

**CONTRACT DOCUMENTS
AND
SPECIFICATIONS
FOR
PROJECT NO. TMUA SP 14-15
TMUA MISCELLANEOUS ROOF REPLACEMENTS
OWRB LOAN NO.'s
ORF-09-0001-CW & ORF-11-0003-CW**

ATTENDANCE AT PRE-BID CONFERENCE IS MANDATORY

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VOLUME II – TECHNICAL SPECIFICATIONS

DOCUMENT 000107 - SEALS PAGE
PROJECT:

Name: City of Tulsa
Location: TMUA Miscellaneous Roof Replacement
Project Number: SP 14-15

SGA Project Number: 1400305

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[Handwritten Signature]

Architect of Record

4.26.2010

Date

City of Tulsa
TULSA METROPOLITAN UTILITY AUTHORITY
MISCELLANEOUS ROOF REPLACEMENT
Tulsa, OK

Project No. SP 14-15
City of Tulsa, Oklahoma
Engineering Services Department

SGA Project No. 1400305

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work under separate contracts.
 - 4. Access to site.
 - 5. Coordination with occupants.
 - 6. Work restrictions.
 - 7. Specification and drawing conventions.
 - 8. References
 - 9. Miscellaneous provisions.

- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Section 015000 - Temporary Facilities and Controls, for limitations and procedures governing temporary use of Owner's facilities.
 - 3. Section 012100 – Allowances, for procedures governing the use of Owner Allowances during construction.

1.2 PROJECT INFORMATION

- A. Project Identification: TMUA
 - 1. Project Location: 3131 North Erie Avenue, Tulsa, OK.

- B. Owner: City of Tulsa.
 - 1. Owner's Project Manager: Max Wells, AIA, CCS.

- C. Architect: SGA DesignGroup, P.C.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work consists of the replacement of the existing roofing system on Buildings A, B, C, D, & E, and consists of the following:
 - 1. Removal of existing roofing system to structural deck.
 - 2. Repairs to existing structural deck as needed.
 - 3. Installation of a new TPO Roofing System.
 - 4. Installation of new roof curbs supporting skylights, mechanical systems, plumbing systems and surrounding other roof membrane penetrations as indicated.
 - 5. Installation of new scuppers, conductor heads and downspouts as indicated on Drawings.

- B. The Work additionally consists of repainting of Buildings B & C.

- C. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.4 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.5 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- C. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 - 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
- E. Controlled Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.
- F. Security: During construction period, Contractor shall install barricades as required to restrict construction area access to the public. Contractor to coordinate security requirements with the City of Tulsa Representative.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.9 REFERENCES

A. Industry Standards:

1. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
2. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
3. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - a. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

B. Abbreviations and Acronyms:

1. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor.
- B. Types of allowances include the following:
 - 1. Owner Contingency Allowances: Unit-cost allowances.
- C. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Section 012200 "Unit Prices" for procedures for using unit prices.

1.2 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances as directed by the Architect or Owner.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.3 OWNER CONTINGENCY ALLOWANCES

- A. An Owner Contingency allowance of **Twenty Thousand Dollars (\$20,000.00)** has been provided in the Contract for additional work not identified in the Contract and for use according to Owner's instructions.
- B. The allowance shall be used only at the discretion of the City of Tulsa. Any allowance balance remaining at the completion of the project will be credited back to the City of Tulsa on the final Application for Payment submitted by the Contractor.
- C. Use the contingency allowance only as directed by Architect and Owner for Owner's purposes that indicate quantities and amounts to be charged to the allowance.
- D. Contractor's overhead, profit, and related costs for materials, products and equipment as directed by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum or Alternate Work Sums. These costs include delivery, labor, installation, insurance, equipment rental, and similar costs.
- E. Directives authorizing use of funds from the Owner's contingency allowance will include Contractor's related costs and reasonable overhead and profit margins as originally bid on the Bid Form.
- F. The Contractor shall provide, to the City of Tulsa Representative, a written request for the use of the allowance, with a schedule of values, and all associated backup information, including any time extensions required to perform the work.

- G. Contractor shall proceed with work included in the allowance only after receiving a written order, from the City of Tulsa Representative, authorizing such work. Proceeding with work in the allowance without a written order from the City of Tulsa Representative will be at the Contractor's cost.

1.4 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount as part of the allowance.
 - 2. Submit substantiation of a change in scope of work, if any, claimed in unit-cost allowances.
 - 3. Owner reserves the right to establish the quantity of work-in-place by quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents.
 - 1. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Unit Prices.
- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Contract – Proposal: for estimated quantities and unit prices.

1.2 DEFINITIONS

- A. Unit Price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Determinations for Unit Price Work: Owner will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Owner will review with Contractor the preliminary determinations on such matters before rendering a decision thereon (by recommendation of an Application for Payment or otherwise). Owner's written decision thereon will be final and binding (except as modified to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of any Claims.
- C. Unit Price Work:
 - 1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
 - 2. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Owner's Field Engineering personnel.
 - 3. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
 - 4. Owner or Contractor may make a Claim for an adjustment in the Contract Price if:
 - a. The quantity of any item of Unit Price performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. There is no corresponding adjustment with respect to any other item of Work; and
 - c. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner will confirm Contractor's measurement of work-in-place that involves use of established unit prices with Owner's Field Engineering personnel.
- D. List of Unit Prices: The schedule of unit prices is included in the Contract - Proposal. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

SECTION 012500 - SUBSTITUTION PROCEDURES**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions during Bidding: Changes proposed by Bidders that are being offered for consideration during the Bidding process.
 - 2. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 3. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
 - 4. The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with Owner's change procedures.
 - 5. Warranty: The Contractor warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.

1.3 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided at the end of this Section.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable.
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES or other qualified code organization.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action during Bidding: Architect may request additional information or documentation for evaluation of the substitution request. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.
- a. Form of Acceptance during Bidding: Addendum.
4. Architect's Action during Construction: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through City Field Engineering of acceptance or rejection of proposed substitution within 15 days of receipt of request.
- a. Form of Acceptance during Construction: Allowance Authorization.
 - b. Form of Acceptance during Construction, when cost of proposed substitution exceeds available funds in Owner's Allowance: Change Order.
 - c. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS**2.1 SUBSTITUTIONS DURING BIDDING**

- A. **Substitutions during Bidding:** No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for a thorough evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.
1. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
 2. **Substitution Request Form:** Each request for substitution shall be submitted on the Substitution Request Form provided at the end of this Section.

2.2 SUBSTITUTIONS DURING CONSTRUCTION

- A. **Substitutions for Cause:** Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. **Conditions:** Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
 2. **Substitution Request Form:** Each request for substitution shall be submitted on the Substitution Request Form provided at the end of this Section.
- B. **Substitutions for Convenience:** Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
1. **Conditions:** Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

- d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
2. Substitution Request Form: Each request for substitution shall be submitted on the Substitution Request Form provided at the end of this Section.
- C. Owner's Approval: Under no circumstances will a substitution be allowed without the Owner's written approval.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST FORM

Project: **TMUA Roof Replacements**
To: _____

Re: _____

Substitution Request Number: _____
Date: _____
From: _____
COT Project Number: **SP 14-15**
Contract for: _____

Specification Section: _____
Specification Title: _____

Description: _____
Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____
Trade Name: _____

Address: _____

Installer/Subcontractor: _____
History: New Product 1-4 years old 5-10 years old More than 10 years old

Address: _____

Differences between proposed substitution and specified products: _____

Point-by-Point comparative data attached – REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Address: _____
Address: _____ Owner: _____
Date Installed: _____

Proposed substitution affects other parts of the Work: No Yes; explain: _____

Savings to Owner (City of Tulsa) for accepting substitution: _____ \$ _____
Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ days.

Supporting data attached: Drawings Product Data Samples Samples Tests
 Reports Other _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified. Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Firm: _____

Address: _____

Telephone: _____ email: _____

Signed by: _____ Date: _____

A/E's REVIEW AND ACTION

- Substitution Approved: Make submittals in accordance with Specification Section 012500 Substitution Procedures.
- Substitutions Approved as Noted: Make submittals in accordance with Specification Section 012500 Substitution Procedures.
- Substitution Rejected: Use specified materials.
- Substitution Request received too late: Use specified materials.

Signed by: _____ Date: _____

Supporting Data Attached: Drawings Product Data Samples Samples Tests
 Reports Other _____

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Requests for Information (RFIs).
 - 3. Project meetings.

- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.

3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. **General:** Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. **Content of the RFI:** Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. **RFI Forms:** AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Software attachments shall be electronic files in Adobe Acrobat PDF format.
- D. **Architect's Action:** Architect will review each RFI, determine action required, and respond. Allow **five** working days for Architect's response for each RFI.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to General Conditions."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within **10** days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
- 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were returned without action or withdrawn.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- 1. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Owner, City of Tulsa Field Engineering, will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner after execution of the Agreement.
- 1. Conduct the conference to review responsibilities and personnel assignments.
 - 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises and existing building.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.

- r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner-Field Engineering and Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Owner-Field Engineering **will schedule and conduct** a project closeout conference, at a time convenient to Owner and Architect prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.

2. Attendees: Authorized representatives of Owner-Field Engineering, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Owner's partial occupancy requirements.
 - k. Installation of Owner's furniture, fixtures, and equipment.
 - l. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, and Architect, each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 1. Attendees: In addition to representatives of Owner-Field Engineering, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes requirements for the administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. General Conditions: Payment Procedures for submitting Applications for Payment and the schedule of values.

1.2 DEFINITIONS

- A. Submittals: Written and graphic information and physical samples that require Architect's and COT-Field Engineering responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and COT-Field Engineering and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 14 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.

- d. Name of subcontractor.
- e. Description of the Work covered.
- f. Scheduled date for Architect's and COT-Field Engineering final release or approval.
- g. Scheduled date of fabrication.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will **not** be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and COT-Field Engineering reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's and COT-Field Engineering receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect and COT-Field Engineering will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect and COT-Field Engineering.
 - 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01).
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.

4. **Additional Paper Copies:** Unless additional copies are required for final submittal, and unless Architect and COT-Field Engineering observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and COT-Field Engineering.
 5. **Transmittal for Paper Submittals:** Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect and COT-Field Engineering will discard submittals received from sources other than Contractor.
 - a. **Transmittal Form for Paper Submittals:** Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Construction Manager.
 - 7) Name of Contractor.
 - 8) Name of firm or entity that prepared submittal.
 - 9) Names of subcontractor, manufacturer, and supplier.
 - 10) Category and type of submittal.
 - 11) Submittal purpose and description.
 - 12) Specification Section number and title.
 - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 14) Drawing number and detail references, as appropriate.
 - 15) Indication of full or partial submittal.
 - 16) Transmittal number, numbered consecutively.
 - 17) Submittal and transmittal distribution record.
 - 18) Remarks.
 - 19) Signature of transmitter.
- E. **Options:** Identify options requiring selection by Architect.
- F. **Deviations and Additional Information:** On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and COT-Field Engineering on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. **Resubmittals:** Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's and COT-Field Engineering's action stamp.
- H. **Distribution:** Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. **Use for Construction:** Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and COT-Field Engineering's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. **General Submittal Procedure Requirements:** Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. **Submittals:** Submit six paper copies of each submittal unless otherwise indicated. Architect, through COT-Field Engineering will return three copies.
 2. **Certificates and Certifications Submittals:** Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. **Product Data:** Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format: Six paper copies of Product Data unless otherwise indicated. Architect, through COT-Field Engineering will return three copies.
- C. **Shop Drawings:** Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. **Preparation:** Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. **Sheet Size:** Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 22 by 34 inches.
 3. **Submit Shop Drawings in the following format:**
 - a. Six opaque (bond) copies of each submittal. Architect and COT-Field Engineering, will return three copies.

- D. **Samples:** Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit six sets of Samples. Architect and COT – Field Engineering will retain three Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- E. **Product Schedule:** As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. Six paper copies of product schedule or list unless otherwise indicated. Architect, through COT-Field Engineering, will return three copies.
- F. **Contractor's Construction Schedule:** Comply with requirements specified in agreement.
- G. **Application for Payment and Schedule of Values:** Comply with General Conditions.
- H. **Test and Inspection Reports and Schedule of Tests and Inspections Submittals:** Comply with requirements specified in Section 014000 "Quality Requirements."
- I. **Closeout Submittals and Maintenance Material Submittals:** Comply with requirements specified in Section 017700 "Closeout Procedures."
- J. **Qualification Data:** Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

- K. **Welding Certificates:** Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- L. **Installer Certificates:** Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- M. **Manufacturer Certificates:** Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- N. **Product Certificates:** Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- O. **Material Certificates:** Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- P. **Material Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- Q. **Product Test Reports:** Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- R. **Preconstruction Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- S. **Compatibility Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- T. **Field Test Reports:** Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- U. **Design Data:** Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. **Performance and Design Criteria:** Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. **Delegated-Design Services Certification:** In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and six paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. **Action and Informational Submittals:** Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and COT-Field Engineering.
- B. **Project Closeout and Maintenance Material Submittals:** See requirements in Section 017700 "Closeout Procedures."
- C. **Approval Stamp:** Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S and COT-FIELD ENGINEERING ACTION

- A. **Action Submittals:** Architect and COT-Field Engineering will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect and COT-Field Engineering will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. **Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and COT-Field Engineering.**
- C. **Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.**
- D. **Submittals not required by the Contract Documents may be returned by the Architect without action.**

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. **Quality-Assurance Services:** Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. **Quality-Control Services:** Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. **Installer/Applicator/Erector:** Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. **Experienced:** When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. **Referenced Standards:** If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For Contractor's quality-control personnel.
- B. **Contractor's Statement of Responsibility:** When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

1.5 REPORTS AND DOCUMENTS

- A. **Manufacturer's Technical Representative's Field Reports:** Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- B. **Factory-Authorized Service Representative's Reports:** Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.
- C. **Permits, Licenses, and Certificates:** For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. **General:** Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

- A. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- B. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Review first subparagraph below with Owner's insurance carrier. Revise to suit Project.
 - 2. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are legible at all times.

- E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- F. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- G. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 2. Section 013300 "Submittal Procedures" for submittal requirements.
 - 3. Section 017700 "Closeout Procedures" for closeout requirements.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."

- b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. **Manufacturer's Warranty:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.

- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
 - 2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. Refer to Divisions 00 through 09. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. **General Product Requirements:** Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. **Standard Products:** If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. **Product Selection Procedures:**
 - 1. **Product:** Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - 2. **Manufacturer/Source:** Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - 3. **Products:**
 - a. **Restricted List:** Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - b. **Non-restricted List:** Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 - 4. **Manufacturers:**
 - a. **Restricted List:** Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

- b. **Non-restricted List:** Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- 5. **Basis-of-Design Product:** Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. **Visual Matching Specification:** Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. **Visual Selection Specification:** Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. **Conditions for Consideration:** Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents; that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Installation of the Work.
 - 3. Cutting and patching.
 - 4. Progress cleaning.
 - 5. Protection of installed construction.

- B. Related Documents and Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Section 011000 "Summary" for limits on use of Project site.
 - 3. Section 013300 "Submittal Procedures" for submitting surveys.
 - 4. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.3 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Electrical wiring systems.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity

to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Sprayed fire-resistive material.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other

construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. **Space Requirements:** Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. **Review of Contract Documents and Field Conditions:** Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 INSTALLATION

- A. **General:** Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. **Tools and Equipment:** Do not use tools or equipment that produce harmful noise levels.
- G. **Templates:** Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. **Attachment:** Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. **Mounting Heights:** Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. **Joints:** Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

- J. **Hazardous Materials:** Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

- A. **Cutting and Patching, General:** Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. **Cut in-place construction** to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. **Existing Warranties:** Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. **Temporary Support:** Provide temporary support of work to be cut.
- D. **Protection:** Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. **Adjacent Occupied Areas:** Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. **Existing Utility Services and Mechanical/Electrical Systems:** Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. **Cutting:** Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. **Finished Surfaces:** Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. **Concrete and Masonry:** Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Proceed with patching after construction operations requiring cutting are complete.
- H. **Patching:** Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. **Inspection:** Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. **Exposed Finishes:** Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
- I. **Cleaning:** Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Closeout Submittals.
 - 2. Substantial Completion procedures.
 - 3. Final Completion procedures.
 - 4. Final cleaning.
 - 5. Repair of the Work.

1.2 CLOSEOUT SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.
- C. Project Warranties: Final submittal at Final Completion.
- D. Operation and Maintenance Manual Submittals: Final submittal at Final Completion.
- E. Record Drawings: Submit copies of Record Drawings as specified herein.
- F. Record Specifications: Submit Project's Record Specifications, including addenda and contract modifications, as specified herein.
- G. Record Product Data: Submit Project's Record Product Data as specified herein.
- H. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit Miscellaneous Record Submittals as specified herein.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items (Punch List): Prepare and submit a list of items to be completed and corrected, indicating the value of each item on the list and reasons why the Work is incomplete.
 - 1. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A or other form as approved by City of Tulsa Construction Manager.
 - 2. Submit three paper copies of list of incomplete items (unless otherwise directed). Architect, through City of Tulsa Construction Manager, will return two copies.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 2. Submit closeout submittals specified in individual Sections, including warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 3. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by City of Tulsa Construction Manager. Label with manufacturer's name and model number where applicable.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Complete startup and testing of systems and equipment.
 2. Perform preventive maintenance on equipment used prior to Substantial Completion.
 3. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 4. Terminate and remove temporary facilities from Project site, construction tools, and similar elements.
 5. Complete final cleaning requirements, including touchup painting.
 6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, City of Tulsa Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. City of Tulsa Construction Manager will prepare the Substantial Completion documentation after inspection or will notify Contractor of items, either on Contractor's list or additional items identified, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to City of Tulsa Construction Manager instructions.
 2. Certified List of Incomplete Items (Punch List): Submit copy of Substantial Completion inspection list of items to be completed or corrected, endorsed and dated by City of Tulsa Construction Manager. Inspection List shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, City of Tulsa Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. City of Tulsa Construction Manager will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS**2.1 PROJECT WARRANTIES MANUAL**

- A. Time of Submittal: Submit written warranties on request of City of Tulsa Construction Manager for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

2.2 OPERATION AND MAINTENANCE MANUALS - GENERAL

- A. Operation and Maintenance Manual Submittals: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals.
 - 1. Submit reviewed manual content formatted and organized as required by this Section.
 - a. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 - b. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
 - 2. Format: Submit operations and maintenance manuals in the following format:
 - a. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - b. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - c. Enable inserted reviewer comments on draft submittals.
 - d. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect, through City of Tulsa Construction Manager, will return two copies.
 - 3. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Operating standards.
 - 3. Operating procedures.

4. Operating logs.
 5. Wiring diagrams.
 6. Control diagrams.
 7. Piped system diagrams.
 8. Precautions against improper use.
 9. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Manufacturer's name, product name and model number. Use designations for products indicated on Contract Documents.
 2. Equipment identification with serial number of each component.
 3. Equipment function.
 4. Operating characteristics.
 5. Limiting conditions.
 6. Performance curves.
 7. Engineering data and tests.
 8. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Manufacturer's name, Product name and model number.
 2. Color, pattern, and texture.
 3. Material and chemical composition.
 4. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following.
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning. List of cleaning agents and methods of cleaning detrimental to product.
 3. Schedule for routine cleaning, maintenance and repair instructions.

- E. **Repair Materials and Sources:** Include material lists and local sources of materials and related services.
- F. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. **Content:** For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. **Source Information:** List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. **Manufacturers' Maintenance Documentation:** Manufacturers' maintenance documentation including the following information for each component part or piece of equipment.
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. **Maintenance Procedures:** Include the following information & items that detail maintenance procedures.
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. **Maintenance Service Contracts:** Include copies of maintenance agreements with name and telephone number of service agent.
- H. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.6 RECORD DRAWINGS

- A. **Record Prints:** Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 2. Mark the Contract Drawings and Shop Drawings completely and accurately.
 3. Mark record sets with erasable, red-colored pencil.
 4. Note Construction Change, alternate numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.

2.7 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 2. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
- B. Format: Submit record Specifications as scanned PDF file(s) of marked-up paper copy Specifications.

2.8 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the products delivered to Project site and changes in manufacturer's written instructions for installation.
- B. Format: Submit record Product Data as scanned PDF file(s) of marked-up paper copy of Product Data.

2.9 MATERIALS FOR CLEANING

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. **Cleaning:** Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, attics, and similar spaces.
 - f. Sweep concrete floors broom clean in unoccupied spaces.
 - g. Vacuum carpet and similar soft surfaces, removing debris; clean according to manufacturer's recommendations if visible soil or stains remain.
 - h. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - i. Clean exposed surfaces of diffusers, registers, and grills.
 - j. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - k. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including fire rated doors and frames, mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3.3 RECORD DOCUMENTS RECORDING AND MAINTENANCE

- A. **Recording:** Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. **Maintenance of Record Documents and Samples:** Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and City of Tulsa Construction Manager's reference during normal working hours.

END OF SECTION 017700

SECTION 053100 - STEEL DECKING**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Roof deck replacement for rusting or damaged deck.
- B. Related Sections:
 - 1. Section 012200 – Unit Prices: Unit pricing for replacement or damaged deck.
 - 2. Section 012500 – Substitution Procedures: Procedure for submitting substitutions.
 - 3. Section 099000 – Painting and Coating: Application to interior side of replaced roof deck.

1.1 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Iron and Steel Institute (AISI): Specification for the Design of Cold-Formed Steel Structural Members.
- C. ASTM International (ASTM):
 - 1. ASTM A 780 – Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 2. ASTM A 1008 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- D. Steel Deck Institute (SDI):
 - 1. Design Manual for Composite Decks, Form Decks, Roof Decks – Publication 31.
- E. Steel Structures Painting Council (SSPC):
 - 1. SSPC-Paint 20 - Zinc-Rich Coating Type I - Inorganic And Type II – Organic.

1.2 ACTION SUBMITTALS

- A. Submittal Procedures: Unless otherwise specified herein, submit in accordance with procedures specified in Section 013300.
- B. Product Data: For each type of deck, accessory, and product indicated.
- C. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product certificates.

- C. Evaluation reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Consolidated Systems, Inc.; Metal Deck Group.
 - 2. Epic Metals Corporation.
 - 3. New Millennium Building Systems, LLC.
 - 4. Nucor Corp.; Vulcraft Group.
 - 5. Verco Manufacturing Co.
 - 6. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008, Structural Steel (SS), shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Grade: To match existing.
 - 1) 22, 20 and 18 gage: Grade 80 (80 ksi).
 - 2) 16 gage: Grade 33 (33 ksi) minimum.
 - b. Color: To match existing.
 - 2. Deck Profile: To match existing.
 - 3. Profile Depth: To match existing.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- G. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Replace corroded metal decking with new spanning a minimum number of roof joists specified by the project Architect.
- D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- I. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- J. Pour Stops and Girder Fillers: Weld steel-sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- K. Floor-Deck Closures: Weld steel-sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Rooftop equipment bases and support curbs.
 2. Wood blocking, cants, and nailers.
 3. Wood furring.
 4. Wood sleepers.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Lumber Standards Committee (ALSC):
1. Softwood Lumber Standards.
- C. ASTM International (ASTM):
1. ASTM A 123/A - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 2. ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 3. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 4. ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 5. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 6. ASTM E 1333 - Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.
- D. American Wood Protection Association (AWPA):
1. AWPA U1 - User Specification for Treated Wood.
 2. AWPA M4 - Care of Preservative Treated Wood Products.
- E. Department of Commerce (National Institute of Standards and Technology) – Product Standard (DOC):
1. DOC PS 2 - Performance Standard for Wood Based Structural Use Panels.
- F. International Code Council (ICC):
1. Table 2304.9.1 – Fastener Requirements.
- G. International Code Council Evaluation Services (ICC-ES):
1. ESR-1539 – Power-Driven Staples and Nails.
- H. National Lumber Grades Authority (NLGA):
1. Grading Rules.
- I. Northeastern Lumber Manufacturers Association (NELMA):
1. Grading Rules.

- J. Southern Pine Inspection Bureau (SPIB):
 - 1. Grading Rules.
 - K. West Coast Lumber Inspection Bureau (WCLIB):
 - 1. Grading Rules.
 - L. Western Wood Products Association (WWPA):
 - 1. Western Lumber Grading Rules.
- 1.3 QUALITY ASSURANCE
- A. Lumber Grading Agency: Lumber to be grade stamped by an agency certified by the Board of Review of the American Lumber Standards Committee (ALSC).
 - B. Regulatory Requirements: Conform to applicable codes for fire retardant treatment of wood surfaces for flame/smoke ratings.

PART 2 - PRODUCTS

2.1 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC3b for exterior construction not in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine, No. 2 grade; SPIB.
 - 2. Eastern softwoods, No. 2 Common grade; NELMA.

3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Where carpentry is exposed to weather, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Power-Driven Fasteners: ICC-ES ESR-1539.

2.4 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spun-bonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- E. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 1. ICC-ES ESR-1539 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

END OF SECTION 061053

SECTION 070150 – PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Tear-off of existing roof, associated flashings, nailers, fasteners, roof drainage boots and roofing accessories.
 2. Examination of existing metal deck for rust or damage.
 3. Examination of existing concrete deck for required repairs.
 4. Requirements and limitations for cutting and patching work.
 5. Products for cutting, patching and extending work.
 6. Transitions and adjustments.
 7. Repair of damaged surfaces and finishes.
- B. Related Requirements:
1. Section 015000 - Temporary Facilities and Controls: Temporary barriers.
 2. Section 017700 – Closeout Procedures: Final cleaning.

1.2 PERFORMANCE REQUIREMENTS

- A. Cutting and patching shall be performed as required for cutting into existing construction to provide for installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cut into or partially remove portions of the existing building as required for new construction. Include such work as:
1. Cutting, moving or removal of items shown to be cut, moved or removed.
 2. Cutting, moving or removal of items not shown to be cut, moved, or removed, but which must be cut, moved, or removed to allow for new construction.
 3. Removal of existing surface finishes as needed to install new work and finishes.
 4. Removal of abandoned items and removal of items rendered no longer required resulting from alterations such as abandoned piping and electrical conduits to nearest J-boxes.
 5. Repair or removal of dangerous or unsanitary conditions resulting from alterations work.
- C. Structural Work:
1. Do not cut and patch structural work in manner resulting in reduction of load-carrying capacity or load and deflection ratio.
 2. Submit proposed methods for cutting and patching of structural work and obtain Owner's Construction Manager's approval prior to the structural alterations.
- D. Operational Limitations:
1. Do not cut and patch in manner resulting in decreased performance, shortened useful life, or increased maintenance.
 2. Submit proposed methods of cutting and patching operational elements and safety components and obtain Owner's Construction Manager's acceptance prior to the work.
- E. Quality Limitations: Do not cut and patch work exposed to view (exterior and interior) in manner resulting in noticeable reduction of aesthetic qualities and similar qualities, as determined by the Owner's Construction Manager.
- F. Limitation on Acceptance: Owner's Construction Manager's acceptance to proceed with cutting and patching shall not waive right to later require removal or replacement of work found to be cut and patched in unsatisfactory manner as determined by Owner's Construction Manager.

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American National Standards Institute/American Society of Safety Engineers (ANSI/ASSE):
 - 1. ANSI/ASSE A10.6 – Safety Requirements for Demolition Operations.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.
- D. US Environmental Protection Agency (EPA): As referenced.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of new membrane roofing system.
- B. Reroofing Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing in a manner which will not disrupt Owner's operations. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 - 1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.
 - 2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated before proceeding with work over the impaired deck area.
- B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- C. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

2.2 MATERIALS

- A. Use materials for cutting and patching that are identical to existing materials. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal or better performance characteristics.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. Take corrective action before proceeding with work if unsafe or otherwise unsatisfactory conditions are encountered.
- B. Examine the metal roof deck exposed during roof removal and replace any corroded metal decking with new spanning a minimum number of roof joists specified by the project architect.
- C. Descale non-corroded metal decking using a wire brush and paint with two coats of rust inhibitor.
- D. Remove any abandoned exhaust fan curbs, soil stacks, conduit penetrations or other thru-roof penetrations that will not be used prior to roof recovery.
- E. Where abandoned curbs will remain, install new nominal 1-inch thick exterior grade plywood over the top of the curb. Cover the enclosed curb with new 60-mil TPO membrane, unless otherwise shown on Drawings.
- F. Contractor is responsible for damage resulting from fasteners penetrating conduit on bottom side of decking.
- G. Remove any rooftop equipment, conduit, roof curbs or other thru-roof penetrations that will not be reused prior to roof recovery.
- H. Install new metal counter-flashings above the termination bars where indicated on Drawings.
- I. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- J. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
- K. Verify that rooftop utilities and service piping have been shut off before beginning the Work.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut to prevent failure.
- B. Protection:
 - 1. Protect other work during cutting and patching to prevent damage.
 - 2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
 - 3. Take precautions not to cut existing pipe, conduit, or duct serving building but scheduled to be re-located until provisions have been made to bypass them.
- C. During removal operations, have sufficient and suitable materials on site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- D. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, or when no work is taking place, or when rain is forecast.

- E. Remove existing roofing membrane and other membrane roofing system components down to the deck, as indicated in Drawings. Remove cover boards, roof insulation, and substrate boards, if applicable.
- F. Remove all sealants, flashing, and loose or damaged CMU/mortar from parapet walls and joints.
- G. Remove fasteners from deck or cut fasteners off slightly above deck surface.
- H. Deck Preparation:
 - 1. Inspect deck after tear-off of membrane roofing system.
 - 2. If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify A/E and Owner. Do not proceed with installation until directed by Owner.
 - 3. Replace deck as required by Owner or A/E.
- I. Broom clean existing substrate.
- J. Verify that existing substrate is dry before proceeding with installation of roofing. Spot check substrates with an electrical capacitance moisture-detection meter.

3.3 CUTTING AND PATCHING

- A. Remove, cut, and patch work in a manner to minimize damage and to provide means of restoring products, materials, and finishes to match original condition.
- B. Cut work using methods that are least likely to damage work to be retained or adjoining work.
- C. Where cutting is required, use hand or small power tools designed for sawing or grinding rather than hammering or chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut and drill from exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.
- D. Patch with seams that are durable and as invisible as possible. Comply with specified tolerances for work.
- E. If the surrounding surface cannot be matched, repaint or recoat the entire surface to the nearest corner or transition point.

3.4 ROOF TEAR-OFF

- A. Remove existing single-ply membrane over precast concrete or steel roof deck, including flashings, nailers, fasteners, and associated roofing accessories.

3.5 TRANSITIONS

- A. Where expansion new work abuts or aligns with existing work, provide a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance
- B. When finished surfaces are cut so that a smooth transition with expansion new work is not possible, terminate existing surface along a straight line at a natural line of division.

3.6 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces which are damaged, discolored, or showing imperfections. Repair substrate prior to patching finish.

- B. Restore existing work that is damaged during construction to a condition equal to its condition at the time of the start of the work.

3.7 AUXILIARY REROOFING MATERIALS

- A. General: Auxiliary re-roofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new membrane roofing system.
- B. Base Sheet Fasteners: Capped head, factory-coated steel fasteners, listed in Factory Mutual (FM) Approval's "Approval Guide."

3.8 REMOVAL AND REPLACEMENT OF EXISTING WORK

- A. Remove existing items, services, finishes, or surfaces as required for the installation of new construction.
- B. Repair, re-route, and extend services, piping, and conduit of existing items and equipment as required during construction operations for installation and operation of new items and equipment. When existing equipment to remain is removed or relocated, re-install as required for proper operation.

3.9 DISPOSAL

- A. Collect and place demolished materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on site. Transport demolished materials from Project site and legally dispose of them.
- B. Storage or Sale of Demolished Materials On-Site: Not allowed.

END OF SECTION 070150

SECTION 075423 – THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. TPO Adhered membrane roofing system.
 - 2. Cover board.
 - 3. Roof insulation.
- B. Related Sections:
 - 1. Section 061053 Miscellaneous Rough Carpentry for wood nailers, cants, curbs, and blocking.
 - 2. Section 076200 Sheet Metal Flashing and Trim for metal roof penetration flashings, flashings, and counterflashings.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
 - 1. ASTM C 1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 2. ASTM C 1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 3. ASTM D 1079 – Standard Terminology Relating to Roofing and Waterproofing.
 - 4. ASTM D 4272 – Standard Test Method for Total Energy Impact of Plastic Films by Dart Drop.
 - 5. ASTM D 6878 – Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
 - 6. ASTM G 152 – Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
 - 7. ASTM G 154 – Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.
 - 8. ASTM G 155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.
- C. Factory Mutual Research Corporation (FM):
 - 1. FM Approvals Building Materials Approval Guide, Chapter 3 - Approved Combinations and Assemblies.
 - 2. FM Global Loss Prevention Data Sheet 1-28 - Design Wind Loads.
 - 3. FM Global Loss Prevention Data Sheet 1-29 - Roof Deck Securement and Above-Deck Components.
 - 4. FM Approval Standard 4454 - Class 1 Insulated Concrete Deck Roofs.
 - 5. FM Approval Standard 4470 - Class 1 Roof Covers.
- D. ICC Evaluation Service (ICC-ES): Evaluation Reports.
- E. National Roofing Contractors Association (NRCA):
 - 1. NRCA Roofing and Waterproofing Manual.

- F. Underwriters Laboratories, Inc. (UL):
 - 1. UL - Roofing Materials and Systems Directory.
 - 2. UL 1256 - Fire Test of Roof Deck Construction.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms in this Section:
 - 1. Glossary of NRCA's The NRCA Roofing and Waterproofing Manual.
 - 2. Roof Consultants Institute Glossary of Roofing Terms.
- B. Sheet Metal Terminology and Techniques: SMACNA Architectural Sheet Metal Manual.

1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Roofing Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Submittal Procedures: Unless otherwise specified herein, submit in accordance with procedures specified in Section 013300.
- B. Product Data: For each type of product.
- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work. Submit Shop Drawings showing the following:
 - 1. Fastener patterns to meet uplift requirements.
 - 2. Layouts for crickets and saddles.
 - 3. Details required for completion but not shown on Drawings.
 - 4. Techniques for nighttime or weather tie offs.
- D. Samples for Verification: For the following products:
 - 1. Membrane roofing, of color and type required.
- E. Manufacturer's Accepted Pre-Installation Registration Notice: Submit prior to start of installation.
- F. Manufacturer's Assembly Letter: Submit in accordance with procedures specified in Section 013300.

1.6 CLOSEOUT SUBMITTALS

- A. Manufacturer's Site Visit Written Report: Submit in accordance with procedures specified in Section 017700.
- B. Final Inspection Report: Submit in accordance with procedures specified in Section 017700.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Site Visit: Schedule to be performed within the first two days of installation.

1.8 INFORMATIONAL SUBMITTALS

- A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- B. Sample Warranties: For manufacturer's special warranties.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Test Reports:
 - 1. Roof drain and leader test or submit plumber's verification.
 - 2. Core cut (if requested).
 - 3. Roof deck fastener pullout test.
- D. Source Limitations: Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system must be labeled by the single source roofing manufacturer issuing the guarantee.
- E. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

1.11 WARRANTY

- A. Provide Warranty commencing at date of Substantial Completion, to include cost of labor and materials for loss of weather tightness without financial limit for a period of 30 years. Warranty windspeed is 55 mph.
- B. Provide warranty signage to be installed on roof at Substantial Completion.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.13 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Carlisle SynTec Incorporated.
 - 2. Firestone Building Products.
 - 3. GAF Materials Corporation.
 - 4. Johns Manville.
- B. Substitutions not allowed.
- C. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 4272.

2.3 REGULATORY REQUIREMENTS

- A. Regulatory Requirements for Roof Assembly: Comply with Factory Mutual (FM) Approvals Building Materials Approval Guide or Underwriters Laboratory, Inc. Roofing Materials and Systems Directory as specified:
 - 1. Achieve minimum ASCE-7 uplift requirements required for the location of the project to satisfy IBC.

2.4 FULLY ADHERED TPO ROOFING

- A. Fully Adhered, Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.
 - 1. Thickness: 80 mils nominal.
 - 2. Exposed Face Color: White.

2.5 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 80 mils thick, minimum, of same color as TPO sheet.
- C. Bonding Adhesive: Manufacturer's standard solvent based.
- D. Fasteners: 316 stainless steel fasteners and plates, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
- E. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.6 AUXILIARY ROOFING SYSTEM COMPONENTS

- A. Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee.
- B. Coping System: Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap, or as indicated on Drawings. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee.
- C. Metal Flashing Sheet: Metal flashing sheet is specified in Section 076200.

2.7 ROOF INSULATION

- A. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289-11, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 TAPERED INSULATION

- A. Tapered Insulation: ASTM C 1289, factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated.

2.9 INSULATION ACCESSORIES

- A. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- B. Cover Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, 1/4 inch.
 - 1. Dens Deck Roof Board, by Georgia Pacific.
 - 2. Substitutions not allowed.

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Confirm that manufacturer's written approved project pre-installation registration notice has been submitted prior to start of installation. Do not begin installation until this notice has been submitted.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 - 4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

- C. If recommended by Manufacturer, prime surface of concrete deck with asphalt primer at a rate recommended by roofing manufacturer and allow primer to dry.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 RE-ROOF PREPARATION

- A. Remove all roofing membrane, surfacing, coverboards, insulation, fasteners, asphalt, pitch, adhesives, etc.
 - 1. Remove an area no larger than can be re-roofed in one day.
- B. Tear out all base flashings, counterflashings, pitch pans, pipe flashings, vents and like components necessary for application of new membrane.
- C. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations.
 - 1. Install decking to match existing as directed by Owner's Representative.
- D. Raise (disconnect by licensed craftsmen, if necessary) all HVAC units and other equipment supported by curbs to conform with the following:
 - 1. Modify curbs as required to provide a minimum 8 base flashing height measured from the surface of the new membrane to the top of the flashing membrane.
 - 2. Nail top of flashing and install new metal counterflashing prior to re-installation of unit.
 - 3. Perimeter nailers must be elevated to match elevation of new roof insulation.
- E. Immediately remove all debris from roof surface. Demolished roof system may not be stored on the roof surface.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 INSULATION INSTALLATION

- A. Coordinate installation of roof system components so insulation and cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation boards with long joints in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with like material.
- E. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- G. Adhered Insulation: Install each layer of insulation and cover board and adhere to substrate as follows:
 - 1. Install each layer in a two-part urethane adhesive according to roofing system manufacturer's instruction.
- H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.6 COVER BOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
- C. Install cover board with long joints of cover board in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with cover board.
 - 1. Cut and fit cover board within 1/4 inch of nailers, projections, and penetrations.
- D. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 - 1. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- E. Adhered Cover Board: Adhere cover board to substrate as follows:
 - 1. Install in a two-part urethane adhesive according to roofing system manufacturer's instruction.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.7 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- D. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.8 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
- B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical representative.

- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - a. Remove and repair any unsatisfactory sections before proceeding with Work.
 - 3. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.
- H. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- I. Proceed with installation only after unsatisfactory conditions have been corrected.

3.9 FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with sheet flashing.
- D. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- E. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.10 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's Registered Roof Observer (RRO) to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

- B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 PROTECTION AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
- B. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Coated aluminum architectural sheet metal flashing.
 - 2. Manufactured counter-flashing.
 - 3. Metal parapet cap (coping).

1.2 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Galvanized Steel: ASTM A 653 Commercial Quality and Lock-Forming Quality, G90 coating designation hot-dip galvanized, mill phosphatized for painting where exposed to view from ground level. Sheet metal gages shall be as shown or as follows where not shown:
 - 1. Flashing and Counter Flashing: 24 gage.
 - 2. Fascia and Edge Trim: 24 gage.

2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 degrees F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 degrees F.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Obtain field measurements for accurate fit before shop fabrication.
 - 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.
- C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2.5 FINISH

- A. Sheet metal finish shall be as shown on Drawings.
- B. Where paint finish is shown, field paint in accordance with Section 099000.
- C. Sheet metal surfaces not designated or specified to receive a finish shall remain uncoated.

PART 3 - EXECUTION**3.1 UNDERLAYMENT INSTALLATION**

- A. **Polyethylene Sheet:** Install polyethylene sheet with adhesive for anchorage. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.
- B. **Felt Underlayment:** Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- C. **Self-Adhering Sheet Underlayment:** Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

- A. **General:** Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. **Metal Protection:** Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. **Underlayment:** Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. **Expansion Provisions:** Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. **Fastener Sizes:** Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. **Seal joints as shown and as required for watertight construction.**

- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel sheet.
 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- G. Parapet Cap Flashing:
1. Install sheet metal coping with continuous cleat in accordance with SMACNA requirements, profiles as indicated.
 - a. Set cleat in full bed of sealant, overlaying and concealing continuous parapet waterproofing membrane.
 - b. Secure cleat at 6 inches on center to nailer.
 2. Install coping in accordance with SMACNA Figure 3-1 over shaped fiber board; secure roof side edge using washered screws in staggered pattern through slotted or oversized holes located at maximum 12" on-center.
 3. Provide coping in minimum 10 to maximum 25 foot lengths.
 4. Provide thermal expansion joints using joints in accordance with SMACNA Figure 3-3, Covered Plate Seam. Set lap in beds of sealant.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturers written installation instructions.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Scuppers.
 - 2. Downspouts.
 - 3. Conductor heads.

- B. Related Sections:
 - 1. Section 012500 – Substitution Procedures: Procedure for submitting substitutions.
 - 2. Section 061053 – Miscellaneous Rough Carpentry: Wood nailers and blocking.
 - 3. Section 075423 – Thermoplastic Polyolefin (TPO) Membrane Roofing.
 - 4. Section 076200 – Sheet Metal Flashing and Trim.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

- B. ASTM International (ASTM):
 - 1. ASTM A 153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM C 1311 – Solvent Release Sealants.
 - 4. ASTM D 1187 – Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - 5. ASTM F 2329 – Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

- C. Factory Mutual Research Corporation (FM):
 - 1. FM Global Loss Prevention Data Sheet 1-28 - Design Wind Loads.
 - 2. FM Global Loss Prevention Data Sheet 1-29 - Roof Deck Securement and Above-Deck Components.
 - 3. FM Approval Standard 4470 - Class 1 Roof Covers.

- D. National Association of Architectural Metal Manufacturers (NAAMM):
 - 1. Metal Finishes Manual (AMP 500-06).

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

- B. FM Approvals' Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 180 degrees F, material surfaces.

1.4 SUBMITTALS

- A. Submittal Procedures: Unless otherwise specified herein, submit in accordance with procedures specified in Section 013300.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- C. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 DELIVER, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653 Structural Quality, Grade 33, G90 zinc coating, mill phosphatized for painting where exposed to view from ground level. Sheet metal components shall be galvanized steel sheet unless otherwise specified.
- B. Option: In lieu of galvanized steel sheet specified above, the following may be provided for through-wall scuppers at the option of the Contractor:
 - 1. Thermoplastic (TPO) Coated Sheet Metal: ASTM A 653, Type B Commercial Steel, 24 gauge, G90 zinc coating, with a layer of 0.035 inch minimum non-reinforced membrane flashing. Color shall match TPO roof color. Product shall be Sure-Weld Coated Metal, by Carlisle, or equivalent.

2.2 COMPONENTS

- A. Downspouts: 22 gauge, SMACNA rectangular unless otherwise indicated. Fabricate downspouts complete with mitered elbows. Downspouts shall be fully enclosed profile, SMACNA Figure 1-32B unless otherwise indicated.
- B. Conductor Head: SMACNA Figure 1-25F unless otherwise indicated.
- C. Through-Wall Scuppers: SMACNA Figure 1-26 unless otherwise indicated.

- D. Overflow Scuppers: SMACNA Figure 1-30 unless otherwise indicated.

2.3 ACCESSORIES

- A. Downspout Straps: Match downspout material, minimum 20 gauge, SMACNA Figure 1-35G unless otherwise indicated.
- B. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coat.

2.4 FABRICATION

- A. Form downspouts of size to match existing.
- B. Fabricate in accordance with SMACNA details unless otherwise shown.
- C. Field measure site conditions prior to fabricating work.
- D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- E. Hem exposed edges of metal.
- F. Field Finishing: Field paint downspouts, conductors, and accessories surfaces exposed to view from ground surface unless noted as unpainted on Drawings.

2.5 REGULATORY REQUIREMENTS

- A. Regulatory Requirements for Roof Assembly: Comply with FM Approvals Building Materials Approval Guide or Underwriters Laboratories, Inc. Roofing Materials and Systems Directory as specified:
 - 1. Factory Mutual: Provide roofing assembly meeting Class 1A-90 requirements for fire resistance and wind uplift in accordance with FM Approvals Standard 4470 and FM Global Loss Prevention Data Sheet 1-28 and FM Global Loss Prevention Data Sheet 1-29.

2.6 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153 or ASTM F 2329.

- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify surfaces behind downspouts are painted as indicated on Drawings prior to install
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - 4. Torch cutting of roof specialties is not permitted.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
 - 2. When ambient temperature at time of installation is between 40 and 70 degrees F., set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 degrees F.

3.3 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
- B. Downspout Nozzle: Install downspout nozzle where indicated through parapet. Continuously support downspout nozzle, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
 - 1. Provide elbows at base of downspout to direct water away from building.
- D. Scuppers: Install in accordance with SMACNA Figure 1-26 or Figure 1-30, as applicable, except as otherwise indicated. Install TPO coated metal scuppers in accordance with manufacturer's instructions. Install scuppers before installation of roofing membrane.
- E. Apply bituminous coating on backside of conductor heads, downspouts, and accessories surfaces in contact with dissimilar materials, masonry, and preservative treated wood.

3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- C. Clean off excess sealants.

END OF SECTION 077100

SECTION 077114 - MANUFACTURED ROOF EDGE FASCIA SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Manufactured roof edge fascia system.
- B. Related Requirements:
 1. Section 061053 – Miscellaneous Rough Carpentry: Wood blocking and nailers.
 2. Section 075423 – Thermoplastic Polyolefin (TPO) Membrane Roofing: Roof substrate.
 3. Section 076200 - Sheet Metal Flashing and Trim: Sheet metal fascia and edge trim, counter flashings, and other sheet metal.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American National Standards Institute / Single Ply Roofing Industry (ANSI/SPRI):
 1. ANSI/SPRI/FM 4435 ES-1 – Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. ASTM International (ASTM):
 1. ASTM A 153 – Zinc Coating (Hot-Dip) on iron and Steel Hardware.
 2. ASTM C920 – Elastomeric Joint Sealants.
 3. ASTM F2329 – Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
- D. Factory Mutual Research Corporation (FM):
 1. FM Approval Standard 4435 – Approval Standard for Edge Systems Used with Low Slope Roofing Systems.
 2. FM Loss Prevention Data Bulletin 1-49.

1.3 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install roof edge fascia that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-60. Identify materials with FM Approvals' markings.
- B. SPRI Wind Design Standard: Manufacture and install copings tested according to SPRI ES-1 and capable of resisting the following design pressures:
 1. Design Pressure: As indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products in compliance with the requirements of Section 01600 and manufacturer's recommendations.
- B. Deliver materials in manufacturer's original unopened containers, dry and undamaged with seals and labels intact.

- C. Store cements, primers, and caulks in heated area above 40 degrees F during cold weather and in area below 80 degrees F in warm weather.
- D. Do not store materials on completed roofing.

1.5 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.
- B. Utilize edge metal included in roof membrane system manufacturer's warranty.

PART 2 - PRODUCTS

1.3 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements and to the extent specified hereinafter, provide products by the following manufacturers:
 - 1. Carlisle SynTec.
 - 2. Firestone Building Products Company.
 - 3. Johns Manville Roofing Systems.
 - 4. Metal-Era, Inc. Waukesha, WI, (800) 558-2162.
- B. Substitutions: Reference Section 016000.

2.2 ROOF EDGE FASCIA

- A. Roof-Edge Fascia System: 24 gage steel, with Kynar finish. Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a formed rail with integral drip-edge cleat to engage fascia cover. Provide matching corner units. Subject to compliance with requirements, provide one of the following products:
 - 1. SecureEdge 1, by Carlisle.
 - 2. Rail Fascia, by Firestone.
 - 3. JM Rail Fascia System, by Johns Manville.
 - 4. Edge Systems One, by Metal-Era.
 - 5. Substitutions not allowed.
- B. Finish: Smooth finish with factory finished baked-on fluoropolymer 2-coat coating system.
 - a. Manufacturer's standard 2-Coat Fluoropolymer conforming to AAMA 621. Fluoropolymer finish containing not less than 70 percent Kynar 500 PVDF resin by weight in color coat with a minimum of 0.9 mil dry film thickness. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Unexposed side finish shall consist of not less than a 0.5 mil dry film thickness backer coat.
 - c. Color: Medium Bronze.
- C. Miters: Fabricated by the manufacturer.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items included in metal edge kit or required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153 or ASTM F 2329.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 3. Install roof specialties to fit substrates and to result in watertight performance.
 4. Torch cutting of roof specialties is not permitted.
 5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
1. Space movement joints at a maximum of 12 feet with no joints within 15 inches of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Provide fasteners as recommended or provided by the fascia manufacturer but not less than the following minimums: fasteners of sizes that will penetrate wood blocking or sheathing not less than 1-1/4-inches for nails and not less than 3/4-inch for wood screws. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.2 CLEANING AND PROTECTION

- A. Clean and neutralize flux materials. Clean off excess solder and sealants.
- B. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077114

SECTION 077213 - MANUFACTURED CURBS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Manufactured structural metal roof curbs.
- B. Related Sections:
 - 1. Section 012500 – Substitution Procedures: Procedure for submitting substitutions.
 - 2. Section 099000 – Painting and Coating: Painting of roof curbs.

1.2 SUBMITTALS

- A. Submittal Procedures: Unless otherwise specified herein, submit in accordance with procedures specified in Section 013300.

1.3 DEFINITIONS

- A. Structural Roof Curb: Manufactured square or rectangular roof curb, bearing on structural steel joists or headers, designed to support equipment dead load and roof dead and live loads.

1.4 QUALITY ASSURANCE

- A. Qualifications for Welding Work: Qualify field welding operators in accordance with AWS Standard Qualification Procedures. Provide certification that field welders have satisfactorily passed AWS qualification tests within previous 12 months.
 - 1. If recertification of welders is required, provide without additional cost to Owner.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Ship curbs to site palletized and banded.
- B. Curb Manufacturer shall furnish Curb Schedule to Contractor identifying curb "Type" and roof penetration for which curb is to be used. Curb Schedule shall identify identical curbs as single "Type" (i.e. Type A - 10 ton RTU's, Type B - 5 ton RTU's, Type C - skylights, Type D - satellite dish, Type E - expansion joints, etc.). Identify each curb with "Type" designation painted in 1 inch high letters on outside face of curb.
- C. Stack curbs at site to prevent twisting, bending or permanent deformation.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Structural Roof Curbs: Subject to compliance with project requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AES Industries, Tallassee, AL (800) 786-0402.

2.2 MATERIALS

- A. Sheet Steel: One of the following:
 - 1. Galvanized Steel Sheet: ASTM A 653, SS (Structural Steel) Classification, Grade 33, G60 hot-dip zinc coating.

2. Aluminum-Coated Steel Sheet: ASTM A 463, SS (Structural Steel) Classification, Grade 33, Type 2, T2 100 aluminum coating.
 3. Aluminum Zinc Alloy-Coated Steel Sheet (GAVALUME): ASTM A 792, AZ55 aluminum zinc alloy coating.
- B. Roof Curb Insulation: Polyisocyanurate Foam; both faces covered with glass fiber felt; thickness to match wood nailer.
- C. Wood Nailers: CCA Pressure Treated Lumber Type C, "Standard" grade lumber of any species.
- D. Zinc-Rich Primer: SSPC-Paint 20 Type II.
- E. Deck Support Clip: Galvanized steel sheet, gauge as shown.

2.3 STRUCTURAL ROOF CURBS

- A. Fabrication, General: Coated 14 gauge steel sheet curb sections, corners fully mitered and welded; 2 inch by 4 inch (nominal dimension) pressure treated continuous wood nailers mechanically fastened with corrosion resistant fasteners at 12 inches on center to exterior face of curb. Shop prime welded connections with zinc-rich paint complying with SSPC-Paint 20.
- B. Curb Height: Unless otherwise required by local codes, minimum curb height from top of bar joist to top of curb shall be as specified below but in no case less than 8 inches from top of roof membrane to top of curb:
1. All Rooftop Unit Curbs Unless Otherwise Shown or Specified: 18 inches.
- C. Reinforce curb sections as required for design loads indicated on Drawings.
- D. Welding: AWS D1.1.
- E. Mechanical Unit Curbs. Mechanical curbs will be provided as follows as applicable:
1. Roof Top Unit (RTU) Curbs: Provide continuous height rail curbs. It is acceptable for units to follow roof slopes not exceeding 3/8 inch per foot only if the unit outdoor air intake (return air end) is oriented toward the high side of the roof pitch.
 2. Air Handling Unit (AHU) Curbs: Provide tapered rail curbs. Construct curb for AHU to be level (verify roof slope).
 3. Double Cross-Sloped and Side-Sloped Curbs: Provide tapered rail curbs for level mounting of RTUs when located in a cross-sloped or side-sloped section of roof as shown on the structural roof plan. Curbs fabricated for cross-sloped or side-sloped installation shall be clearly marked by the manufacturer to indicate for special application.
- F. Shop Painting of New Manufactured Curbs: Shop finish interior surfaces of curbs including safety screen and hardware kit of items that will be exposed to the public after installation. Use PPG dry fog coating as specified; color to match Sherwin-Williams #SW6385 "Dover White".
- G. Field Painting of Existing Manufactured Curbs:
1. Perform preparation and cleaning procedures in accordance with paint manufacturer's published instructions for each particular substrate condition.
 2. Remove loose paint by scrape or wire brush as necessary. Clean surfaces thoroughly and roughen existing paint surfaces by light sanding. Clean and remove mildew using trisodium phosphate. Touch up bare surfaces with manufacturer's recommended prime coat. Painted surfaces with existing sound prime or finish coats do not require additional prime coating.
 3. Remove barrier coats over incompatible primers or remove and reprime as required.
 4. Touch-up shop-applied prime coats where damaged or bare. Clean and touch-up with same type shop primer.
 5. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent. Apply coat of etching primer if required by paint manufacturer.

6. Remove accessories and similar items in place and not to be painted and provide surface applied protection prior to surface preparation and painting operations. Reinstall all removed items after completion of paint work.
7. Clean surfaces to be painted before applying paint or surface treatment. Remove oil and grease prior to mechanical cleaning.
8. Apply paint only on surfaces free of dirt, rust, scale, grease, moisture, scuffed surfaces, and conditions otherwise detrimental to formation of a durable paint film.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install curbs in accordance with manufacturer's instructions and as indicated on Drawings. Coordinate installation with roof membrane installation requirements specified under other Sections.
- B. Roof Curbs Bearing on Steel Angles, Joists, and Headers:
 1. Set units in place and secure base to roof structure by welding to top chord of structural member.
 2. Secure metal deck to perimeter of curb as indicated on Drawings.
- C. Roof Curbs Bearing on Roof Deck:
 1. Set units in place and secure base to steel roof deck by self-tapping screw fasteners spaced at a maximum of 12 inches on center, staggered.

3.2 INTERFACE WITH OTHER WORK

- A. Coordinate project requirements for custom adapting and connecting to roof curbs with manufacturers and suppliers of curb mounted items and equipment. Adapt and connect roof curbs to ductwork.

3.3 ROOF CURB SCHEDULE

- A. Structural Curbs:
 1. HVAC roof top units (RTU).
 2. Air handling units (AHU).

END OF SECTION 077213

SECTION 079200 - JOINT SEALANTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Preformed joint sealants.

- B. Related Sections:
 - 1. Section 012500 – Substitution Procedures: Procedure for submitting substitutions.
 - 2. Section 013300 – Submittal Procedures: Requirements for submittals.
 - 3. Section 076200 – Sheet Metal Flashing and Trim: Joint sealants at sheet metal.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

- B. ASTM International (ASTM):
 - 1. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants.
 - 2. ASTM C 1193 – Standard Guide for Use of Joint Sealants.
 - 3. ASTM C 1330 – Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
 - 4. ASTM D 1056 – Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber 1, 2.

1.3 ACTION SUBMITTALS

- A. Submittal Procedures: Unless otherwise specified herein, submit in accordance with procedures specified in Section 013300.

- B. Product Data: For each joint-sealant product indicated.

- C. Samples: For each kind and color of joint sealant required.

- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
1. BASF Building Systems (952) 496-6000.
 2. Dow Corning Corporation (989) 496-7767.
 3. Emseal Joint Systems, Ltd., Westborough, MA (800) 526-8365.
 4. GE Advanced Materials – Silicones (877) 943-7325.
 5. Greenstreak, St. Louis, MO (800) 325-9504.
 6. Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
 7. Pecora Corporation (215) 796-1401.
 8. Sika Corporation; Construction Products Division (972) 567-9430.
 9. Tremco Sealant – Weatherproofing Division (800) 841-3778.
 10. Willseal USA, Pelham, NH (800) 438-0684.

2.2 ELASTOMERIC BUILDING SEALANTS

- A. **General:** Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. **P1:** ASTM C920, Type M, Grade NS, Class 50, Multi-Component. Subject to requirements, provide one of the following:
1. Dymeric 240FC, by Tremco.
 2. Sonolastic NP-2, by BASF.
 3. Dynatrol II, by Pecora.
 4. Substitutions not allowed.
- C. **S1:** ASTM C920, Type S, Grade NS, Class 25.
1. Spectrem 1, Spectrem 2, or Sectrem 3, by Tremco.
 2. 791 Silicone Perimeter Sealant, by Dow.
 3. 864 or 890, by Pecora.
 4. MasterSeal NP 150, by BASF.
 5. SilPruf, by GE.
 6. Substitutions not allowed.
- D. **Sealant Color:** For exterior exposed to view areas, match color of adjacent paint color finish or other adjacent finish color.

2.3 BUILDING JOINT FILLER

- A. **Preformed Control Joint Filler:**
1. **Regular Joint:** 2-5/8 inches by 1-1/2 inches; rubber.
 - a. RS-STANDARD Control Joint by Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
 - b. Masonry Control Joint No. 571 by Greenstreak, St. Louis, MO (800) 325-9504.
 2. **Tee Joint:** 2-5/8 inches by 1 inch; rubber.
 - a. RS-TEE Control Joint by Hohmann & Barnard, Inc.
 - b. Masonry Control Joint No. 572 by Greenstreak.

- B. Expansion Joint Filler (Compression Seal):
 - 1. Backerseal (Grayflex) expanding precompressed foam by Emseal Joint Systems, Ltd.
 - 2. Willseal 600 polyurethylene foam joint sealing tape by Willseal USA.

2.4 JOINT SEALANT BACKING

- A. Sealant Backing (Backer Rod): Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. Cylindrical Sealant Backings: Closed or bi-cellular backer rod conforming to ASTM C 1330 Type B or Type C, approved by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance. The use of ASTM C 1330 Type O open cell backer rod is prohibited.
 - a. Backer Rod for Exterior Masonry: Closed cell foam, oversized 50 percent; self-expanding.
 - 2. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

- B. **Joint Priming:** Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. **Masking Tape:** Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. **Sealant Installation Standard:** Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. **Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.**
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. **Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.**
- D. **Install sealants using proven techniques that comply with the following and at the same time backings are installed:**
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. **Tooling of Non-sag Sealants:** Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

JOINT-SEALANT SCHEDULE:

EXTERIOR JOINTS				
	MATERIAL TO	MATERIAL	JOINT WIDTH	SEALANT TYPE
WALL FLASHING	Metal Flashing	Metal Flashing		S1
	Metal Flashing	Brick Wall	1/4"	P1
WALL PENETRATIONS	Steel Pipe Through	Brick Wall	1/2"	P1
	Steel Conduit Through	Brick Wall	1/2"	P1
	Ganged Steel Conduit Through	Brick Wall	1/2"	P1
	PVC Pipe Through	Brick Wall	1/2"	P1
	Copper Pipe Through	CMU Wall	1/2"	P1
ROOF MEMBRANE AREA	Roofing Membrane	Roofing Membrane		See Section 075423
	Roofing Membrane	Waterproof Wall Membrane		See Section 075423
	Roofing Membrane	Molded Pipe Flashing		See Section 075423
	Waterproof Membrane	Metal Plates and Bolts		P1
	Waterproof Membrane	Steel Conduit	1/2"	P1
	Vent Flashing Joints	Vent Flashing		S1
	RTU Flashing Joints	RTU Flashing		S1
	Waterproof Membrane Termination Bar	Brick Wall	1/4"	S1
	Steel Downspout	Steel Downspout		S1
	Roof Panel	End Closure		P1
	Roof Panel	Flue Penetration Flashing		P1
Urethane Rubber Seal System	Steel Pipe / Flue	Varies	See Section 075423	

END OF SECTION 079200

SECTION 086313 – DOMED METAL-FRAMED SKYLIGHTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Prefabricated fixed skylights.
- B. Related Requirements:
 - 1. Section 077213 - Manufactured Curbs: Curbs for mounting of skylight assemblies.
 - 2. Section 079200 - Joint Sealants: Application of sealant around skylights.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. Aluminum Association (AA):
 - 1. Specifications for Aluminum Structures.
- C. ASTM International (ASTM):
 - 1. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
 - 1. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- E. Factory Mutual System (FM):
 - 1. FM - Approval Guide, Chapter 18 - Building Materials.
 - 2. FM Standard 4430 - Test Criteria for Heat and Smoke Vents.
- F. National Fenestration Rating Council (NFRC):
 - 1. NFRC 100 - Procedure for Determining Fenestration Product U-Factors.
 - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance of Normal Incidence.
- G. North American Fenestration Standard (NAFS):
 - 1. AAMA\WDMA\CSA\101\I.S.2\A440 - The Voluntary Performance Specification for Windows, Doors, and Skylights.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Transport, handle, store, and protect products in accordance with the requirements of Section 016000.
- B. Handle, deliver, and store in manufacturer's original packaging, following manufacturer's recommendations.
- C. Store in a dry area and in a manner to prevent damage.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Subject to compliance with project requirements, provide products by one of the following:
 - 1. Acralight International Skylights, Irvine, CA (949) 863-9343.
 - 2. Bristolite Daylighting Systems, Santa Ana, CA (800) 854-8618.
 - 3. Sunoptics Skylights, Sacramento, CA (800) 289-4700.
- B. Substitutions not allowed.

2.2 REGULATORY REQUIREMENTS

- A. Skylights shall be certified by the NFRC.
- B. Skylights shall be certified by the NAFS.

2.3 PERFORMANCE REQUIREMENTS

- A. Plastic unit skylights shall conform to recommendations of the AA Specifications for Aluminum Structures.
- B. Skylights shall be designed to carry a minimum 20 psf tributary roof load or greater per site as specified in the current International Building Code or prevailing model code.
- C. Skylights shall be tested and labeled in accordance to AAMA\WDMA\CSA\101\I.S.2\A440 as required by Section 2405.5 of the 2006 International Building Code.
- D. The test laboratory shall also perform a 200 lb drop test from a height of 24 inches above the center (highest point) of dome shape and at mid points of both the 5 foot and 6 foot side. (approximately 15 inches and 18 inches from center) The 200 pound load shall be contained within a flexible bladder or sack having approximate dimensions no larger than 30 inches long, 20 inches wide, and 8 inches high, filled with course sand or pea gravel. The dome shall withstand the sack drop without inverting or breaking. The drop test shall be witnessed and certified by the test laboratory.

2.4 FIXED SKYLIGHT UNITS

- A. Description: Factory fabricated aluminum framed plastic thermalized sealed double glazed dome skylights.
- B. Skylight Glazing Panels:
 - 1. Outer Lens: 50% minimum impact modified clear acrylic or clear prismatic acrylic of sufficient thickness to meet the specified performance requirements.
 - 2. Inner lens: High diffusing 50% minimum impact modified white prismatic acrylic.
 - 3. Energy Requirements: Glazing material shall have a maximum light distribution characteristic that maximizes the shading factor. The combined inner/outer lens target values shall be as follows:
 - a. Light Transmittance: 60 percent minimum.
 - b. Solar Heat Gain Coefficient: 0.50 maximum NFRC 200.
 - c. "U" Value: 0.74 or lower (glazing and framing) in accordance with NFRC 100 or "unlabeled skylight" default requirements of ASHRAE 90.1.
- C. Frame:
 - 1. ASTM B 221 alloy 6063-T5 or -T6 extruded aluminum frame with extruded aluminum dome retaining angle, thermal break, and integral condensate gutter.
 - 2. Finish: Manufacturer's standard mill finish.

3. Provide pre-installed 1-1/2 inches x 1/4 inch foam rubber gasket between frame and curb.
4. Provide weather sweep attached to frame.
5. Curb Dimensions: To match existing. Verify with selected skylight manufacturer.
6. Frame assembly shall be designed for installation on prefabricated curb as specified in Section 077213.

2.5 SKYLIGHT CURBS

- A. Specified in Section 077213.

2.6 ACCESSORIES

- A. Sealant: As recommended by skylight manufacturer and provided by the Contractor.
- B. Fasteners (For anchorage of skylight to roof curb): #12 x 1-1/2 inch stainless steel screws with washers, furnished by skylight manufacturer. Provide fasteners in sufficient quantity for complete installation.
- C. Washers: Neoprene/stainless steel bonded washer furnished by skylight manufacturer.

2.7 FABRICATION

- A. Provide skylight fabrication drawings to manufactured curb manufacturer specified in Section 077213 for verification of exact dimensions and attachment methods prior to fabrication of manufactured curb assemblies.
- B. Skylights shall be assembled and glazed ready for installation
- C. Fabricate skylights weathertight and free of visual distortions and defects.
- D. Exterior drip/counterflashing and drainage ports shall be protected from weather and air-borne debris. Corners of curb and retaining frames shall be mitered and full penetration welded. Retaining frames that secure the glazing panels along each side under spring tension need not be welded and must be sealed with a silicone sealant along the full perimeter of the retaining frame. Skylight frames shall be predrilled for anchorage to roof curbs.
- E. Seal glazing panels to base frame allowing for sufficient expansion and contraction. Provide weeping hole arrangement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and adjacent areas in which Work under this Section is to be performed. Do not proceed with Work until satisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install skylights on manufactured curbs in accordance with manufacturer's published instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.
- B. Separate aluminum surfaces of units in contact with cementitious materials or dissimilar metals with bituminous coating or other permanent separation as recommended by manufacturers.
- C. Attach skylight to curbs with specified fasteners and washers with minimum spacing of 12 inches on center.

3.3 FIELD QUALITY CONTROL

- A. Inspect skylight installation and attachment to manufactured curbs. Verify that installation is weathertight.

END OF SECTION 086313

SECTION 099000 – PAINTING AND COATING**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on the following substrates:
 - 1. Exterior concrete masonry units.
 - 2. Exterior hollow metal doors and frames.
- B. Related Sections:
 - 1. Section 079200 – Joint Sealants: Joint sealants at substrate.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Toxicity/EQ: Comply with federal, state, and local toxicity and environmental quality regulations and with federal requirements on content of lead, mercury, and heavy metals. Do not use solvents in paint products that contribute to air pollution.
- B. Elastomeric Coating Applicator Qualifications: Applicator having minimum 5 years documented experience in the application of elastomeric coatings and approved by coating manufacturer.
- C. Elastomeric Coating Pre-Installation Conference:
 - 1. Convene a pre-installation conference at the site, one week prior to commencing Work of this Section.
 - 2. Attendance:
 - a. Contractor.
 - b. Coating subcontractor.
 - c. Coating manufacturer's technical representative.
 - 3. Agenda:
 - a. Substrate condition including manufacturer's written approval.
 - b. Sequence and method of application of coating system.
 - 4. Record discussion of conference and decisions and agreements (or disagreements) reached, and affix signatures of all attendees. Furnish copy of record to Owner's representative and to each party attending.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Transport, handle, store, and protect products in compliance with the requirements of Section 016000.
- B. Delivery of paint materials shall be in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and/or reducing.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Apply paint finishes only when moisture content of surfaces is within manufacturer's acceptable ranges for type of finish being applied.
- B. Minimum surface temperatures or ambient air temperature shall be as follows for the specified coatings unless otherwise specifically stated by the manufacturer for the specific coating:
 - 1. Alkyd and interior and exterior latex finishes: 50 degrees F.
 - 2. Varnish and transparent finishes: 65 degrees F.
 - 3. All coatings: 5 degrees F. above dew point.
- C. Do not apply paint in areas where dust is being generated.
- D. Waste Management:
 - 1. Obtain paint in containers of the largest size practical for each color, sheen, and type.
 - 2. Remove excess paint from containers and dispose in accordance with MSDS data and local environmental regulations for paint products.
 - 3. Expose waste paint to air and allow paint to dry.
 - 4. Return reusable drums and totes to manufacturer.
 - 5. Clean and recycle containers that cannot be returned to manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide painting and coating products by the following:
 - 1. Sherwin Williams Company; Contact: Stephen Hallum (918) 408-5880; swrep4461@sherwin.com.
 - 2. Substitutions not allowed.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Accessory Materials: Accessory materials not specifically indicated herein but required to achieve the finishes specified shall be of highest quality and as recommended by the manufacturer.
 - 1. Paint Thinners: Type recommended by paint or coating manufacturer for paint or coating system, VOC compliant, first line commercial quality. Do not use solvents for thinning paint materials.
 - 2. Patching Materials: Low VOC latex filler.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
 - 2. Remove all sealants, flashing, and loose or damaged brick/mortar from parapet walls and joints.
- B. Ferrous Metals: Clean ferrous surfaces that are not shop-coated, of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning.
 - 1. Touch-up shop-applied prime coats where damaged or bare. Clean and touch-up with same type shop primer.
- C. Previously Painted CMU Block:
 - 1. Power wash wall and repair as required.
 - 2. Prior to application of primer, confirm that the pH of the surface to be painted is within a range of 6 to 13.
 - 3. Replace joint sealants where required.

3.3 APPLICATION

- A. Apply coating systems specified in the Painting Schedule hereinafter for the corresponding surface. Shop primed surfaces will not require field applied 1st coat (primer) specified in the Painting Schedule.
- B. Apply paint products in accordance with manufacturer's published instructions using application procedures approved for the particular application and substrate.
- C. Apply each coat to the Dry Film Thickness (DFT) specified which represents the minimum Dry Film Thickness in mils per coat. Apply each coat to uniform coverage.
- D. Apply each coat slightly darker than preceding coat. Sand smooth surfaces lightly between coats to achieve specified finish.
- E. Allow drying time between coats as recommended by the manufacturer.
- F. Apply additional coats when undercoats, stains, or other conditions show through final coat until paint film is of uniform finish, color, and appearance. Surfaces, including edges, corners, crevic-

es, welds, and exposed fasteners shall receive minimum dry film thickness equivalent to that of flat surfaces.

- G. Prime Coats: Before application of finish coats, apply a prime coat of material as scheduled or as recommended by manufacturer to material scheduled to be painted or finished that has not been shop primed. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

3.4 MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Replace identification markings on mechanical or electrical equipment when painted over or spattered.
- B. Where exposed piping, conduit, and electrical equipment are to be painted, paint color and texture shall match adjacent surfaces.

3.5 APPLICATION OF ELASTOMERIC COATINGS

- A. General:
 - 1. Begin system application at rear of building and work toward front. Begin system application at top of wall and work down. Begin application of system in the presence of Manufacturer's Technical Representative.
 - 2. Apply coatings in accordance with manufacturer's recommendations.
 - 3. Apply cold weather coatings at surface and ambient temperatures at or above manufacturer's recommended application temperatures and rising.
- B. Application:
 - 1. Coating:
 - a. Allow block filler to dry 24 to 48 hours before proceeding with subsequent coating.
 - b. Apply material by brush, roller, plaster type sprayer, or low pressure sprayer unless recommended by manufacturer to use brush only. Back roll brushed or sprayed material. Cross roll roller-applied material. Finish material with brush and roller strokes in one direction. For spray application, use airless equipment.
 - c. Apply two coats with a minimum dry film thickness (DFT) as specified in the Painting Schedule.
 - d. Provide pinhole free finish coat.

3.6 CLEANING AND PROTECTION

- A. As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of work keep premises free from unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect waste, cloths, and material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.
- D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- E. At completion of construction activities of other trades, touch up and restore damaged or de-

faced painted surfaces. Upon completion of work, leave premises neat and clean.

3.7 PAINTING SCHEDULE

EXTERIOR PAINTING SCHEDULE							
Surface	Sheen	1st Coat	DFT (mils) (per coat)	VOC (g/l)	2nd and 3rd Coats	DFT (mils) (per coat)	VOC (g/l)
Ferrous Metal (Hollow Metal Doors and Frames)	Semi-gloss	Epolon II Rust Inhibitive Epoxy Primer B67W400, B67A400, B67A400	4.0	300	1 coat: WB Acrolon 100 Water Based Urethane B65-720, B65V720	2.0 - 4.0	<100
Concrete Masonry Unit Elastomeric (50 degrees F. or above)	Flat	---	---	---	2 Coats: Conflex XL High Build Elastomeric, A5-400	6-7.5	97
Concrete Masonry Unit Elastomeric (Below 50 degrees F.)	Flat	---	---	---	2 Coats: UltraCrete Solvent Borne Masonry Coating, B46 Series (Above 20 degrees F.)	6-8	400

END OF SECTION 099000

SECTION 221426 – RETROFIT ROOF DRAINS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Retrofit roof drains.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Zurn Industries, Erie, PA (855) 663-9876.

2.2 RETROFIT METAL ROOF DRAINS

- A. Replacement Roof Drain: 16-gage, type 316 stainless steel flange and stem with acid-resistant powder coated cast iron clamp ring and dome.
 - 1. Model: Modified RD2150, by Zurn. Special order this product.
 - a. Contact: Cornerstone Sales, Tulsa, OK (918) 280-1200.
 - 2. Fasteners: Type 304 or 431 stainless steel.
 - 3. Pipe Size: To match existing.
- B. This is a special order item. Contact manufacturer to determine required lead time.
- C. Substitutions not allowed.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine existing roof drains to receive retrofit roof drains.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.

- C. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

- A. Remove dome in existing roof drain and clear interior drain body and drainage pipe of any debris.

3.3 INSTALLATION

- A. Install roof drain per manufacturer's written instructions.

3.4 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221426

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Contractor's Qualifications.
 2. Electrical Identification.
 3. Hangers and Supports.
 4. Conduit Sleeves.
 5. Grounding and Bonding.

1.2 DEFINITIONS

- A. Electrical Worker: For the purposes of the requirements of this Section, electrical workers are defined as those workers who perform work on the Project on electrical conductors of 50 volts or greater and electrical equipment of 50 volts or greater.

1.3 CONTRACTOR QUALIFICATIONS

- A. Electrical workers, as defined above, doing work on the Project shall be either:
1. A licensed electrician or,
 2. An apprentice working under an approved governmental or trade organization apprenticeship program whose work is being directly overseen by a licensed electrician.
- B. If state or local requirements or industry standards require more stringent qualifications of electrical workers than the minimum requirements stated above, the electrical workers shall possess such qualifications required by such State or local requirements or industry standards in lieu of the minimum requirements stated in this Section.
- C. If Contractor, subcontractor, or any sub-subcontractor fails to meet the above qualifications on the Project, then Owner may, without limitation, at Owner's sole discretion:
1. Prevent Contractor from participating on bids with regard to additional Owner projects for a minimum of 90 days for the first violation of the above-stated requirement; and
 2. Permanently suspend Contractor from bidding on future Owner projects for violation of the above stated requirements two or more times.
- D. If Contractor believes, based upon its experience and judgment, that compliance with requirements of this Section cannot reasonably be achieved, Contractor shall provide Owner with written notification stating why Contractor believes compliance cannot be achieved and stating how Contractor proposes to proceed with electrical work on the Project.

PART 2 - PRODUCTS**2.1 CONDUIT SLEEVES**

- A. Sleeves: Galvanized, black steel or schedule 40 PVC pipe.

2.2 GROUNDING AND BONDING

- A. Insulated Grounding Bushing: Steel with feed-thru lugs.
- B. Insulated Equipment Ground Wire: Copper.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install specified materials in accordance with manufacturer's recommendations and as indicated on Drawings.
- B. Electrical Equipment Supports: Support electrical equipment with hangers and supports specified above or in another approved manner where details are not indicated.
- C. Sleeves: Install where conduits pass through concrete floors. Caulk sleeves through outside walls above grade with sealant as specified in Section 079200.
- D. Fastening and Anchoring: Fasten conduit straps, disconnect switches, panelboards, and other equipment secured to walls and slabs with cadmium plated screws or bolts and lead cinch anchors or expansion bolts and install in holes drilled with proper size masonry drill. Properly size anchors in accordance with manufacturer's recommendations for load to be supported.
- E. Torque all conductor connection terminations to manufacturer's recommended values. Inspect panelboards for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

3.2 GROUNDING

- A. General: Ground all metallic conduits, supports, cabinets, equipment, system neutrals, metal building structures, and other items required to be grounded in accordance with the NEC and other applicable codes and as indicated on drawings.
- B. Equipment Grounding:
 - 1. Make conduits electrically continuous using proper fittings, connections, grounding bushings, etc.
 - 2. Where Galvanized Rigid Metal Conduit (GRC) penetrates the grade outdoors or penetrates the slab, install insulating grounding bushings.
 - 3. Install an insulated equipment ground wire as shown on drawings.
- C. Concrete Encased Electrodes: Where indicated on the Drawings, furnish and install electrodes, jumpers, and approved fittings in accordance with Grounding Electrode Detail .
- D. Ground Rods: If ground rods are required, install two 5/8 inch minimum diameter Copperweld rods driven vertically not less than 12 feet apart and each with 8 feet of length in contact with the soil.

3.3 TESTING

- A. Upon completion of installation, perform continuity tests on power and equipment branch circuit conductors. Inspect wire and cable for physical damage. Verify proper phasing connections.

- B. Measure ground resistance from system neutral connection at service entrance to convenient ground point on building water pipe using suitable ground testing equipment.
- C. Test receptacles with circuit tester to ensure proper polarity, grounding, and continuity of circuits.
- D. Load test GFCI receptacles.

END OF SECTION 260500

