrations
4. Ground terminals
5. Equipotential bonding

(2) Related work

(a) Section 07500 – Modified bitumen roofing membrane
(b) Section 07600 – Flashing and sheet metal

(3) Qualifications

(a) The system shall be installed by a firm actively engaged in the installation of master labeled lightning protection systems and shall be so listed by Underwriters Laboratories, Inc. The completed system shall comply with the latest editions of the “Installation Requirements for Lightning Protection Systems, UL96A” and the National Fire Protection Association’s “NFPA 780, Standard for the Installation of Lightning Protection Systems.”

(b) The materials used in this lightning protection system shall be labeled or listed by Underwriters Laboratories, Inc. for use in master labeled lightning protection systems.

PART 2 – PRODUCTS

(1) Materials

(a) Materials shall generally be of copper and/or copper-bronze. In locations where the system components are mounted on aluminum, galvanized steel, or other dissimilar metal surfaces, aluminum materials shall be used to avoid electrolytic corrosion of the dissimilar metals.

(b) Materials shall be sized in accordance with the material requirements of NFPA 780 and UL96a.

(2) Air terminals
(a) Air terminals shall be provided so as to enclose all roof areas of the structure in a zone of protection. Air terminals shall project a minimum of ten inches above the area protected and shall be located at intervals not exceeding 20'-0” along ridges of pitched roofs and around the perimeter of flat or gently sloping roof edges. Air terminals shall be located within two feet of edges and outside corners of protected areas. Air terminal spacing exceeding these dimensions is permitted so long as the entire structure lies within a zone of protection.

(b) Air terminals shall be provided for stacks, flues, mechanical equipment, and other objects not located within a zone of protection. Non-metallic objects or metallic objects having a metal thickness of less than 3/16 inch require the installation of air terminals and required conductors. Metal objects having a metal thickness 3/16 inch or greater may be connected to the lightning protection system as a strike terminal using main size conductors and a connector fitting having a minimum of three (3) square inches of contact area with the metal object.

(c) Air terminal mounting bases shall be of cast construction and shall be securely fastened to the structure in accordance with the requirements of the specified standards.

(3) Conductors

(a) Main conductors shall be sized in accordance with the material requirements listed above. Conductors shall provide a two-way path from each air terminal horizontally or downward to the ground terminals. Conductors shall be free from excessive splices and sharp bends. Bends in conductors shall not form an included angle of less than 90 degrees nor have a radius of bend of less than eight inches. Conductors shall be fastened to the structure at intervals not exceeding 3’-0”.

(b) Down conductors shall be copper and shall be run concealed from view outside the structure as described below.

(4) Roof penetrations

(a) Where down conductors penetrate the roof, through-roof assemblies with solid bars and appropriate roof flashing shall be used. Conductors shall not pass directly through the roof. Flashing of the through-roof penetrations to the roof shall be compatible with the roofing system and be furnished and installed by the roofing Contractor so as to maintain their warranty.

(5) Ground terminals

(a) Each down conductor shall terminate at a ground terminal dedicated to the lightning protection system. The ground terminals shall consist of 3/4 inch by 10 feet long copper-clad steel ground rods. The down conductor shall be connected to the ground rod using an exothermic welded connection.

(6) Equal potential bonding (common bonding)

(a) All grounding media in or on the structure shall be interconnected and bonded to the lightning protection system using main size conductors and fittings. The
interconnection of the lightning protection system and other grounded media shall be in the form of a ground loop conductor run exposed in the basement of the structure.

(b) Intermediate-level potential equalization shall be accomplished by interconnecting the lightning protection system down conductors, reinforcing steel, other grounded media, and long vertical metal bodies by horizontal loop conductors at intermediate levels between the top and base of the structure at intervals not exceeding 200 feet.

(c) Potential equalization at the top of the monument shall be verified. The steel framing of the star may serve as this loop provided the existing down conductors, reinforcing steel, elevator rails, and other long vertical metal objects are connected to the steel framing or a loop conductor.

(d) Other grounded metal bodies not covered in a, b, and c above shall be bonded to the system if they are within the required bonding distance calculated by the bonding distance formulas contained in NFPA780. The resulting required bonding connections shall be made using bonding conductors and fittings.

PART 3 – EXECUTION

(1) Installation

(a) Install new lightning protection system air terminals at the at the statuary base roof edge. Interconnect these air terminals with a new roof conductor. Provide new down conductors from the statuary base roof down through the first floor to the basement. Connect to the existing down conductors in the monument shaft at this roof level.

(b) Route down conductors down through the first floor in storage areas at the four corners. Protect down conductors in PVC conduit or guards at the first floor. Extend down conductors to the basement ceiling and through the foundation wall to the exterior of the building and terminate with new ground terminals. Coordinate cutting and patching through the floors and at the Terrace with the architect.

(c) Install a new lower-level potential equalization loop at the perimeter of the basement ceiling. Connect the new as well as the existing down conductors to this loop conductor. Bond underground metal piping entering the building as well as electric, telephone, and other building service grounds to this loop conductor. Provide bonding connections to reinforcing steel and other long vertical metal bodies (elevator rails for example) that extend up through the shaft of the monument from this loop conductor.

(d) Install new intermediate level potential equalization loops within the monument shaft. Locate these loop conductors on the inside face of the shaft wall at intermediate levels not exceeding 200 feet. Bond to existing down conductors, reinforcing steel, and other long vertical metal bodies within the shaft at each intermediate level.
(e) Verify that a roof-level potential equalization loop exists with the existing lightning protection system at the top of the monument. The steel framing of the star may serve as this loop provided the existing down conductors, reinforcing steel, elevator rails, and other long vertical metal objects are connected to the steel framing or a loop conductor.

(2) Inspection

(a) Upon completion of the installation, the installing Contractor shall obtain a reconditioned master label issued for this system by Underwriters Laboratories, Inc.

END OF SECTION