

**MSBA ARP ROOF SYSTEM REPLACEMENT
HAMILTON-WENHAM REGIONAL HIGH SCHOOL
775 BAY ROAD
SOUTH HAMILTON, MA 01982**

February 3, 2026

60% DESIGN SUBMISSION

Prepared For:

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SECTION 011100

SUMMARY OF WORK

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Coordinate work with that of all other trades impacted by the work of this Section. Cooperate with such trades to facilitate the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Supply all necessary chutes, disposal facilities, transportation, and labor necessary to dispose of all demolished materials, dirt, and debris off-site in a legal dumping area. Each Contractor and sub-contractor shall obtain all permits necessary to transport and dispose of all materials, rubbish, and debris impacted by their scope of work.
- C. Provide and maintain temporary protection of all building components designated to remain or new components installed throughout the duration of construction. Supply all shoring and protection necessary to protect the building areas, building systems, and landscaped areas.
- D. Site and building access and the scheduling and completion of all Work with the Owner and other trades.
- E. Perform isolated gypsum deck repairs where designated on the Contract Drawings. Refer to Section 035100 – Gypsum Roof Deck Repairs for additional information.
- F. Perform masonry repairs where designated on the Contract Drawings. Refer to Section 040120 – Masonry Restoration and Cleaning for additional information.
- G. Perform isolated metal deck repairs where designated on the Contract Drawings. Refer to Section 050130 – Maintenance of Metal Decking for additional information.
- H. Remove and replace metal roof ladder where designated on the Contract Drawings. Refer to Section 055133 – Metal Ladders for additional information.
- I. Install new wood blocking and plywood sheathing where indicated on the Contract Drawings. Refer to Section 061000 – Rough Carpentry for additional information.

SUMMARY OF WORK

- J. Remove and replace the existing roof systems. Refer to Section 075400 – Thermoplastic Membrane Roofing for additional information.
- K. Remove and replace the designated skylights as indicated on the Contract Drawings. Refer to Section 075400 – Thermoplastic Membrane Roofing.
- L. Remove, designated skylights and infill deck opening. Refer to Section 035100 – Gypsum Roof Deck Repairs and Section 050130 – Maintenance of Metal Decking.
- M. Install new portable guard rails as indicated on the Contract Drawings. Refer to Section 075400 – Thermoplastic Membrane Roofing.
- N. Remove and replace the existing roof drain bowls and associated hardware. Refer to Section 221426 – Roof Drains for additional information.
- O. Perform all mechanical/electrical disconnections/reconnections associated with the roof replacements. Refer to multiple Sections of Divisions 23 and 26 for additional information.
- P. Perform all plumbing, mechanical, and electrical work associated with the accessibility modifications. Refer to Multiple Sections of Divisions 23 and 26 for additional information.
- Q. Perform unit price scope of work as indicated in Section 012200 – Unit Prices.
- R. Complete all associated work in accordance with these project specifications.
- S. Clean and restore all areas impacted by the work.

1.03 ALLOWANCES

- A. Not applicable to this section.

1.04 UNIT PRICES

- A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section “Unit Prices” for quantities to be carried in the Base Bid or Alternate(s) and provided on the Bid Form. Any work in addition to those shown on the Contract Drawings shall be either added or deducted based on the unit costs.

1.05 ALTERNATES

- A. Technical requirements for related Alternate work are defined in this section. Refer to Division 01 Section “Alternates” for scope to be carried in the Base Bid or Alternate(s) and provided on the Bid Form.

1.06 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.

- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent building and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.07 PRE-CONSTRUCTION CONFERENCE

- A. A Preconstruction Conference will be held with the Owner, Designer, Contractor, sub-contractor(s) and all involved trades to discuss all aspects of the project. The Contractor's foreman or field representative will attend this Conference. The Conference will not be held until all Shop Drawings and submittals have been received and reviewed by the Owner and the Designer.
- B. The foreman and/or superintendent must be able to effectively communicate in English (both written and spoken) and shall be on site at all times while work is being performed.
- C. Delivery of materials and commencement of construction shall not proceed until the preconstruction conference is held. Delays in obtaining a complete set of submittals shall not extend the contracted completion date.

1.08 CONSTRUCTION SCHEDULE

- A. The Contractor will be allowed to work at the project site between the hours of 7:00 a.m. and 5:00 p.m., local time, Monday through Friday. No other work hours are being considered at this time. The Owner reserves the right to disapprove or suspend a request to work outside of normal working hours. The cost of providing building maintenance personnel on site for weekend work, should they be deemed

necessary, shall be borne by the Contractor if weekend work is allowed and performed.

- B. The Owner shall review the Contractor's Construction Schedule prior to the start of any work. The Contractor's work schedule shall clearly define the location and type of work to be performed each day during the Contract such that the Owner can arrange to control occupancy in the building area(s) impacted by each day's work. The Owner shall notify the building tenants within the work area to allow for the proper coordination of the work. It shall be the responsibility of the Contractor to supply the Owner with written notice, 72 hours in advance, if the work location(s) for a workday differs from the schedule and to update the schedule. The Contractor shall submit the original schedule in accordance with Section 013300 – Submittal Procedures and shall update his Construction Schedule and submit a copy each week to the Owner for review and to the Designer for reference.
- C. Areas of the buildings contained in this Contract are sensitive to noise and disruption. The Contractor shall coordinate construction in these areas to minimize disturbance. The Contractor must notify the Owner in advance for review of any construction work that will cause excessive noise.
- D. The Contractor shall be required to update the final approved schedule weekly during construction.

1.09 PROGRESS MEETINGS

- A. The Owner shall schedule weekly progress meetings, unless otherwise indicated by the Owner.
- B. The General Contractor's Project Manager and site Supervisor and/or Foreman shall attend each project meeting.

1.10 DIMENSIONS AND QUANTITIES

- A. The general nature, quantity, and distribution of the various work items are shown on the Contract Drawings. All dimensions and quantities shall be field verified by the Contractor. The Contract Documents have been compiled from various sources and may not reflect the actual field conditions at the time of construction.
- B. The Contractor is cautioned to take all necessary precautions and make all necessary investigations to properly supply, fabricate, and install the proposed work. The Owner will not consider unfamiliarity with the project as a basis for any additional compensation.
- C. In case of inconsistency between Drawings and Specifications or within either document, the better quality and/or greater quantity of work shall be provided, as determined by the Owner.
- D. Additional compensation due to unfamiliarity with project conditions will not be considered.
- E. The Contractor is solely responsible for means and methods of construction. Make necessary investigations and take necessary precautions to properly supply, fabricate, and install work.

1.11 CONTRACTOR GUARANTEE

- A. Upon completion of the work, and prior to final payment, the Contractor and sub-Contractor(s) shall submit Guarantee(s) of their work to be free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years and shall be signed by the Principal of the Contractor's firm and sealed if a corporation.

1.12 WARRANTY

- A. Refer to the individual technical sections for specific material warranties related to this project.

1.13 INDEMNIFICATION AND WAIVER OF LIENS

- A. The Contractor shall provide a partial lien waiver for the Contractor, Sub-contractors, Sub-sub-contractors, and suppliers, as applicable, with progress payment applications by utilizing one of the following two methods:
 - 1. Conditional partial lien waiver: Provide a conditional partial lien waiver for the construction period covered by the corresponding payment application. A conditional partial lien waiver includes a statement that identifies that the lien waiver is in effect upon receipt of payment.
 - 2. Unconditional partial lien waiver: Beginning with the second payment application for the Contractor, provide an unconditional partial lien waiver for the construction period covered by the previous application. Unconditional partial lien waivers will be required for Sub-contractors, Sub-sub-contractors, and suppliers on their respective second and subsequent payment requests.
- B. The Contractor shall provide a final lien waiver for the Contractor, Sub-contractors, Sub-sub-contractors, and suppliers, as applicable, with the final payment application for the project.
- C. Lien waivers shall be in a form that is acceptable to the Designer of Record and Owner. Note that certain states, including Massachusetts, have standard forms available for use.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

End of Section

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SECTION 012200

UNIT PRICES

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. This Section contains instructions and references other Contract Documents that relate to Unit Prices. The Owner may elect certain aspects of the work, whose quantities cannot be determined at this time, to be performed or deleted by the Contractor. If such work items are selected, the Contract price will be adjusted by the Unit Price amount shown for each item in the Bid Forms.
- B. A Unit Price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.
- C. The Bidders shall submit with their Bids prices for the performance of Unit Price work. The general scope of the Unit Price work is defined within this section.
- D. The successful Bidder shall coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by each Unit Price Item is complete and fully integrated into the project.
- E. The specific quantities of Unit Price Work included in the Base Bid Scope of Work are provided herein. This applies to items whose exact quantities are unknown but are anticipated to exist, for example, damaged metal roof deck.
- F. The quantities of Unit Price Work listed in this Section and the bid and contract forms are in addition to the quantities shown on the Contract Drawings.
- G. The Unit Prices requested herein shall include a pro-rata share of all costs for materials, labor, equipment costs, overhead, profit, and applicable taxes.
- H. Where not otherwise specified, Unit Prices cover net costs and credits to the Owner for executing authorized changes in the Work. No separate adjustments are made for labor, materials, transportation, handling, storage, overhead, profit, or other related work expenses.
- I. If unit price quantities vary twenty (20) percent greater than the amounts carried in the Base Bid, the Owner reserves the right to re-negotiate unit price costs during the project.

- J. Should the Unit Prices referenced in this section not be used as part of the project, they shall be credited back to the Owner, less fifteen (15) percent for overhead and profit.

1.03 SCOPE OF WORK

- A. The Unit Prices for items of Work, as set forth in the Schedule of Unit Prices, shall be used to determine adjustments to the Contract Amount when changes in the Work involving said items are made in accordance with the Contract Documents.
- B. Materials, methods of installation, and definitions of terms set forth under the various Unit Price items in the Schedule of Unit prices shall be as indicated in the Contract Documents.
- C. The successful Bidder shall coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by each Unit Price Item is complete and fully integrated into the project.

1.04 APPLICABILITY OF UNIT PRICES

- A. Prior to commencing removal or replacement of materials set forth in the schedule of Unit Prices, the Contractor shall notify the Owner in sufficient time to permit proper inspection and measurements to be taken. Only quantities that have been approved in writing by the Owner will be considered in the determination of adjustments to the Contract Sum.
- B. Unit Price Work includes providing and installing all accessories and appurtenant work necessary to properly execute the Unit Price Work.
- C. Performance of work not required by the Contract Documents, or which is not authorized by Change Order or Field Order, whether or not such work is set forth hereunder as a Unit Price item, shall not be considered cause for extra payment. The Contractor will be held fully responsible for such unauthorized work, including the performance of all corrective measures required by the Owner.

1.05 VERIFICATION OF UNIT PRICE QUANTITIES

- A. The following minimum procedures must be included by the Contractor for each of the indicated unit repair items for the duration of the project:
 - 1. The Contractor is required to track, and record actual placed and completed Unit Price Work throughout the course of construction and submit a breakdown to the Owner and Designer on a weekly basis or as requested. The breakdown shall include the following for each Unit Price item:
 - a. Completed quantity to date.
 - b. Remaining quantity to date.
 - c. Percentage of total quantity remaining.
 - 2. The Contractor shall contact the Owner and Designer if a Unit Price quantity is anticipated to be reached prior to exceeding that quantity. No additional costs will be awarded to the Contractor for additional Unit Price Work without written approval from the Owner and/or Designer.

3. The Contractor must provide safe, adequate, and ample access to the Owner and Designer for verification of the Unit Price Work throughout the course of construction.
4. Photographic documentation of Unit Price work, with an approximate scaling device, must be performed if an Owner's representative is not available at the time of the work being performed.

1.06 SCHEDULE OF UNIT PRICES

- A. The unit prices listed below are above and beyond those shown on the Contract Drawings and shall be included by the Contractor under the appropriate Base Bid Scope of Work. The Contractor's Schedule of Values will carry each item under the bid amount selected for this project. Should the unit price work not be performed on this project, the total amount, or remaining amount if portions of unit price work are performed, shall be credited to the Owner.

Specification Section	Item	Estimated Quantity (beyond drawings)	Unit of Measure
035100	Gypsum Deck Repairs (Full Depth)	1,800	SF
035100	Gypsum Deck Repair (Shallow Repair, less than 1-inch in depth)	10	LF
035100	Gypsum Deck Full Replacement Including Formboard and Reinforcing Mesh	100	SF
035100	Replace unsuitable subpurlin bulb-tees	40	LF
035100	Prepare, prime, and paint areas with surficially rust on exposed steel framing during deck removal	100	SF
035100	Prepare, prime, and paint areas of exposed sub-purlin bulb tees that exhibit surficial rusting	100	SF
040120	Repoint Deteriorated Mortar Joint	200	SF
040120	Repoint Deteriorated Mortar Joint	300	LF
040120	Replace Spalled/Cracked Brick Masonry Unit	50	Units
050130	Replace Areas of Corroded / Deteriorated Metal Decking	270	SF

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Specification Section	Item	Estimated Quantity (beyond drawings)	Unit of Measure
050130	Repair Areas of Surface Rusted Metal Decking (Prepare, Prime, and Coat Surface Rust)	100	SF
050130	Repair Metal Decking (16ga. Deck Plate), Mineral Wool, Sealant	20	SF
050130	Metal Decking Repair (Re-attach Metal Roof Deck with Approved Fasteners (1 Box of 500 Screws))	1	UNIT
061000	Replace Deteriorated Wood Blocking Designated to Remain	1,200	BF
061000	Replace Deteriorated Plywood Sheathing Designated to Remain	750	SF
075400	Provide Additional Roof Walkway Pads	100	LF
075400	Provide Additional 6-Foot Portable Guardrails	10	UNITS

B. The unit prices listed below are above and beyond those shown on the Contract Drawings and shall be included by the Contractor under Alternate #1 Scope of Work. The Contractor's Schedule of Values will carry each item under the bid amount selected for this project. Should the unit price work not be performed on this project, the total amount, or remaining amount if portions of unit price work are performed, shall be credited to the Owner.

Specification Section	Item	Estimated Quantity (beyond drawings)	Unit of Measure
075400	Replacement of Existing Wet Insulation	20	SF
075400	Repairs to Existing Roof Surface	100	LF

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

End of Section

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SECTION 012300

ALTERNATES

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. The Bidders shall submit with their Bids, prices for the performance of Alternate Scopes of Work. The scopes of the Alternate Work are defined within this Section.
- B. The successful Bidder shall coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by the Alternate is complete and fully integrated into the project.
- C. Where a quantity of Unit Price work is included in the Base Bid, it is also included in the Alternates as defined in Section 012200 – Unit Prices. Selection of an Alternate does not delete any Unit Price work carried in the Base Bid.
- D. The successful Bidder shall coordinate all related work and modify or adjust adjacent work as necessary to ensure that work affected by the accepted Alternate is complete and fully integrated into the Project.
- E. Alternate Bid amount shall include the Work of each Technical Specification section, including related drawings, shown for the Base Bid except those sections indicated with an Alternate section.
- F. Alternate Bid amount shall include all costs associated with furnishing, erecting, and maintaining temporary constructions including overhead sidewalk protection, scaffolding, shoring and temporary barrier construction, waterproofing and dust proofing the interior of the building, as well as all overhead and profit associated.

1.03 SCHEDULE OF ALTERNATES

- A. Alternate Number One: includes the cost to furnish all labor, equipment, materials, overhead, and profit to perform all work described in and in accordance with the Contract Documents to install a liquid applied coating overtop the existing roof membrane system on Roof Area E in lieu of replacing the full roof system. Refer to Section 075400 – Thermoplastic Membrane Roofing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

End of Section

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SECTION 013300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. This Section contains instructions for submittals and shop drawings required at various stages of the project. The following will be required for all construction components and systems:
1. List of materials stating manufacturer's name and address, as well as material trade name and manufacturer's designation.
 2. Shop Drawings.
 3. Samples.
 4. Catalog Data.
 5. Mockups.
 6. Manufacturer's Instructions.
 7. Contractor's Schedule as it affects the contracted completion date and sequence of construction.
 8. Certificate of Dumping Facilities.
 9. Safety Data Sheets (SDS).

1.03 TIME OF SUBMITTALS

- A. The following submittals are required during the various phases of the Contract. Each submittal item shall have the technical section and paragraph number clearly indicated. All submittal items without the proper designations will be returned and will not be reviewed.
1. Bid Submission: shall include all items required under the Information to Bidders Section.
 - a. Refer to Instructions to Bidders regarding information to accompany Bid Form.
 2. Contract Submissions: After the successful Bidder has received the Notice to Proceed or Letter of Intent to Enter the Contract the Bidder shall, within ten (10) working days, provide electronic copies of the following submittals to the Designer:
 - a. Proposed Construction Schedule and Sequencing for completion of the Work specified in this project manual.
 - b. Complete Materials List
 - c. Manufacturer's Technical Literature as selected
 - d. Manufacturer's Instructions
 - e. Catalog Data ("SPEC DATA" Sheets)

SUBMITTAL PROCEDURES

- f. Safety Data Sheets (SDS)
 - g. Samples of all materials of construction, including caulking, sealers, fasteners, and sheet metal.
 - h. Shop Drawings
 - i. Certificates as approved Applicator by Manufacturer
 - j. List of proposed storage facilities and their location(s)
 - k. Proposed location(s) of dumpsters
 - l. Schedule of Values (Note: each trade including labor and materials, as well as all unit price items, are to be included in the schedule of values)
 - m. The Contractor shall provide a job specific health and safety plan, a temporary protection program and work schedule as they relate to the construction project.
 - n. The Contractor shall provide a detailed safety plan outlining the fall arrest, tie-off anchorage, securement of equipment, etc. related to the activities associated with working at the site.
 - o. The Contractor shall provide an overhead and sidewalk protection plan.
 - p. The Contractor shall comply with NFPA 241.
3. The Contractor shall make contract submissions in full packages. Any list of required submittals provided to the Contractor shall be responded to fully by the Contractor. Formal submissions by the Contractor which do not address every open article of the submittal list shall be returned to the Contractor for completion prior to review. Time issues resulting from the above shall be borne by the Contractor.
4. Bi-weekly Submissions: At the end of each second weekly period during construction, the Contractor shall submit an updated construction schedule which will show the status of the work with respect to the schedule and anticipated completion date. A list of all completed work is also required.
5. Prior to start of construction, the Contractor is to provide the Owner with copies of all building permits, etc.

1.04 SHOP DRAWINGS

- A. Original Submittal: One (1) electronic copy of all shop drawings shall be submitted for approval within five (5) days of Award of Contract.
- B. Shop drawings for all aspects of this project shall be submitted. The shop drawings shall include existing conditions, all applicable dimensions, new products to be installed, locations, etc.
- C. Resubmittal: When a resubmittal is required, the original so indicating will be returned to the Contractor. After revision of the original, a new electronic copy shall be submitted for review.
- D. Review: The above procedure shall be repeated until approval is obtained. The original electronic copy of the reviewed shop drawing will be returned to the Contractor, at which time the Contractor shall make prints in sufficient numbers for the Owner (If Requested), as well as sufficient copies for his use.

- E. Shop drawings of an engineering nature shall be sent directly to the Designer for review, with a copy of the electronic transmittal and submittal sent to the Owner.

1.05 SAMPLES

- A. Original Submittal: Two (2) samples, unless otherwise specified, of each item for which samples are required shall be furnished for approval. Approval shall be obtained prior to delivery of the materials to the project site. Such samples shall be representative of the actual material proposed for use in the project and of sufficient size to demonstrate design, color, texture, and finish when these attributes will be exposed to view in the finished work.
- B. Resubmittal: All rejected samples will be returned upon request, and any or all resubmittals shall consist of two (2) new samples.
- C. Review: Upon approval by the Designer, one sample so noted will be returned and the remainder will be retained by the Designer until completion of the work. When requested, all approved samples will be returned for installation, provided their identity is maintained in an approved manner until final acceptance of the project.
- D. Important specific samples are specified in Technical Sections of the Specifications. The Contractor is cautioned to quickly provide specified samples.
- E. Each submittal item shall have the technical section and paragraph number clearly indicated. All submittal items without the proper designations will be returned and will not be reviewed.

1.06 CATALOG DATA

- A. Submittals: Electronic copies of catalog data are required for the original submittal and each subsequent resubmittal along with shop drawings. Following review, one electronic copy will be returned with its status noted. If approved, such additional copies may be requested by the Designer or Owner and shall be furnished without additional cost.
- B. Data: Each submittal shall have all pertinent data contained therein that is applicable to the item submitted for review, adequately and permanently designated.

1.07 MANUFACTURER'S INSTRUCTIONS

- A. Where in these specifications an item is called for to be installed in accordance with the manufacturer's directions, specifications or recommendations, the Contractor shall furnish the Designer with electronic copies of said directions, specifications, or recommendations, before the item is installed.

1.08 CERTIFICATES AND GUARANTEES

- A. Certificates of performance, treatment, and conformance to specified standards shall be submitted prior to initiating work on the project.
- B. Copies of all guarantees required on the project shall be submitted for review and acceptance as to form.

1.09 IDENTIFICATION

- A. Data: All submittals for review shall have the following identification data, as applicable, contained thereon, or permanently adhered thereto:
 - 1. Project name and location.
 - 2. Designer's name.
 - 3. Subcontractor's, Vendor's, and/or Manufacturer's name and address.
 - 4. Product Identification. (It is important that the specific product intended for use is indicated in the manufacturer's literature).
 - 5. Shop drawing title, drawing number, revision number, and date of drawing and revision.
 - 6. Applicable Contract Drawings and Specification Section numbers.
- B. Catalog Data: Each separate catalog, brochure, or single page submitted shall have the identification required hereinbefore.
 - 1. Catalogs or brochures submitted containing multiple items for approval need the identification on the exterior and on each specific item clearly circled, flagged, or otherwise identified.
 - 2. In the event that one or more of the multiple items are not approved in any submittal, the additional copies required will not be requested until all items are approved.
- C. Space: Vacant space approximately two and one half inches wide by four inches high shall be provided adjacent to the identification data to receive the Designer's status stamp.

1.10 CONTRACTOR'S RESPONSIBILITY

- A. Representation: By their submittal of any shop drawing or catalog data, the Contractor thereby represents that they have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, or will do so, and that they have checked and coordinated each item with other applicable approved shop drawings and the Contract requirements. Certification shall appear on each shop drawing stating that the Contractor has made this check. All drawings without this certification will be returned without examination.
- B. Deviations: Changes shown on the submitted shop drawings that deviate from the Design Drawings must be brought to the Owners and Designers' attention in writing prior to review. Changes must be clearly visible on the shop drawings in the form of written notation, ballooning or highlighting the intended change. A written description of the proposed change must also be included and submitted on company letterhead. Changes to drawings and details not submitted in accordance with these requirements will not be recognized as an approved deviation from the Design of Record. Construction repairs, renovations, or replacements required as a result of shop drawing and submittal deviations that are not documented in accordance with these requirements are subject to removal and/or replacement by the Contractor, at the sole cost of the Contractor.
- C. Commencement: Order, fabricate, and install materials requiring a submittal only after the approval of the submittals and shop drawings related to such items. Any items installed prior to approval may be required to be removed and replaced with

an approved item at no additional cost to the Owner and with no extension of the completion date of the contract.

- D. Acceptance: Project Work, materials, fabrication, and installation shall conform to accepted submittals, shop drawings, and catalog data.
- E. Manufacturer's Information: Where manufacturer's directions, specifications or requirements are called for, the Contractor shall have the responsibility of determining whether such directions, specifications, or requirements may safely and suitably be employed in the work. Notification of the Owner must be made, in writing, if deviations or modifications are necessary for installation safety or proper operations.
- F. Concealed Conditions: If an unspecified or undetailed condition is discovered during the work, the Contractor shall submit scaled shop drawings indicating specific components and configurations planned for use. Provide temporary protection for the duration of the review process. Shop drawings must be approved and accepted by the Owner and/or the Owner's Representative prior to installation of the related work.
- G. Non-Submittal: Failure by the Contractor to submit shop drawings or submittals in ample time for review or resubmission (if required) prior to the commencement of construction shall not affect the completion date of the contract. Materials or methods of construction utilized in the Work by the Contractor without written acceptance by the Owner shall be done at the Contractor's own risk. Such materials or methods shall be subject to rejection by the Owner.
- H. Prohibitions: No portion of the work requiring a shop drawing, sample or catalog data shall be started, nor shall any materials be fabricated or installed, prior to the approval of such item.
- I. Review: Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and catalog data.
- J. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Designer's receipt of submittal.
 - 1. Initial Review: Allow ten (10) business days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Designer will advise the Contractor when a submittal being processed must be delayed for coordination.
 - 2. Concurrent Review: Where concurrent review of submittals by the Designer's consultants, or other parties is required, allow ten (10) business days for initial review of each submittal.
 - 3. Direct Transmittal to Consultant: Where the Contract Documents indicate that submittals may be transmitted directly to Designer's consultants, provide duplicate copy of the transmittal to the Designer. The submittal will be returned to the Designer before being returned to Contractor.
 - 4. If an intermediate submittal is necessary, process it in same manner as initial submittal.
 - 5. Allow ten (10) business days for processing each re-submittal.

6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
 7. The Designer will schedule one working day for submittal review for this project typically on a Wednesday of each week. Unless a time critical submittal requires immediate attention, all individual, or partial submittal packages will be retained, and not reviewed until multiple items are provided until said designated day. The Contractor shall take this into account when scheduling and coordinating submittal and construction activities to prevent delays in their work activities.
 8. Multiple individual submittal reviews or incomplete packages are subject to potential back charges to the Contractor due to unreasonable review times which may be required. The Contractor is to provide complete submittal packages for technical section.
- K. Prior to the start of construction, the General Contractor shall complete applicable applications, permits, and notifications to the MADEP, such as the Demolition/Construction form BWP AQ-06, and the Asbestos Notification Form ANF-001, if required and pay the required fees. These forms must be submitted at least 10 working days in advance of any regulated activity on the site or as required by the Authority Having Jurisdiction (AHJ). Demolition permits must be submitted for any work involving demolition, new construction, and renovation. The General Contractor shall provide the Owner's representative(s) with copies of any and all notifications as well as e-receipts for transmission to the Authorities having Jurisdiction.

1.11 RECORD DRAWINGS

- A. The Contractor shall provide a copy of all Contract Drawings showing as-built conditions and any Contract changes to the Owner at the completion of the project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. This Section contains instructions and requirements for the provision and utilization of temporary facilities to protect the Owner's property, the site, and construction materials, and daily maintenance and cleanup of the site during the project.

1.03 CONTRACTORS USE OF EXISTING FACILITIES

- A. The Contractor is hereby made aware that the Owner's daily operations shall not be affected by the work and shall conform to the Owner's site/facility requirements. Furthermore, the Owner may require that the Contractor relocate to other work areas at times to avoid conflicts with the Owner's operations. Therefore, the Contractor will be required to provide the Owner with a 72-hours' notice on anticipated work areas.
- B. The building will be occupied and in use during construction. The Contractor shall provide all protection, guards, fencing, and barriers necessary to segregate the work area and the areas adjacent to or below ongoing work from pedestrian and vehicular traffic. Protect existing building, building finishes, landscaping, and paved areas from damage.
- C. Limit the use of the premises to the work indicated, so as to allow for the Owner's uninterrupted occupancy and use. Confine operations to the areas indicated under the Contract. Conformance to the regulations set forth by the Owner, regarding use of existing facilities is mandatory.
- D. Owner may assist in controlling occupancy. Contractor shall provide and place portable barricades, as coordinated with the Owner.
- E. Take any and all precautions necessary and provide equipment, materials and labor to adequately protect previous construction, the building, its contents and occupants, and surrounding landscaped areas from damage due to construction as well as from inclement weather during construction.
- F. Clean interior and exterior areas affected by the construction on a daily basis. Do not allow construction debris, waste materials, tools, excess packaging materials or other construction related materials to accumulate on the roof, work platforms, in the facility, or at the exterior grounds and paved areas.

1.04 SANITARY FACILITIES

- A. Sanitary facilities shall be provided as required by local and state statute. They are to be provided by the Contractor in a location designated by the Owner. Units shall be ballasted to prevent overturning and secured to prevent un-authorized access.
- B. Sanitary facilities shall not be stored on the roof at any time during the project.

1.05 BARRIERS

- A. The Contractor shall install temporary fencing, warning lines, barriers, and the like, as required, to segregate the construction areas from existing facilities, occupants, and the public. In the event that access cannot be interrupted in the construction area, the Contractor shall provide protection above doorways and walks in the construction area.
- B. The Contractor is required to conform to OSHA requirements and all local, state, and federal safety regulations.
- C. The Contractor shall provide guard lights on all barriers and all lighting necessary to prevent vandalism of work and storage areas. The Owner is not responsible for Contractor's losses due to damage or theft by vandals.
- D. The Contractor shall provide warning lines inside of doors and adjacent to roof areas being renovated.

1.06 SCAFFOLDING AND STAGING

- A. Where scaffolding and staging are required for the proper installation of the work it shall be erected to provide a minimal impact on the site.
- B. All barriers and warning lines shall be installed at the base of any scaffolding or staging and around ground areas below elevated staging.
- C. Provide walk through overhead protection where work areas are above doors, walkways, or sidewalks.
- D. All scaffolding and staging shall be erected in conformance with all applicable state, federal and local codes. The Contractor shall follow all applicable local, state, and federal requirements regarding the construction of scaffolding and staging and the protection of public safety. Specific reference shall be made to the OSHA Construction Safety Regulations and all requirements of the Massachusetts Department of Labor and Industries.
- E. Should scaffolding be provided over the existing roof system, the Contractor shall provide a visual observation report of the existing roof components prior to setting up any equipment and report any pre-existing damages to the Owner's representative. Provide temporary protection as outlined within these documents.

1.07 FIRE PROTECTION

- A. The Contractor shall provide all necessary temporary fire protection for the buildings, building contents and materials during construction. The Contractor

shall provide incombustible protective blankets where necessary to protect surfaces or building contents from damage.

- B. At no time shall any combustibles be stored inside the building. All adhesives, caulks and cleaning solvents shall be stored well away from the building in a method approved by local fire officials.
- C. Should any cutting, burning, or welding be necessary, the Contractor shall provide a fire watch. This watch will continue during the operations and for four hours minimum after completion.
- D. At no time shall open flames be present around adhesives, caulks, or cleaning solvents as they will readily ignite. Rags soaked with cleaning solvents shall not be discarded in the dumpsters but shall be stored in a metal receptacle and removed from the site daily.
- E. The Contractor shall be required to comply with all local fire codes and shall obtain all permits necessary from the local fire department and provide one (1) copy to the Designer.
- F. The Contractor shall provide recently tested, fully charged fire extinguishers around the storage area, rubbish receptacle and two (2) within 100-feet of the work area or as specifically required by the Fire Department.

1.08 HOT WORK REQUIREMENTS

- A. Hot work shall comply with NFPA 51B, Fire Prevention During Welding, Cutting, And Other Hot Work and FM's Hot Work Permit System.
- B. The definition of Hot Work as listed in 527 CMR 1.00 and NFPA 51B 3.3.2 and 3.3.6 shall include: 1) welding and allied processes, 2) heat treating, 3) grinding, 4) thawing pipes, 5) powder-driven fasteners, 6) hot riveting, 7) torch-applied roofing, and 8) similar applications producing or using sparks, flame, or heat.
- C. All hot work including cutting, welding, brazing, etc. shall require a permit from the local Fire Department. The cost of any required fire watch required as condition of the permit shall be the responsibility of the Contractor. The cost of any local Fire Department paid details is the responsibility of the Contractor.
- D. All welding and cutting shall be in accordance with the local Fire Department's regulations.
- E. The Contractor shall confirm that all persons engaged in hot work operations on the work site have completed a Hot Work Safety Certificate. Certificates shall be provided by the National Fire Protection Association (NFPA), or equivalent certificate or course completion as determined and approved by the Head of the Fire Department.
- F. The Contractor will ensure that the requirements in the Contract Documents and any and all permit requirements regarding fire protection and prevention, including fire watch, are strictly adhered to during the entire duration of the Contract, until Final Completion of the Work.

- G. Torch cutting and/or welding operations by Sub-Contractors shall have the approval of the Contractor prior to start of such operations, and Sub-Contractors shall also submit Hot Work safety certificates.
- H. Wherever electric or gas welding or cutting work is done in the vicinity of combustible material, or over areas where persons may be found, interposed shields of fireproof material shall be used to protect against fire damage or injury.
- I. Personnel with suitable fire extinguishing equipment, experience, and training shall be stationed near welding and cutting operations to prevent the sparks from lodging in floor cracks or passing through floor or wall openings and from lodging in combustible materials.
- J. Chemical extinguishers shall be available and ready for use in all locations where torch cutting and/or welding operations are in progress. At a minimum, chemical extinguishers shall be 10lb ABC fire extinguishers or as directed by the fire department.

1.09 UTILITIES

- A. Electrical service will be provided to the Contractor free of charge by the Owner through exterior electrical outlets if operable. Use shall be limited to construction hours. The Contractor or Sub-Contractor will be required to provide their own generators as required to operate dust collection devices and/or equipment which may require large amperage than that available on site. The Owner reserves the right to charge the Contractor for excessive electrical service usage (i.e., wasteful usage). Should charges be considered, the Owner will notify the Contractors in writing of their intent, 72-hours in advance. Should the Contractor need to use generators to operate their equipment, it will be the responsibility of the Contractor to supply these units.
- B. Water for construction purposes will be provided to the Contractors free of charge by the Owner through exterior water spigots if operable. The Owner reserves the right to charge the Contractor for excessive or wasteful use. Should charges be considered, the Owner will notify the Contractor in writing of their intent, 72-hours in advance. Drinking water shall be provided by the Contractor.
- C. All other utilities (phone, fax, access to the site, sanitary facilities, etc.) required will be provided by the Contractor.
- D. Plumbing, heating, and electrical work, including reinstallation of equipment and other work to be performed by the Contractor, shall be carried out without interference to the building's normal operation. Where work requires interruption of service, the Contractor shall make advance arrangements with the Owner for dealing with such interruption.
- E. Ensure proper and safe operation and maintenance of utility systems within the construction limits, whether these are supplied by the Owner's distribution system or otherwise, until the work is accepted by the Owner. Maintain and operate appurtenances within the construction area which serve the distribution system, subject to periodic inspection by the Owner's operating personnel. Inspection by any representative or personnel of the Owner shall not relieve the Contractor of

his responsibilities in connection with operation and maintenance of these facilities and equipment.

1.10 TEMPORARY PROTECTION

- A. Provide suitable Owner approved temporary protection to prevent the entrance of debris and obstructions into the building. Provide warning signs to reroute personnel around areas of dangerous work. Schedule operations to allow for completion of work over a predetermined area within a day's work.
- B. Protect materials scheduled to be reused from damage by placing them in labeled containers or wrappings stored in a weathertight trailer.
- C. Provide temporary protection such as plywood and tarps for streets, drives, curbs, sidewalks, landscaping, and existing exterior improvements during all phases of the project.
- D. Provide temporary protection over windows/doors/vents/etc. as required to prevent dust migration into the building.
- E. Roof Protection:
 - 1. All existing roof areas, trafficked during construction, shall be protected with plywood over polyisocyanurate insulation (2-inch thickness minimum) and a drainage mat. Other proposed protection methods shall be at the Owner's approval.
 - 2. The Contractor is responsible for the prompt repair of any damage to the existing roof systems resulting from the work at the project.

1.11 WALKWAY COVERING

- A. Install walkway coverings above all entrances and at locations required to properly protect all construction and pedestrian personnel from falling debris. Roof coverings over entrances shall be constructed with layers of 3/4-inch thick plywood with a roof span rating of not less than 32-inches. Roof covering supports shall be placed at not more than 32-inches on center for the length of the coverings. The framework supporting the walkway covering shall be free-standing and well braced. The roof covering and support framing shall be designed to support a live load of at least 150 psf. The roof coverings shall be of width sufficient to cover the entrance doorway and extend 8-feet away from the building face. A minimum height clearance of 8-feet, 6-inches shall be maintained for temporary overhead protection. Protection shall be in accordance with all applicable OSHA standards.
- B. Provide temporary 60-watt lighting under overhead staging locations where the general public may frequent. Temporary lighting shall be spaced 8-feet minimum on center.
- C. Provide temporary signage as required to show access/egress areas, or temporary closures of entrance ways.

1.12 DEBRIS REMOVAL

- A. The Contractor shall supply adequate covered receptacles for waste, debris, and rubbish.

- B. All receptacles must be immediately removed from the site when full.
- C. The grounds in the area of the receptacle must be cleaned daily and prior to moving the receptacle to another location on the project. Disposal shall be off-site in a legal dump intended for that use.
- D. The receptacles shall be located in areas designated by the Owner. Receptacles shall not remain adjacent to the building overnight.
- E. Receptacles shall be removed from the site daily. Should, for any reason, receptacle removal is not possible on any given day, the Contractor shall move the receptacle a minimum of 50-feet from the building or as required by local fire officials.

1.13 EXISTING COMPONENT REMOVAL

- A. Under no circumstances shall the Contractor remove the existing systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent buildings and property areas shall be protected from airborne debris.

1.14 VOLATILE MATERIALS

- A. The Contractor is reminded that the adhesives, solvents, etc., are highly volatile and flammable materials. These materials, along with tools and applicators and rags, shall not be stored on or within the building. Do not transport materials through the building. Take precautions and closely follow the Specification requirements for fire protection on site during construction.
- B. Locate and use flame-heated equipment so as not to endanger the structure, other materials on site, or adjacent property. Locate and use flame-heated equipment in specific areas approved by the Owner. Do not relocate flame-heated equipment without prior approval from the Owner.

1.15 PREPARATORY WORK BY THE OWNER

- A. The Owner will perform the following preparatory work to the building contents below the work areas:
 - 1. Coordinate the potential relocation of occupancy adjacent to the work areas. Note however that the building will be considered occupied at all times.
 - 2. Upon written notification from the Contractor, the Owner may relocate adjacent building activities should it be anticipated that the construction renovations may affect the adjacent operations. The Contractor will be required to provide a description of the activities, duration, and suggested solutions to reduce potential issues.
 - 3. Aside from the work outlined above, the Owner will not perform any other preparatory work. The Owner shall be provided with sufficient notice (72-hours minimum) as to the location of the work, should it differ from the submitted work schedule.

1.16 PREPARATORY WORK BY THE CONTRACTOR

- A. The Contractor will perform the following preparatory work to the building contents below the work areas:
 - 1. Cover open shelving and office equipment including suspended ceilings, and furniture. No fixtures or appliances will be protected by the Owner.
 - 2. Mask openings to closets, encased bookshelves, cabinets, and similar fixed storage areas.
 - 3. Temporarily mask window openings to reduce dust infiltration.
 - 4. The Contractor shall coordinate the shutdown of air intakes with the Owner's representative so as to prevent intake of dust and fumes.
 - 5. Upon completion of the work, remove all masking and protection and clean and restore the area to the satisfaction of the Owner.
 - 6. Soiled, stained, or damaged floor areas will be cleaned, repaired, or replaced by the Contractor to the satisfaction of and at no additional cost to the Owner.

1.17 SIGNAGE

- A. If requested by the Owner, the Contractor shall conspicuously post a project sign at ground level. This sign shall designate the project entrance. Only one (1) entry may be used by the Contractor at each site. The entry location shall be as directed by the Owner.

1.18 ACCESS TO THE WORK

- A. Do not interfere with the Owner's normal business operations. Coordinate activities and sequencing of the Work with the Owner.
- B. The Contractor must secure the permission of the Owner prior to entering the building or performing work at the building interior. All access to the Work areas shall be provided by the Contractor from the exterior of the facility. An access tower shall be located at an Owner approved location for this purpose and shall be made secure at the end of each workday to prevent un-authorized access onto the unit.
- C. The Owner will designate which portions of the site the Contractor may utilize and access for the performances of the work. The Contractor must submit a site plan indicating their locations of set up, material storage, and parking. Parking at other locations throughout the lot, without prior authorization, is subject to vehicle removal at no cost to the Owner.
- D. All hoisting of equipment and materials must be done on the exterior of the building. No tools will be permitted inside the building unless specifically required to perform the designated scopes of work.
- E. The Contractor will be required to provide a clean change of clothes and shall be responsible for any damages or stained interior components should access to the interior be required.

1.19 PARKING

- A. Contractor parking at the site may be available at Owner approved locations. The Contractor to coordinate all parking locations with the Owner. All emergency fire lanes shall remain free and clean at all times.

1.20 TEMPORARY SITE OFFICE

- A. The Owner will not provide the Contractor with a temporary office or telephone line within the building.

1.21 TRAFFIC CONTROL

- A. The Contractor shall arrange and pay for all police details required to control traffic affected by any part of the work.
- B. The Contractor shall coordinate with the Owner daily to avoid disruptions to the bus lanes and bus activities.
- C. At times, it will be the responsibility of the Contractor to assist and direct traffic while erecting scaffolding and accepting material and equipment deliveries.

1.22 CLEAN-UP

- A. Site clean-up shall be to the conditions prior to construction, and to the satisfaction of the Owner. Site clean-up shall be performed daily.
- B. All roofs, building (interior and exterior), landscape, and parking areas shall be cleaned of all trash, debris, and dirt caused by or associated with the work.
- C. All landscape areas damaged or littered due to the work shall be raked clean and re-seeded if required.
- D. All paved areas shall be swept clean of debris daily.
- E. Any accumulated debris as a result of the roof renovations on the suspended ceiling tiles, or mechanical ductwork, shall be cleaned by the Contractor at no additional cost to the Owner.
- F. All areas stained, dirtied, discolored, or otherwise damaged due to the work shall be cleaned, restored, or replaced as required.
- G. All trash and debris shall be completely removed from the site daily during the work and at the completion of the project. All debris shall be legally disposed of offsite.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

End of Section

SECTION 016500

PRODUCT DELIVERY REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. This Section contains instructions and requirements for the provision and maintenance of adequate delivery, storage, and handling on site of products and materials to be utilized in the Work.

1.03 IN GENERAL

- A. The Contractor shall take the necessary precautions and provide all equipment, materials, and labor necessary to adequately protect the Contract Area, previous construction, the buildings, their contents, and occupants, surrounding landscaped and paved areas from damage due to the construction or inclement weather during construction.
- B. No storage on or within the building will be allowed without prior authorization from the Owner and Designer.

1.04 WEATHER PROTECTION

- A. Weather protection shall mean the temporary protection of that work adversely affected by moisture, wind, heat and cold by covering, patching, sealing, enclosing, ventilating, cooling and/or heating. This protection shall be provided for all work areas, the buildings, and their contents, trafficked adjacent areas, and all construction materials and accessories.
- B. The cost of heat, fuel, and power necessary for proper weather protection shall be the responsibility of the Contractor.
- C. Installation of weather protection shall comply with all safety regulations, including provisions for adequate ventilation and fire protection devices.

1.05 MATERIALS STORAGE, STORAGE, AND HANDLING

- A. All materials shall be stored in trailers onsite or brought to the site daily. Storage trailers will be allowed in the location(s) designated by the Owner. All flammable substances cannot be stored along the building.
- B. In the event that materials are exposed to the elements, they shall be marked as unacceptable and immediately removed from the site. They may not be used.

- C. The Contractor will be required to provide additional tarps or canvas covers over any materials that may be stored with the Owner's permission at the site. The Contractor will not be permitted to rely on the manufacturer's shrink wrap material as the sole source of weather protection. These covers are to be adequately ballasted and secured to prevent wind uplift.
- D. Protect all existing and new wood stored on site to prevent moisture absorption. Use tarps over the wood pile (top, sides, and bottom) elevated on pallets (one side lower to shed water).
- E. Onsite storage of materials is the responsibility of the Contractor. The Owner is not responsible for the Contractor's losses due to damage or vandalism.

1.06 TOOLS AND EQUIPMENT

- A. The Contractor is responsible for delivery, storage, maintenance, and security of tools and equipment.

1.07 INSPECTION NOTIFICATION

- A. Materials stored on site and subject to damage from wind, precipitation, or other potential climactic conditions will be subject to inspection on a daily basis by the Owner or Owner's Representative.
- B. If, during the Contract period, the Contractor is notified of insufficient weather protection, they shall, within 24-hours, properly restore the weather protection and repair or replace any damaged unprotected materials and systems.
- C. Should the Contractor not enact immediate repair or replacement when notified, the Owner shall have the proper protection installed at the Contractor's expense. The Contractor is responsible for all damages to the building as a result of leaks.

1.08 MANUFACTURER'S INFORMATION

- A. The manufacturers of all the materials shall supply written instructions concerning the storage and handling of all supplied materials, including sealants, and accessories. The manufacturer shall also provide information concerning storage and handling of flammable or volatile materials.
- B. Storage facilities shall be acceptable to the manufacturer and conform to his written requirements concerning temperature, humidity, ventilation, and the like.
- C. The "shelf-life" of materials shall be provided with the date of manufacture of all perishables, including volatiles, caulking, and mastics.
- D. The Contractor shall supply a copy of all manufacturers' written instructions to the Owner and Designer as outlined in Section 013300 – Submittal Procedures. The Contractor shall comply with all storage and handling requests and instructions of the manufacturer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

End of Section

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SECTION 017000

PROJECT CLOSE-OUT

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION

- A. This Section contains requirements for items to be completed by the Contractor prior to Owner's final acceptance.

1.03 SUBSTANTIAL COMPLETION

- A. Substantial completion for this project is defined as the date when the Owner and Owner's Representative mutually agree and certify that all project-related work has been properly installed and completed in a manner conforming to the Contract Documents. Work specified within the Contract Documents which has not been performed or has been performed in a manner which does not conform with the Contract Documents shall be deemed as not achieving substantial completion.

1.04 CLOSE-OUT PUNCH LIST REVIEW

- A. Notify the Owner or Owner's Representative in writing that the Contract Work of the project has been completed and is ready for close-out punch list review. After work is deemed substantially complete, and only minor repair items remain, the Owner's Representative shall tour the project site and compile a list of these items. Minor repair items are those items which have been properly installed and are functional, but which require cosmetic repair or cleaning that does not affect the systems' integrity. A copy of the list shall be sent to the Contractor who shall then correct each item. The Contractor shall certify completion of the itemized repair list to the Owner's Representative and request a re-review in writing. Should the Contractor delay correction of the list of items for more than 30-days, the Owner may have the deficiencies repaired by others at the Contractor's expense.
- B. Any work specified within the Contract Documents, which has not been performed, or has been performed in a non-conforming manner to the Contract Documents shall not be defined as minor "punch-list" items and must be performed or corrected as appropriate in order to achieve substantial completion.

1.05 PUNCH LIST RE-REVIEWS

- A. After providing written notification to the Owner and Designer that the punch list work has been completed, the Owner and Designer will perform one (1) final review. Should additional re-reviews be required due to punch list items which are

not completed or improperly completed, the costs of these re-reviews will be assessed to the Contractor.

1.06 MANUFACTURER'S INSPECTIONS

- A. After the re-inspection by the Owner's representative, the Materials Manufacturer's representative will be required to tour the site. The representative shall determine if the materials have been installed as required by the Manufacturer. Any items the representative determines were not so installed shall be reinstalled so as to comply with the Manufacturer's intended use. The Manufacturer shall forward a copy of the list of all items determined to be not installed as intended by the Manufacturer to the General Contractor and Designer.

1.07 WARRANTIES AND GUARANTEES

- A. When both the Owner's representative and the Manufacturer's representative agree that the Contractor has performed according to the Specifications and has installed the materials to the satisfaction of the Manufacturer, the Contractor shall petition the Manufacturer for the materials guarantee. They shall forward this guarantee to the Owner and provide a copy for the Designer.
- B. The Contractor will be required to provide lien releases for their work. The Contractor shall then forward their guarantee covering the construction to the Owner and provide one (1) copy for the Designer.

1.08 PROJECT CLOSE-OUT SUBMITTALS

- A. A minimum of two (2) sets of close-out documents are to be placed in individual three ring binders and submitted to the Designer for review. Two (2) sets will be issued to the Owner. One (1) thumb drive of all the documents will also be provided to the Designer and Owner at a special closeout meeting once the package has been accepted.
 - 1. Specified Contractor's and Materials Manufacturer's Warranties and Guaranties.
 - 2. Executed Punch-List Inspection letter.
 - 3. Consent of Surety to Final Payment (AIA Form G707).
 - 4. Lien Releases from Contractor, subcontractor, and suppliers (AIA Form G706A).
 - 5. Contractor's Affidavit of Payment of Debts and Claims (AIA Form G706).
 - 6. Final Application and Certificate for Payment (AIA Form G702).
 - 7. As-Built Drawings.
 - 8. Other documents which may be specifically required by the Owner, or the Designer.

1.09 RETAINAGE RELEASE

- A. When guaranties, warranties, certificates of compliance, and lien releases have been received by the Owner, and the Work has been accepted by the Owner as complete, the Owner shall release retainage monies to the Contractor and other monies retained by the Owner to ensure project completion in accordance with the Conditions of the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

End of Section

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SECTION 024100

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Demolition and removal of selected portions of buildings and structures and as required for new work. Refer to the appropriate technical Section and Contract Drawings for additional requirements.
- C. Salvage of existing items to be reused or turned over to the facility.
- D. Refer to other technical specification sections for selective demolition operations.
- E. Scheduling and sequencing operations without interrupting utilities serving occupied areas. If interruption is required, obtain written permission from the utility company and the Owner. Schedule interruption when the least amount of inconvenience will result.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 035100 – Gypsum Roof Deck Repair
- B. Section 040120 – Masonry Restoration and Cleaning
- C. Section 050130 – Maintenance of Metal Decking
- D. Section 055133 – Metal Ladders
- E. Section 061000 – Rough Carpentry
- F. Section 075400 – Thermoplastic Membrane Roofing
- G. Section 076200 – Sheet Metal Flashing and Trim

H. Section 221426 – Roof Drains

1.06 ALLOWANCES

A. Not applicable to this section.

1.07 UNIT PRICES

A. Not applicable to this section.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

A. Not applicable to this section.

1.10 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to the User Agency ready for reuse, at a location designated by the User Agency. Protect from weather until accepted by User Agency.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Protect from weather until reinstallation.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed, and salvaged, or removed and reinstalled.

1.11 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain property of the Owner or user Agency as applicable. Carefully remove each item or object in a manner to prevent damage and deliver promptly to a location acceptable to the Owner.

1.12 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.

- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with early and late starting and finishing dates for each activity. Ensure Owner's on-site operations are uninterrupted if applicable.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other occupants affected by selective demolition operations.
 - 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
 - 7. Means of protection for items to remain and items in path of waste removal from building.
- E. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged, and turned over to the Owner.
- F. Pre-demolition Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01. Submit before Work begins.

1.13 QUALITY ASSURANCE

- A. Examination of Existing Conditions: The Contractor shall examine the Contract Drawings for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. The Contractor shall visit the site and examine the existing conditions as he finds them and shall inform herself/himself of the character, extent and type of demolition and removal work to be performed. Submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time period established for receipt of such questions during the bidding period.
- B. Demolition Firm Qualifications: An experienced firm that specializes in demolition work similar in material and extent to that indicated for this Project.
- C. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- D. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- E. Standards: Comply with ANSI A10.6 and NFPA 241.

1.14 PROJECT CONDITIONS

- A. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- B. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- C. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent buildings and property areas shall be protected from airborne debris.
- D. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- E. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- F. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.15 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate, and measure the nature and extent of conflict. Promptly submit a written report to the Designer.

- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction videotapes.
 - 1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- F. Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES AND MECHANICAL / ELECTRICAL SYSTEMS

- A. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies and User Agency.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing. Where the entire wall is to be removed, existing services/systems may be removed with removal of the wall.
 - 4. Prior to commencing cutting work on existing surfaces, take all precautionary measures to assure that mechanical and electrical services to the particular area have been made inactive. Coordinate with Fire Protection, Plumbing, HVAC, and Electrical subcontractors. Only licensed tradesmen of that particular trade shall disconnect and cap existing mechanical and electrical items that are to be removed, abandoned and/or relocated.
 - 5. If, during the process of cutting work, existing utility lines are encountered which are not indicated on the Drawings, regardless of their condition, immediately report such items to the Designer. Do not proceed with work in such areas until instructions are issued by the Designer. Continue working in other areas.

3.03 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Section 015000 – Temporary Facilities and Controls.
 - 2. Maintain adequate passage to and from all exits at all times. Before any work is done which significantly alters access or egress patterns, consult with the Designer and obtain approval of code required egress. Under no condition block or interfere with the free flow of people at legally required exits, or in any way alter the required condition of such exits.

- B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
 - 2. Remove temporary shoring, bracing and structural supports when no longer required.
 - 3. Post warning signs and place barricades as applicable during placement and removal of temporary shoring.
- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).
 - 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Provide temporary barricades as required to limit access to demolition areas.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
- D. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

3.04 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering, and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during and after flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to the Owner.
 4. Transport items to storage area designated by the Owner.
 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Designer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- E. Items for Re-use and Preservation of Existing Surfaces to Remain:
1. The Contractor shall inspect closely each item specifically designated to be relocated, re-used, or turned over to the Owner prior to its removal, and immediately report damages and defects to the Designer and Owner. The Contractor shall be responsible for any subsequent damage to the same other than latent defects not readily apparent from close inspection and shall bear responsibility for its repair or same replacement as directed by the Designer, to the satisfaction of the Owner.
 2. Unless special surface preparation is specified under other Specification Sections, leave existing surfaces that are to remain in a condition suitable to receive new materials and/or finishes.

3.05 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. Provide all measures required by federal, state, and municipal laws, regulations, and ordinances for the protection of surrounding property, the public, workmen, and Commonwealth's employees during all demolition and removal operations. Measures are to be taken, but not limited to installation of sidewalks, sheds, barricades, fences, warning lights and signs, trash chutes and temporary lighting.
- B. Protect all walks, roads, streets, curbs, pavements, trees, and plantings, on and off premises, and bear all costs for correcting such damage as directed by the Designer, and to the satisfaction of the Owner.

- C. Demolition shall be performed in such a manner that will insure the safety of adjacent property. Protect adjacent property from damage and protect persons occupying adjacent property from injuries which might occur from falling debris or other cause and so as not to cause interference with the use of other portions of the building, of adjacent buildings or the free access and safe passage to and from the same.
- D. Every precaution shall be taken to protect against movement or settlement of the building, of adjacent buildings, structures, sidewalks, roads, streets, curbs, and pavements. Provide and place at the Contractor's own expense, all necessary bracing and shoring in connection with demolition and removal work.
- E. Remove portions of structures with care by using tools and methods that will not transfer heavy shocks to existing and adjacent building structures, both internal and external of the particular work area.
- F. Provide and maintain in proper condition, suitable fire resistive dust barriers around areas where interior demolition and removal work is in progress. Dust barriers shall prevent the dust migration to adjacent areas. Remove dust barriers upon completion of major demolition and removal in the particular work area.
- G. Protect unaltered portions of existing construction, including finishes, furnishings, and equipment.
- H. Provide secure weather protection where demolition has removed a portion of the exterior envelope.

3.06 DISCOVERY OF HAZARDOUS METALS

- A. If hazardous materials, such as chemicals, asbestos-containing materials, or other hazardous materials are discovered during the course of the work, cease work in affected area only and immediately notify the Designer and the Owner of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Continue work in other areas.
- B. If unmarked containers are discovered during the course of the work, cease work in the affected area only and immediately notify the Designer and the Owner of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Take immediate precautions to prohibit endangering the containers integrity. Continue work in other areas.

3.07 CUTTING

- A. Perform all cutting of existing surfaces in a manner which will ensure a minimal difference between the cut area and new materials when patched. Use extreme care when cutting existing surfaces containing concealed utility lines which are indicated to remain and bear full responsibility for repairing or replacement of all such utilities that are accidentally damaged.
- B. Provide a flush saw cut edge where pavement, curb and concrete removals abut new construction work or existing surfaces to remain undisturbed.
- C. Provide fire safing through all interior penetration walls to seal around new penetrations.

3.08 DISPOSAL OF DEMOLISHED MATERIALS

- A. Do not allow demolished materials to accumulate onsite.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- D. Burning: Do not burn demolished materials.

3.09 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division One for additional information.

END OF SECTION

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SECTION 035100

GYPSUM ROOF DECK REPAIR

(Filed sub-bid with Section 070002)

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work specified within this Section shall be the responsibility of the Roofing Filed Sub-Contractor.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Repair or replacement of deteriorated gypsum roof deck components. Repairs to be performed as a Unit Price item.
- C. Coordinate the removal and replacement and/or reinstallation of the existing ceiling systems and interior finishes to perform the work.
- D. The Contractor must provide temporary protection below area of roof deck removal. All temporary protection required to prevent water infiltration in these areas must be included. Temporary protection should also be included for adjacent electrical, fire sprinkler, and HVAC conduits as they are encountered.
- E. The Contractor is cautioned that electrical conduits may be in close proximity to the underside of the roof deck. The Contractor will be responsible to coordinate for all electrical disconnects/reconnects associated with removal of deteriorated sections of roof deck.
- F. Repair surface defects in existing gypsum deck uncovered during removal of existing roof systems.
- G. Install new decking where skylights are designated to be removed.
- H. The Contractor is responsible for performing fastener and/or bond adhesion uplift resistance tests throughout the roof(s) with the roof manufacturer to determine vapor barrier type.
- I. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
- J. Clean and restore all areas affected by the work.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition
- B. Section 061000 – Rough Carpentry
- C. Section 075400 – Thermoplastic Membrane Roofing
- D. Section 076200 – Sheet Metal Flashing and Trim
- E. Section 221426 – Roof Drains

1.06 ALLOWANCES

- A. Not applicable to this section.

1.07 UNIT PRICES

- A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section “Unit Prices” for quantities to be carried in the Base Bid and provided on the Bid Form. Any work in addition to those shown on the Contract Drawings shall be either added or deducted based on the unit costs.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Technical requirements for related Alternate work are defined in this section. Refer to Division 01 Section “Alternates” for scope to be carried in the Base Bid or Alternate(s) and provided on the Bid Form.

1.10 REFERENCES

- A. National Roof Deck Contractors Association (NRDCA).

1.11 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.

- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements. Indicate intended location of use on each data sheet.
- D. Submit Safety Data Sheet (SDS) for each type of product indicated.
- E. Submit associated equipment and materials list, including, but not limited to, surface preparation equipment and methods used, pinning and mesh hardware, injection apparatus, primers, bonding agents, etc.
- F. Submit means and methods proposed for curing and protecting all repairs, and for masking surrounding surfaces and protecting public from work areas, etc.
- G. Submit colored photographs of all approved mock-ups for project records.

1.12 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with a minimum of three (3) years of experience.
- B. Comply with National Roof Deck Contractors Association (NRDCA) Publication NRDCA 500 "Gypsum Roof Deck Replacement Procedures" for all repair work.
- C. Copies of Documents at Project Site: Maintain at the project site a copy of reference documents that prescribe execution requirements.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all products to the project site in manufacturer's original unopened packing.
- B. Store gypsum products under cover and elevated above grade.
- C. Ambient Conditions: Do not install gypsum products when conditions exceed those stated in manufacturer's printed literature.

1.14 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall

be manufactured for this purpose. Adjacent building and property areas shall be protected from airborne debris.

- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.15 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

1.16 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
- B. See Division 01 Section "Description of Work" for contractor's warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum concrete patching material:
 - 1. United States Gypsum; USG Securock – Gypsum-Concrete Patch (Formerly PYROFILL)
- B. Permanent Formboard:
 - 1. United States Gypsum; SECUROCK Gypsum-Fiber Roof Board 5/8-inch thick 6-pound density.
 - 2. Temple-Inland; GreenGlass Roof Board, 5/8-inch thick
 - 3. Georgia-Pacific; DensDeck Roof Board, 5/8-inch thick

2.02 ACCESSORIES

- A. Reinforcing wire mesh: Electrically welded galvanized 12-gauge longitudinal wire 4-inches on center, and 14-gauge transverse wire 8-inches on center.
- B. Bulb tee sub-purlins: #218 bulb tees having a weight of 3.87 plf, min moment of inertia of .598 and a depth of 2-1/8-inches conforming to ASTM A 499.
- C. Water: potable, free from deleterious substances that may affect gypsum concrete.

- D. Primer for sub-purlin bulb tee repairs or other steel framing members shall be a zinc rich (83% minimum zinc content by weight), high solids, low VOC compound such as Zinc Clad II HS Inorganic Zinc-Rich Coating, by Sherwin Williams, ZRC Zero VOC Water Based Galvanizing Compound by the ZRC Worldwide, or Cold Galvanizing Compound by Rust-Oleum.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall coordinate all work in this Section with the work in other sections as required for the work to proceed in an orderly fashion. Removal and replacement shall be performed in a specified, controlled manner so as to provide a watertight building at the end of each day's work, free of excessive build-up of trash, dust, dirt and debris. The general procedure for this is listed below, and all items shall be done on a daily basis.
- B. All deteriorated existing roof deck areas, as determined by the Designer or Owner's Representative, shall be replaced. The roof deck surface shall be carefully inspected following removal of the existing roof system. Any deck areas found damaged, excessively deflected, or otherwise unsuitable shall be replaced. No decking shall be replaced until it is viewed by the Owner and the Designer and replacement is authorized. The Contractor shall protect exposed roof areas until viewed by the Designer and Owner and renovated with the new system.
- C. Temporarily remove, store, and reinstall existing ceiling tiles, light fixtures, and the like prior to initiating the removal operations to prevent damage to the existing items to remain.
- D. Protect interior surfaces below deck repair and replacement areas with tarps prior to construction. Mask, protect, and clean open ducts, grills, thermostats, electric boxes or similar fixtures and items that can be soiled or affected by work or which might conduct dust to other areas.
- E. Disconnect and/or support the electrical power and mechanical equipment fastened below the gypsum roof deck area designated to be replaced prior to the start of demolition.

3.02 EXAMINATION

- A. Verify sections of the deck requiring replacement or repairs by visually surveying the underside of the deck for sagging or water damaged, stained or wet formboard. Look for areas of structural damage such as broken formboards, delamination of the formboard, or excessively cracked gypsum decking. Based on the survey results, mark off the top surface of the roof to denote possible areas of concern.

3.03 REMOVAL OF EXISTING GYPSUM DECK MATERIALS

- A. Protect the interior equipment and finishes as noted within this specification and the specification Section 024100 – Selective Demolition.

- B. Areas of the gypsum deck system requiring replacement shall first be reviewed with the Owner and the Designer prior to removal. At that time, the extent (and dimensions) of replacement for the area shall be defined.
- C. Prior to removal of deck sections, the Contractor shall install all necessary supports and braces for the existing rooftop equipment and deck penetrations. If it is necessary to disconnect any of these items, the Contractor shall not proceed until the Owner and Designer have reviewed the situation and approved disconnecting. Notify utilities, if necessary.
- D. The areas to be removed shall be cut into convenient sections, making sure supports are not disturbed and to prevent debris from falling into the interior of the building. The limits of existing deck removal shall occur over a framing member.
- E. Comply with the roof deck manufacturer's written recommendations and procedures.
- F. Starting with the wettest or most damaged gypsum, remove top surface of the gypsum to expose the wire mesh. If any of the wires are rusted through, then the entire area of gypsum including the mesh and full thickness of gypsum concrete and form board must be replaced. Continue removing the top surface of gypsum in all directions down to the wire mesh until wire mesh that has not rusted through is found.
- G. Cut the existing panel parallel to the bulb tees starting at one end of the panel and extending for the full length of the deck tile panel by making clean straight saw cuts through gypsum a minimum of 18-inches in all directions from defect area and to adjacent bulb tees. Cut decking and form along the centerline of supports. Carefully remove the deck tile panel without damaging the adjacent roof deck section scheduled to remain.
- H. Where bulb tees are currently not present, remove decking and form to the nearest support in each direction. If the section to be removed is against an existing bulb tee, pay particular attention to avoid damaging the welds that secure the bulb tee to the primary structural steel framing.
- I. Existing wire mesh must remain intact a minimum of 12-inches into defective area in order to lap new wire to be installed.
- J. After removing deteriorated gypsum concrete from area and sweeping dust and debris, carefully remove existing formboards to prevent excessive amounts of dust and debris from entering building below. Replace missing or damaged bulb tees at areas of deck enclosure.
- K. Clean exposed edges of structural steel with wire brush. Prime rusted steel prior to installing new steel form, decking, and associated components. Apply primer by brush in accordance with primer manufacturer's printed instructions. Allow proper drying time prior to installation of new decking.

3.04 GYPSUM DECK REPAIRS

- A. Prepare any chips, spalls, or cracks in exposed gypsum deck by sweeping away all dirt, debris, loose substances, and spalling gypsum concrete in order to provide smooth uniform surface.

- B. Mix and apply gypsum repair material in accordance with the manufacturer's written instructions. Thoroughly fill areas being repaired with trowel applications. Trowel surface of repair smooth and level while still in an uncured state. Ensure that repair area is level with adjacent existing deck surface.
- C. Allow proper drying time (in accordance with the manufacturer's written instructions) prior to installing new roofing materials. Gypsum deck repairs shall be allowed to cure until thoroughly dry.

3.05 REPLACEMENT OF POURED GYPSUM ON FORMBOARD DECK

- A. Place form on lower flanges of sub-purlins or other framing with ends and edges supported by cross-tees or other primary framing members. Cut forms to fit at ends and frame openings. End joints not supported by framing should be supported by cross tees.
- B. Staffer joints in adjacent courses. Provide continuous 5/8-inch minimum bearing for form support at deck perimeter, form ends and openings exceeding 8-inches.
- C. Where existing gypsum is removed, leave minimum 8-inches of existing wire reinforcing exposed around full perimeter of replacement area. Lap and tie replacement reinforcing onto existing prior to pouring replacement gypsum.
- D. Application of Grout:
 - 1. Mix gypsum concrete on site. Immediately follow with placement of gypsum concrete. Follow the manufacturer's printed mixing instructions precisely. Failure to follow recommended mix ratios and procedures will be cause to reject batch prior to placement. Discharge gypsum concrete from mixing apparatus close to surface of formboard to prevent impact loads. Pour in one continuous operation.
 - 2. Fill edges with slight excess using a single pour at sub-purlins.
 - 3. Grout end joints against steel framing.
 - 4. Strike excess material to form a smooth, flush surface joint. Use screeds as a guide to match the original thickness of deck.
 - 5. Form cants and curbs where required.
 - 6. Provide temporary protection over deck replacement areas.

3.06 BULB TEE REPAIRS

- A. Prepare and prime areas of existing sub-purlin bulb tee framing that show signs of surficial rusting.
- B. Scrape and wire brush surficial rusted surfaces down to sound metal. Remove all rust and corrosion to reveal 100% bare metal.
- C. Apply two coats of the specified cold galvanizing compound. Apply by brush or roller. Apply to all surfaces including bottoms of flutes.
- D. Allow compound to dry to the touch prior to installing grout patch material or roof system components.

3.07 PROTECTION

- A. Protect installed gypsum deck from subsequent construction operations.

3.08 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in “punch-list” form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor’s equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division One for additional information.

End of Section

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SECTION 040120

MASONRY RESTORATION AND CLEANING

(Filed sub-bid with Section 040001)

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work specified within this Section shall be the responsibility of the Masonry Work Filed Sub-Contractor.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Provide all shoring and temporary protection as required to complete the work.
- C. Provide and maintain vacuum equipped grinder equipment as required to reduce dust accumulation at the site. Provide and maintain pre-measured mixing buckets upon approval of the appropriate mortar color mix design.
- D. Pre-clean existing masonry components prior to performing any masonry renovations at the site. Pre-cleaning at stained areas shall include use of cleaning detergent, as indicated herein, to remove vegetative growth, atmospheric staining, efflorescence, and the like.
- E. Install new masonry through-wall flashings at the designated locations above roofing as shown in the Contract Drawings.
- F. Perform miscellaneous masonry repairs to above roof-line rising walls (i.e. brick unit replacement, repointing deteriorated mortar, etc.) as a Unit Price scope of work.
- G. Perform a final cleaning of the work locations once all masonry repairs have been completed.
- H. Clean and restore all areas affected by the Work.
- I. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition
- B. Section 055133 – Metal Ladders
- C. Section 061000 – Rough Carpentry
- D. Section 075400 – Thermoplastic Membrane Roofing
- E. Section 076200 – Sheet Metal Flashing and Trim

1.06 ALLOWANCES

- A. Not applicable to this section.

1.07 UNIT PRICES

- A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section “Unit Prices” for quantities to be carried in the Base Bid and provided on the Bid Form. Any work in addition to those shown on the Contract Drawings shall be either added or deducted based on the unit costs.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Not applicable to this section.

1.10 REFERENCES

- A. Brick Industry Association (BIA) Technical Notes
- B. ASTM C216 – Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
- C. ASTM C270 – Standard Specification for Mortar for Unit Masonry
- D. ASTM C150 – Standard Specification for Portland Cement
- E. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes
- F. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar
- G. ASTM C920 – Standard Specification for Elastomeric Sealants

- H. ASTM C1330 – Standard Specification for Cylindrical Sealant Backing for Use with Clod Liquid-Applied Sealants
- I. ASTM D5249 – Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints

1.11 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.
- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- D. Samples for Verification: Before erecting mockup, submit samples of the following:
 - 1. All brick shall be submitted to the Owner for acceptability as to color and appearance match with the existing brick. The Contractor may be required to submit additional brick samples for approval.
 - 2. Mortar puck samples prior to in-place mockups.
- E. Qualification Data: For restoration specialists including field supervisors and chemical manufacturer.
- F. Restoration Program: For each phase of restoration process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials on building and Project site.
 - 1. Include methods for keeping pointing mortar damp during curing period.
 - 2. If materials and methods other than those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.
- G. Cleaning Program: Describe cleaning process in detail, including materials, methods, and equipment to be used and protection of surrounding materials on building and Project site, and control of runoff during operations.
 - 1. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.12 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.
- B. Mockups: Prepare in-place mockups of restoration and cleaning as follows to demonstrate aesthetic effects and qualities of materials and execution. Prepare mockups on existing walls under same weather conditions to be expected during remainder of the Work. Approved mockups may be included in the final construction.

1. Three (3) linear feet of throughwall flashing above roofing.
 2. Three (3) square feet of brick masonry rebuilding.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall not be delivered to site until they have been approved through submittal review and samples have been reviewed and approved by the Owner.
- B. Materials shall be stored on site only in the area(s) identified by the Owner.
- C. The manufacturers of all the materials shall supply written instructions concerning the storage and handling of all supplied materials, including sealants and accessories. The manufacturers should also provide information concerning storage and handling of flammable or volatile materials.
- D. Storage facilities shall be acceptable to the manufacturer and conform to the written requirements concerning temperature, humidity, ventilation and the like.

1.14 SPECIAL PROJECT CONDITIONS

- A. Not applicable to this section.

1.15 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent buildings and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.

- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.
- I. Cold Weather Application: Applies only to rebuilding, no repointing shall be completed when the air temperature is less than 40°F. The Contractor shall comply with the following cold weather masonry construction requirements at no change in Contract price:
 1. The cold weather construction and protection requirements shall be closely followed.
 2. Construction materials shall be received, stored, and protected in ways that prevent water from entering the materials.
 3. If climatic conditions warrant, temperatures of construction materials should be measured. Frozen sand and wet masonry units must be thawed. Masonry units below 20°F must be heated above 20°F without overheating.
 4. Sufficient mortar ingredients should be heated to produce mortar temperatures between 40°F and 100°F. Every effort should be made to produce consecutive batches of mortar with the same temperatures falling within this range. The mortar temperature after mixing and before use should be above 40°F, maintainable either by auxiliary heaters under the mortar board or by more frequent mixing of mortar batches. Heated mortar on mortar boards should not become excessively hot (greater than 100°F).
 5. During below-normal temperatures, masonry should be placed only on sound unfrozen foundations. Masonry should never be placed on a snow or ice-covered surface, because of the danger of movement when the base thaws and the possibility of very little bond being developed between the mortar and the supporting surface.
 6. At the end of the day, the top surface of all masonry should be protected to prevent moisture such as rain, snow, or sleet from entering the masonry. This protection must cover the top surface and should extend a minimum of 2-feet down all sides of the masonry.

Workday Temperature	Construction Requirement	Protection Requirement
Above 40°F	Normal masonry procedures.	Cover walls with plastic or canvas at end of workday to prevent water entering masonry.
40°F – 32 °F	Heat mixing water to produce mortar temperatures between 40°F – 100°F.	Cover walls and materials to prevent wetting and freezing. The covers should be plastic or canvas.
32°F – 25 °F	Heat mixing water and sand to produce mortar temperatures between 40°F - 100°F.	With wind velocities over 15 mph provide windbreaks during day and cover walls and materials at the end of

Workday Temperature	Construction Requirement	Protection Requirement
25°F – 20 °F	Heat mixing water and sand to produce mortar temperatures between 40°F - 100°F. Mortar on boards should be maintained above 40°F.	the workday to prevent wetting and freezing. Maintain masonry above freezing for 16-hours using auxiliary heat or insulated blankets.
20°F – 0°F and below	Heat mixing water and sand to produce mortar temperatures between 40°F - 100°F.	Provide enclosures and supply sufficient heat to maintain masonry enclosure above 32°F for 24 hours.

7. Note: Construction requirements, while work is in progress, are based on ambient temperatures. Protections requirements, after masonry is placed, are based on mean daily temperatures.

J. Hot Weather Application: The Contractor shall keep the areas being built sufficiently moist at all times during the operations. Mortar mixed and ready for application shall be used within 1-hours' time and continually remixed to prevent excessive evaporation of moisture from the mortar. Discard all mortar which has begun to set or is not used within 1-hours' time. Water for tempering should be available at all times.

Workday Temperature	Construction Requirement	Protection Requirement
40°F to 100°F	Normal masonry procedures.	Normal protection procedures.
Above 100°F (or above 90°F with wind velocity in excess of 8 mph)	Flush mixer, mortar transport container, and mortar beds with cool water before they contact mortar ingredients. Maintain temperature of mortar below 120°F and maintain mortar consistency by retempering with cool water.	Fog spray newly constructed masonry until damp, a minimum of three (3) times daily for a minimum of three (3) days after installation.
Above 115°F	Shade materials and mixing equipment from direct sunlight. Flush mixer, mortar transport container, and mortar beds with cool water before they contact mortar ingredients. Use cool mixing water to maintain the temperature of mortar below 120°F. Ice is	Fog spray newly constructed masonry until damp, a minimum of three (3) times daily for a minimum of three (3) days after installation.

<u>Workday Temperature</u>	<u>Construction Requirement</u>	<u>Protection Requirement</u>
	permitted in the mixing water prior to use, but not when water is added to mortar. Maintain mortar consistency by retempering with cool water.	

1. Note: Construction requirements, while work is in progress, are based on ambient temperatures. Protection requirements, after masonry is placed, are based on mean daily temperatures.

1.16 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

1.17 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
- B. See Division 01 Section "Description of Work" for contractor's warranty.

PART 2 PRODUCTS

2.01 SALVAGED MATERIALS

- A. All building materials, equipment and debris of whatever nature from the portions of the existing structure removed under this project and not designated to be reused or reinstalled shall become the property of the Contractor and legally disposed of offsite.

2.02 MASONRY UNITS

- A. Brick masonry shall conform to ASTM C 216, Grade SW, Type FBS specifications.
- B. Brick shall match existing size, configuration, color and texture. The Contractor is cautioned that replacement brick may be a special order and that submittals/mockups are to be presented as quickly as possible.
 1. The existing brick masonry units were measured to be approximately:
 - a. 8-inches x 3-5/8-inches x 2-1/4-inches
 - b. Sizes may vary – Confirm all dimensions in the field.

2.03 MORTAR

- A. Mortar for repointing and rebuilding shall be Type N, conforming to ASTM C270 specifications and shall match the existing in color, texture and appearance.

Mortar shall be pre-hydrated and conform to Parts 8 and 11E of the BIA Technical Notes.

- B. The existing mortar joints have the following approximate dimensions and color(s);
- C. If custom batched mortar is utilized materials shall conform to the following:
 1. Portland cement shall be Type 1 conforming to ASTM C150, specifications.
 2. Hydrated lime shall conform to ASTM C207, Type S specifications.
 3. Mortar joints: approximately 3/8-inch.
 4. Sand shall conform to ASTM C144, amended as follows:

Sieve Size	% Passing (By Weight)
#4	100
#8	95-100
#16	70-100
#30	40-75
#50	20-40
#100	10-25
#200	0-10

5. Tinting or coloring agent(s) shall be added to the sand, lime, and cement to color the fully cured, in-place mortar to match the physical and chemical characteristics and specified requirements of the Type N mortar.
 6. Admixtures - No admixtures shall be allowed.
- D. Water shall be clean, potable water.

2.04 LATERAL MASONRY TIES

- A. Lateral masonry ties shall be 300 series stainless steel flexible ties such as #345-BT or #345-BL Flexible Ties as manufactured by Hohmann & Barnard, Inc., 103-C Triangular Wire Veneer Anchor with #316 Triangle Tie as manufactured by Heckman Building Products, Inc., or approved equal. Ties shall be selected in accordance with the manufacturer's written instructions for securement to the existing backup wall.
- B. Fasteners for securing brick masonry ties shall be 1/4-inch diameter hammer drive anchors with zinc sheaths, stainless steel pins and flat heads such as Zamac Nailins by Powers Fasteners, HIT anchor by Hilti, Masonry Anchor by Olympic Fasteners or approved equal. Fasteners shall penetrate the substrate 1-1/2-inch minimum.
- C. Note where lateral ties are in place in the existing conditions the intent may be to match in kind depending on the type and the unique existing wall configuration(s).

2.05 WEEPS

- A. Baffles to be installed in full head joint weeps of brick masonry shall be 3/8" x 2-1/2" x 3-3/8" baffle comprised of a bonded cellular material, such as:
 1. Cell Vent, No. 3601, by Wire Bond.
 2. Quadro-Vent by Hohmann & Barnard, Inc.
 3. Cell Vent by Dur-O-Wall, Inc.
 4. Or approved equal.

- B. Color(s) to be selected by Owner.

2.06 SHEET METAL THROUGHWALL FLASHINGS

- A. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
 - 1. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "FreedomGray" by Revere Copper Products, Inc.
 - 2. Weight (Thickness): 16-oz./sq. ft. uncoated weight, with 0.787-mil coating thickness applied to each side.
- B. Throughwall flashings shall have integral soldered end dams at all terminations.
- C. Sheet metal flashings shall be shop fabricated. All breaks, bends and hems shall be uniform, clean, straight lines.
 - 1. Flanges in general, shall be 4" wide minimum and shall be hemmed.
 - 2. Drips shall be hemmed 3/4" wide and break at a 30° angle.
 - 3. All copper joints shall be soldered.
 - 4. Seams shall be formed of a single lock, crimped, and soldered.

2.07 MEMBRANE THROUGHWALL FLASHINGS AND ACCESSORIES

- A. Fabric-coated copper flashing shall consist of a full 5 oz. copper sheet with polymer fabric laminated to both copper faces with non-asphalt adhesive. Tensile strength shall be 31,500 psi minimum. Puncture resistance shall be greater than 500 pounds average. Fabric flashings shall be:
 - 1. Multi-Flash 500 by York Manufacturing, Inc.
 - 2. Copper-Fabric NA Copper Fabric Flashing by Hohmann & Barnard, Inc.
 - 3. Copper Fabric Flashing (#4150) by Wire-Bond.
 - 4. Copper Fabric Flashing by Advanced Building Products, Inc.
 - 5. or approved equal.
- B. Self-Adhered throughwall flashings shall be a 40 mil, rubberized asphalt or adhesive based flashing with cross-laminated polyethylene film such as:
 - 1. Blueskin TWF by Henry.
 - 2. Textroflash by Hohmann & Barnard.
 - 3. Perm-A-Barrier Wall Flashing by GCP.
 - 4. CCW-705-TWF by Carlisle Coatings and Waterproofing.
 - 5. Or approved equal.
- C. Mastics and/or sealants specific to the membrane flashing manufacturer shall be compatible with the membrane throughwall flashing material(s).
- D. Termination bar shall be 1/8-inch x 1-inch copper or stainless-steel bar stock with pre-punched holes spaced 6-inches on center.
 - 1. Fasteners for masonry or concrete substrates shall be minimum 1/4-inch diameter hammer drive anchors with zinc sheaths, stainless steel pins and flat heads such as Zamac Nailins by Powers Fasteners, HIT anchor by Hilti, Masonry Anchor by Olympic Fasteners or approved equal. Fasteners shall penetrate the substrate 1-1/2-inch minimum.

2. Fasteners to metal Studs shall be No. 10 fully threaded, self-drilling, Type 410 Stainless Steel screws.
- E. Rivets shall be 3/16-inch diameter copper or stainless-steel to match metal type.
- F. Solder for Zinc-Tin Alloy-Coated Copper (FreedomGray): ASTM B 32, 100 percent tin, lead-free application as such, Johnson #497 SuperFlo by Johnson Manufacturing Company.
 1. Flux for use with FreedomGray shall be Johnson's E-127 Flux-'N-Solder with Pure Tin.
- G. All accessories, including but not limited to nails, screws and clips shall be copper, or stainless steel and completely compatible with the surrounding metal to prevent galvanic reaction.

2.08 MASONRY CLEANER

- A. The Contractor shall attempt to clean masonry with hot water prior to use of cleaners.
- B. Should hot water washing not be sufficient for cleaning the masonry, pre-cleaners to be used to remove tough deposits of rust staining, carbon staining, and algae prior to performing any masonry repairs shall be a semi-viscous, biodegradable liquid specifically formulated for cleaning of heavily soiled brick or stone masonry surfaces, such as:
 1. Enviro Klean by Prosoco, Inc.
 2. Easy Brick Cleaner by Envirosafe Manufacturing Corp./Eco-Wares, Inc.
 3. Oxy Solve Concrete and Driveway Cleaner by Simple Green.
 4. Or approved equal.
- C. Cleaner shall be specifically recommended by the manufacturer for the removal of excess mortar from masonry without damaging or altering colored mortar additives, for newly rebuilt, replaced, or repointed brick masonry and cast stone shall be:
 1. Sure Klean Vana Trol by Pro-So-Co, Inc.
 2. Hydroclean HT 455 by Hydrochemical Techniques, Inc.
 3. 200 Lime Solvent by Diedrich Technologies.
 4. Or approved equal.
- D. Masking materials shall be commercially available masking or duct tape of appropriate width. Self-adhesive materials shall be completely strippable, leaving no adhesive residue when removed.
- E. Plastic sheet for masking tape areas shall be 4 mil thick minimum polyethylene sheet of appropriate size to cover the required areas.

2.09 SEALANT

- A. Sealant for masonry joints and all exposed locations shall be a single-component silicone conforming to ASTM C 920, Type S, Grade NS, Class 50, Uses NT, M, A and O, such as manufactured by Tremco, Dow, Sika Corp., or approved equal.
- B. Sealant color(s) shall be selected by the Owner from the approved manufacturer's color chart.

2.10 SEALANT ACCESSORIES

- A. Primer shall be non-staining type as manufactured or recommended by the sealant manufacturer(s).
- B. Joint cleaner shall be non-corrosive and non-staining as recommended by the sealant manufacturer(s). Cleaner shall be totally compatible with the sealant.
- C. Bond breaker tape shall be pressure-sensitive tape as recommended by the sealant manufacturer(s).
- D. Backer rod shall be continuous length, closed-cell polyethylene foam, as recommended by the sealant manufacturer. Backer rod shall be compressible, resilient, non-waxing, non-extruding, non-staining, and non-gassing. Backer rod shall be of sufficient size to be compressed 30% to fit the maximum joint width and shall be totally compatible with the sealants, primers and substrates. Backers shall conform to the requirements of ASTM C 1330, Type B, such as SOF Rod as manufactured by Nomaco, ITP Soft Type backer rod by Armacell, MasterSeal 921 by Sika, or approved equal.
- E. Masking material shall be commercially available masking tape of appropriate width or other material recommended by the sealant manufacturer. Self-adhesive masking materials shall be of low tack and completely strippable, leaving no adhesive residue behind when removed.

PART 3 EXECUTION

3.01 GENERAL WORKMANSHIP

- A. Set up of scaffolding or similar access shall be subject to review and approval by the Owner.
- B. Do not leave any partially completed sections exposed to the elements overnight. Provide all devices (including heaters and insulation) necessary to maintain areas at the correct temperature and humidity for proper curing of mortar.
- C. During freezing weather the Contractor shall protect all masonry with tarpaulins or other approved material. Masonry materials shall be stacked on platforms and covered, or stored in a manner acceptable to the Owner, to protect them from contact with soil and weather exposure. Materials with stained faces will not be used in the walls.
- D. No masonry work shall be executed when the temperature in the work area has dropped below 40°F unless it is rising. The Contractor shall provide heat and maintain the temperature of masonry materials and protect the completed work from freezing. Protection shall consist of heating and maintaining the temperature of masonry materials to at least fifty 50°F, but not more than 100°F, and maintain an air temperature above 40°F on both sides of completed masonry for a period of at least seventy-two (72) hours.
- E. Keep covers tightly sealed on all evaporative products to prevent premature curing.
- F. During the removal of any existing component, the Contractor shall report to the Owner any areas of damaged, deteriorated or otherwise unsuitable framing, wood

blocking, or wall materials uncovered during the work. Do not cover unacceptable areas until reviewed by the Owner and Designer. Provide temporary protection to the area in question.

- G. Any wall areas opened shall receive the new masonry that day. Should rebuilding of masonry not be completed, temporary weather protection and shoring of the wall shall be provided by the Contractor.
- H. The Contractor shall lay-up brick or other masonry plumb, level, and true to the lines and dimensions at the existing walls. Chipped or broken units shall not be used. If any such units are placed in the finished wall, they shall be removed and replaced with new units at no additional cost to the Owner.
- I. The Contractor will be required to use pre-measured mixing buckets upon notification of the approved mortar mixture. Shovel mixing will not be permitted for color mortars.
- J. Refer to Brick Industry Association (BIA) technical notes for standard practice for masonry repointing, rebuilding, and repair.

3.02 MASONRY PRE-CLEANING

- A. The Contractor shall attempt to clean masonry with hot water. Should hot water washing not be sufficient for removing atmospheric or efflorescence staining, cleaners should be used as a secondary option. Coordinate with the Owner and Designer for direction to proceed with cleaners.
- B. Prior to pre-cleaning, test the specified cleaner on a small area of masonry wall to determine compatibility with the masonry, window units, sealants, etc. Evidence of discoloration, metallic salts, or other detritus shall be grounds for requiring the use of a substitute cleaner.
- C. Pre-clean the existing masonry at the stained locations designated on the Contract Drawings. Follow the cleaning solution manufacturer's written instructions for dilution rates, dwell periods, and water application pressure. Follow the manufacturer's instruction regarding the need for recapture of wash water.
- D. Scrub any stubborn stains with masonry washing brushes. Steel bristle wire brushes are not to be used.
- E. The intent of the pre-cleaning is to remove atmospheric staining, vegetative growth, rust staining, and other miscellaneous dirt and staining from the masonry prior to the start of wide-scale masonry repairs.

3.03 REMOVAL OF BRICK MASONRY

- A. Provide shoring of the existing surroundings prior to and as the masonry removal progresses.
- B. It is the responsibility of the Contractor to design and carry out shoring procedures sufficient to comply with applicable regulations, securely support all masonry or other elements left unsupported by the required removals of brick masonry, prevent displacement, and permit the work of other trades to proceed.

- C. Remove masonry units in the locations shown on the Contract Drawings. Use hand and power tools to remove masonry. Pneumatic demolition tools are not permitted.
- D. Remove maximum 4-linear feet sections of masonry at a time, or as required to prevent deflection or displacement of the existing masonry to remain.
- E. The maximum spacing of temporary shoring vertical supports shall be 12-inches on center. The addition of temporary lateral bracing or blocking between vertical shoring elements is required.
- F. If cracks occur in mortar joints of brick intended to remain, completely stabilize the area with additional shoring or new construction cut out the damaged joint area and repoint it after removal of shoring. Secure the Designer's approval of repair.
- G. Sawcut surrounding mortar joints and remove the designated masonry units. Remove adjacent units as required. Provide temporary shoring and protection as necessary.
- H. Remove masonry units in a manner so as not to damage sound materials designated to remain.
- I. Do not remove header bricks unless they are loose or deteriorated. It is the intent to rebuild the brick masonry around the existing header bricks as much as possible.
- J. Completely remove shoring system when no longer needed.

3.04 MASONRY REPLACEMENT

- A. Reconstruct brickwork with new brick to follow the existing profile and configuration. All brick masonry shall be plumb, level and true to the lines and dimensions of existing wall. Chipped or broken units shall not be used. If any such units are placed in the finished wall they shall be removed and replaced with new units at no additional cost to the Owner.
- B. Prior to reinstalling the outer wythe of masonry the Contractor shall report any deterioration of the inner wythe to the Owner and Designer. Repoint areas of deteriorated mortar joints on the inner wythe under a unit price scope of work.
- C. The Contractor shall supply all jacks, shoring and temporary supports necessary to support brickwork above and adjacent to any area to ensure proper installation of the work.
- D. Wet all new and existing masonry units in the work area. Masonry shall be kept damp but without standing water.
- E. Utilized pre-measured mixing buckets for all colored mortar to provide consistency. Shovel mixing will not be permitted for measuring colored mortars.
- F. Utilize rotary mixers when fabricating all mortar. Be sure to maintain relative proportions of mortar materials to provide the texture and color to match the existing mortar. No anti-freeze compounds or other substances shall be added to the mortar. Mix all mortar for at least 3 minutes and not more than 5 minutes with the minimum amount of water to produce a workable consistency. The maximum allowable air content of cured mortar shall be 12% by volume. Retempering of

mortars that have stiffened because of evaporation of water will be allowed for standard colored mortar in order to provide the proper consistency provided all mortar in a batch is utilized within 1-hour of initial mixing. Re-tampering of colored mortars will not be acceptable as it may affect the color shading.

- G. Set each brick in a full bed of mortar and build upward. Tool all joints to match the existing mortar joints profile(s). Fully butter all heads.
- H. Work mortar into joints for complete width and depth. Consolidate and tool to match the existing finish at each location, which typically appears to be a weathered joint. Tool exposed joints when the mortar is thumbprint hard. For horizontal joints, jointers shall be at least 12-inches long for brickwork. Jointers shall be slightly larger than the width of the joint so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint. Strike flush joints that will not be exposed. Tool vertical joints first. Brush joints to remove all loose and excess mortar. Horizontal joints shall be level, vertical joints shall be plumb and in alignment from top to bottom of wall.
- I. Provide full joint depth of new mortar. Strike off and tool brick masonry mortar joints to match the existing joint profile(s). Allow areas to be fully cured prior to cleaning.
- J. Where brick masonry replacement occurs in areas to be repointed, rake back joints and repoint together with the wall area.

3.05 REPOINTING OF MASONRY

- A. Be sure all brick rebuilding and replacement are completed prior to beginning repointing to allow for installation of continuous mortar joints.
- B. Any masonry unit damaged during the repointing process shall be replaced by the Contractor at no additional cost to the Owner.
- C. Cut and point all designated brick masonry joints.
- D. Refer to Technical Notes, Section 46 of the Brick Industry Association for methods and materials for pointing repairs.
- E. Remove existing mortar to a depth of at least 1-inch minimum or 3 times the width of the joint in the areas to be repointed. Removal shall be accomplished using hand and power tools so as not to damage the existing brick. Remove both horizontal and vertical joints. Brush the joint clean of all loose mortar and dust and wet the exposed surface down with a light water spray. Keep exposed surface damp throughout procedure.
- F. Utilized pre-measured mixing buckets for all colored mortar to provide consistency. Shovel mixing will not be permitted for measuring colored mortars.
- G. Utilize rotary mixers when fabricating mortar. Be sure to maintain relative proportions of mortar materials to provide the texture and color to match the existing mortar. No antifreeze compounds or other substances shall be added to the mortar. Mix dry ingredients before adding water. Mix all mortar for at least 3 minutes and not more than 5 minutes with the minimum amount of water to produce a workable consistency. The maximum allowable air content of cured

mortar shall be 12% by volume. Retempering of mortars that have stiffened because of evaporation of water will be allowed in order to provide the proper consistency, provided all mortar in a batch is utilized within 1-hour of initial mixing.

- H. Prehydrated mortar shall be used for pointing of masonry. Add only a sufficient amount of water to produce a damp mass of such a consistency that it would retain its form when pressed into a ball with hands but will not flow under a trowel. Be sure that the color and texture sample of the cured mortar has been viewed and approved by the Owner.
- I. Work mortar into prepared joints for complete width and depth. Consolidate and tool into joint using tooling equipment to completely fill the joint cavity. Repoint rebuilt masonry areas along with the existing masonry. Repointed joints shall be tooled to match the existing joint profile(s).
- J. Protect areas of repointing from inclement weather during curing.
- K. Allow repointed areas to be fully cured prior to masonry cleaning as described in this section.

3.06 SHEET METAL THROUGHWALL FLASHING INSTALLATION

- A. Coordinate installation of new sheet metal throughwall flashing and counterflashings with all work of other trades.
- B. Fabricate and install new sheet metal flashing and extend rear leg of flashing 3-inches minimum up the back of the wall or as shown on the Contract Drawings.
 - 1. Form the flashing to shed water. Provide 2-inch-high end dams at limits of throughwall flashings. Provide completely watertight seams and overlaps. Rivet and solder end dam connections. End dams shall finish 2-inch-high minimum.
- C. Remove and shore masonry as required to install the new sheet metal throughwall flashings and anchors. Brush clean all loose mortar from the existing back-up wall.
- D. Prior to installing new sheet metal throughwall flashing, parge uneven areas of the backup wall to provide smooth surface to install throughwall flashing. Parge shall extend up past the termination bar to allow the flashing to be terminated and sealed to a smooth surface.
- E. Install new flashings as shown on the Contract Drawings. Extend new sheet metal throughwall flashings through the masonry wall. Set the horizontal portion of sheet metal flashing in a trowel coat of flashing cement. Secure the back leg of the flashing to the existing brick backup wall with masonry anchors.
- F. The ends of flashing sections shall be fully soldered. Clean existing flashings to remain to provide positive sealant bonding.
- G. All corner/limits of flashings shall provide minimum 3-inch end laps, shall be riveted and soldered to provide a watertight connection, and shall be set in a full bed of mastic.
- H. Expansion joints in the sheet metal throughwall flashing shall be installed as detailed in the Contract Drawings or every 25-linear feet and within 2-linear feet of corners where throughwall flashing extends around a corner.

3.07 MEMBRANE THROUGHWALL FLASHING INSTALLATION

- A. Install the membrane throughwall flashing over the installed sheet metal flashing using one of the following options:
 - 1. Set fabric-coated copper membranes in a trowel coat of flashing cement and extend a minimum of 5-inches above the sheet metal flashings. Where practical, position laps in fabric-coated copper a minimum of 12-inches from the sheet metal flashing laps.
 - 2. Prime all surfaces to receive self-adhered membrane throughwall flashings per manufacturer's instructions. Outer leading edge of membrane throughwall flashing shall not be exposed to ultra-violet and shall be set back from the face of masonry minimum of 1/2-inch. Roll membrane to fully bond to surfaces and prevent "fishmouths".
- B. Install weep baffles at maximum 24-inches on center. Weep baffles shall be in direct contact with the throughwall flashing materials at the lower limits and not blocked with mortar or sealant. Any blocked weep baffles will be required to be removed and replaced at no additional cost to the Owner.

3.08 LATERAL TIE INSTALLATION

- A. Install new lateral ties into the existing backup wall. At a minimum, the spacing for the lateral tie installation shall be 16-inches on center, unless otherwise indicated on the Contract Drawings.

3.09 SEALANT JOINT PREPARATION

- A. Ensure all work by others occurring at sealant joint locations has been completed prior to the start of sealant installation.
- B. Remove the existing sealant and backer material.
- C. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
- D. Following removal of existing sealants and preparation of bonding surfaces, clean bonding surfaces with two applications of the manufacturer's recommended cleaning solution. Apply solution with brushes and wipe with clean white rags.
- E. Joint Priming: Prime joint substrates where recommended in writing by joint-sealant manufacturer, based on 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.
- F. Primer shall be applied and allowed to dry prior to the application of joint backer, bond breaker or sealant.
- G. Masking Tape: Use masking tape where required to prevent contact of sealant 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

3.10 SEALANT INSTALLATION

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Precondition sealants to a temperature between 65 and 75°F, or as required by the manufacturer.
- D. Sealant shall be applied to clean, dry joints by knife, trowel, manual or air pressure guns using proper nozzle sizes. Substrate ambient temperatures shall not be lower than 40°F.
- E. Install sealant backings 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. Provide a 2:1 width to depth ratio unless otherwise indicated by the manufacturer. Select joint backing materials as recommended by the sealant manufacturer for each application.
 - 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.
 - 4. Provide approximately 30% compression of backer materials.
- F. Install bond-breaker tape to surfaces not intended to bond with the sealant in accordance with the manufacturer's recommendation and as required to prevent 3-sided adhesion.
- G. Prime joint substrates when recommended by the sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- H. Install sealants as recommended by the sealant manufacturer and 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. Apply using adequate pressure to fill and seal joint width.
 - 3. Completely fill recesses in each joint configuration.
 - 4. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
 - 5. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 - 6. Provide sealant joints with a minimum of ¼-inch, and an appropriate depth to width ratio for the given application.

- I. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified 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 the sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 8A in ASTM C 1193, unless otherwise indicated.
- J. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- K. If sealant is accidentally applied to masonry or other porous surfaces in the vicinity of the work, remove with solvent in accordance with the manufacturer's written instructions. For excess sealant installed on masonry and other porous surfaces at the joint, allow sealant to cure for 24 hours and remove by wire brushing or sanding. Remove any debris resulting from this process. For excess sealant installed on metal and other non-porous surfaces, remove the excess sealant with a solvent moistened cloth and remove solvent residue in accordance with the manufacturer's recommendations

3.11 MASONRY CLEANING

- A. Prior to all masonry cleaning, confirm that the sealant work of this and all other trades is 100% complete and allowed to fully cure for a minimum of 8-days.
- B. Test the specified cleaner on a small area of masonry wall to determine compatibility with the masonry, window units, sealants, etc. Evidence of discoloration, metallic salts or other detritus shall be grounds for requiring the use of a substitute cleaner.
 - 1. Follow the manufacturer's instructions regarding cleaner application rates and procedures.
- C. Totally clean all new, rebuilt or repointed masonry areas of all stains and excess mortar. Do not perform any cleaning until mortar joints and sealants are fully cured. Mockups may be requested.
- D. Provide masking and protection for all building components that may be damaged by the masonry cleaning. Any areas damaged or stained by cleaning operations shall be repaired or replaced at no cost to the Owner.
- E. Provide sufficient wash water to dilute all cleaning compounds that wash off of the wall.
- F. Apply the cleaner at the manufacturer's recommended dilution rate. Pre-wet the wall if the manufacturer so recommends.
- G. Allow the cleaner to stand for the manufacturer's recommended dwell period while monitoring to ensure that the surface does not dry. Scrub any stubborn stains with masonry washing brushes. Steel bristle wire brushes are not to be used.

- H. Rinse all cleaner from the wall with water applied at the manufacturer's recommended flow and pressure. High pressure washing equipment may be required. Any acid neutralizing agent required by the manufacturer shall be applied as part of this rinse. Ensure that effluent does not accumulate at ground level, and fully rinse all effluent from sidewalks, streets and landscaping each day.
- I. Repeat any or all steps mentioned above as required by cleaner manufacturers.

3.12 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division 01 for additional information.

End of Section

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SECTION 050130

MAINTENANCE OF METAL DECKING

(Filed sub-bid with Section 070002)

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work specified within this Section shall be the responsibility of the Roofing Filed Sub-Contractor.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Prepare and repair surficial rusted areas of metal decking and exposed steel framing that are uncovered during the roof replacement process.
- C. Remove and replace deteriorated areas of the existing metal roof deck that are uncovered during the roof replacement process.
- D. Install metal plates over holes in the existing metal roof deck that are 12-inches by 12-inches or smaller that are uncovered during the roof replacement process.
- E. Install new metal decking where skylights are designated to be removed.
- F. Resecure the existing metal roof deck with approved fasteners.
- G. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
- H. Clean and restore all areas affected by the work.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition
- B. Section 061000 – Rough Carpentry
- C. Section 075400 – Thermoplastic Membrane Roofing
- D. Section 076200 – Sheet Metal Flashing and Trim

MAINTENANCE OF METAL DECKING

E. Section 221426 – Roof Drains

1.06 ALLOWANCES

A. Not applicable to this section.

1.07 UNIT PRICES

A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section “Unit Prices” for quantities to be carried in the Base Bid and provided on the Bid Form. Any work in addition to those shown on the Contract Drawings shall be either added or deducted based on the unit costs.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

A. Not applicable to this section.

1.10 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only
- B. Steel Deck Institute (SDI) Design Manual.
- C. FM Global.
1. Property Loss Prevention Data Sheet 1-29 – Roof Deck Securement and Above-Deck Roof Components.
- D. AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (AISC Specifications)
1. AISC M011 - Manual of Steel Construction Allowable Stress Design
 2. ASIC M013 - Detailing for Steel Construction
 3. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges
- E. American Society for Testing and Materials (ASTM)
1. ASTM A36/A36M - (2012) Standard Specification for Carbon Structural Steel
 2. ASTM A123A - Standard Specification for Zinc Coatings on Iron and Steel Products
 3. ASTM A307 – (2010) Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 4. ASTM F 436 – (2011) Hardened Steel Washers
 5. ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts
 6. ASTM A992/A992M – (2011) Standard Specification for Structural Steel Shapes

- F. American Welding Society (AWS)
 - 1. AWS A2.4 – (2007) Standard Symbols for Welding, Brazing and Nondestructive Examination
 - 2. AWS D1.1/D1.1M – (2010; Errata 2011) Structural Welding Code - Steel

1.11 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.
- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- D. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pour stops, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- E. Qualification Data:
 - 1. Welding certificates.
 - 2. Field quality-control test and inspection reports.

1.12 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- C. 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."

1.13 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.

1.14 SPECIAL PROJECT CONDITIONS

- A. Not applicable to this section.

1.15 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent buildings and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.16 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

1.17 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
- B. Special Warranty:
- C. See Division 01 Section "Description of Work" for contractor's warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Metal Deck:
 - a. Canam Steel Corp.; The Canam Manac Group.
 - b. Consolidated Systems, Inc.
 - c. Epic Metals Corporation.
 - d. United Steel Deck, Inc.
 - e. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.02 METAL ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade G90 zinc coating.
 - 2. Deck Profile: Type B, to match existing.
 - 3. Profile Depth: 1-1/2-inch, to match existing.
 - 4. Design Uncoated-Steel Thickness: 20-gauge
 - 5. Span Condition: As indicated.
 - 6. Note, a comparable match to the existing deck profile may be a special order. The Contractor shall field verify existing deck configuration prior to performing the roof renovations and shall provide sufficient scheduling for delivery of materials.
- B. Metal decking shall be certified by the Steel Deck Institute and manufactured by Canam, United Steel Deck, Inc., Wheeling Corrugated Co., Roll Form Products, Inc., or Designer approved equal.
- C. Metal decking shall be Underwriter's Laboratories (UL) approved for non-combustible roof deck construction.
- D. All metal decking, lap strips, and cover plate sheet steel shall be fabricated with galvanized sheet material. Galvanized sheet materials shall conform to ASTM A653 Specifications with G-90 galvanizing.

2.03 ACCESSORIES

- A. Fasteners to secure existing or new metal decking panels to existing framing shall be 1-inch-long No. 12 self-drilling, self-tapping screws in accordance with FM 4470 requirements, such as TEKS Fasteners, as manufactured by Buildex Division, Illinois Tool Works, Inc., or approved equal.
- B. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

- C. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- D. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747-inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- E. Primer for surficially rusted steel: Corrosion-inhibiting, lead and chromate-free, metal primer such as Kem Bond HS Universal metal primer by Sherwin Williams, Super Spec HP alkyd metal primer P06 by Benjamin Moore or Designer approved equal.
- F. Provide 16-Gauge, 18-inch x18-inch metal deck plates, unless otherwise indicated for a specific condition, to be used for deck infill locations.
- G. Sealant required for fire safing at metal deck plate infill locations shall be single component, neutral-cure silicone sealant conforming to ASTM E 814 (UL 1479).
- H. Mineral wool insulation required for fire safing at metal deck plate infill locations shall be minimum 4 PCF, sized and installed at 25% compression.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.02 GENERAL

- A. The Contractor shall coordinate all work in this Section with the work in other sections as required for the work to proceed in an orderly fashion. Removal and replacement shall be performed in the specified, controlled manner so as to provide a watertight building at the end of each day's work, free of excessive build-up of trash, dust, dirt, and debris. The general procedure for this is listed below, and all items shall be done on a daily basis.
- B. All deteriorated existing roof deck areas, as determined by the Designer or Owner's representative, shall be replaced. The roof deck surface shall be carefully inspected following removal of the existing roof system. Any deck areas found damaged, excessively deflected, or otherwise unsuitable shall be replaced. No decking shall be replaced until it is viewed by the Owner and the Designer and replacement is authorized. The Contractor shall protect exposed roof areas until viewed by the Designer and renovated with the new system.
- C. Disconnect and/or support the electrical power and mechanical equipment fastened below the metal deck area to be replaced prior to the start of demolition.
- D. The securement of the existing and new metal decking shall be completed in accordance with FM guidelines. Refer to FM Data Sheet 1-29 for additional information.
- E. Supply all tarps, warning lines and other means necessary to protect the building interior from damage, as well as the occupants.

3.03 DELIVER, 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.

3.04 METAL DECK RE-SECUREMENT

- A. Re-secure existing metal deck to the framing below with approved fasteners where found to be loose or unsecured.
- B. Secure metal deck panels 12-inches on center at side laps in the field zone and 6-inches on center in perimeter and corner zones, and at each flute along head laps. All fasteners shall penetrate the bottom flute only.

3.05 METAL DECK REPAIRS

- A. Areas of the deck system with surficial rust shall first be reviewed with the Owner and the Designer prior to repairs. At that time, the extent (and dimensions) of repairs for each area shall be defined.
- B. Provide interior protection to avoid damaging interior finishes should the metal primer drip through existing holes and/or joints within the existing metal roof deck. Contractor will be required to clean and/or replace Owner's interior finishes at no additional cost to the Owner.
- C. Scrape and wire brush surficially rusted surfaces down to sound metal. Remove all rust and corrosion to reveal 100% bare metal.
- D. Apply one coat of the specified primer. Apply by brush or roller. Apply to all surfaces including bottoms of flutes.
- E. Allow compound to dry to the touch prior to installing roof system components.

3.06 REMOVAL OF DETERIORATED METAL DECK

- A. Areas requiring replacement of the deck system shall first be reviewed with the Owner and the Designer prior to removal. At that time, the extent (and dimensions) of replacement for each area shall be defined.
- B. Provide a fire watch as required by the local fire department within the building to prevent sparks from igniting and causing damage to the building.
- C. Removals for deck replacement shall include extending over four (4) support members while ensuring that adjacent panels also extend over four (4) supports. All sharp edges and burs shall be ground smooth.
- D. The limits of deck removal shall be defined with a clean, straight saw-cut through the metal decking. Remove areas of deteriorated decking by cutting to the nearest support. Support the deteriorated panel sections during cutting and lift out once free. Caution: the Contractor shall investigate the underside of the roof deck to confirm if conduits are in close proximity of the cutting areas, or if equipment is secured to the decking.

- E. Prior to removing deteriorated metal decking, clear all debris from flutes. The Contractor shall also review the underside of the existing roof deck to determine if there are suspended utilities, ceilings, equipment, etc., that are attached to the area(s) of existing metal decking designated to be removed and replaced. The Contractor shall temporarily remove or disconnect and restore all equipment and utilities previously removed, after the new metal roof deck is installed to its original condition.

3.07 METAL DECK REPLACEMENT / INSTALLATION

- A. Provide a fire watch as required by the local fire department within the building to prevent sparks from igniting and causing damage to the building.
- B. Wire brush and prime all areas of exposed metal joists and framing which are experiencing surficial rust. More severely rusted or otherwise deteriorated members shall be immediately reported to the Owner's representative and Designer for further evaluation.
- C. Position replacement metal decking over existing steel framing. New metal deck panels shall be sized to bear upon a minimum of four (4) support members, unless otherwise indicated. The metal deck components shall be interconnected to adjacent units where feasible.
- D. Secure metal deck panels 12-inches on center at side laps in the field zone and 6-inches on center in perimeter and corner zones, and at each flute along head laps. All fasteners shall penetrate the bottom flute only.
- E. The ends of replacement deck panels shall be secured with the specified fasteners to the framing members at each bottom flute or 6-inches on center maximum and to the adjacent existing metal deck panels with the use of an 18-gauge lap strip.

3.08 METAL PLATE DECK REPAIR

- A. Should the Contractor uncover existing openings in the metal roof deck less than 12-inches by 12-inches square, these openings shall be covered by a metal plate. This work shall be performed as a Unit Price. Should the Contractor uncover an existing opening in the metal roof deck greater than 12-inches by 12-inches square, the Designer and Owner shall be alerted to review the condition.
- B. Set the metal plate in a layer of fire-safing sealant. The metal plate shall be oriented to provide 3-inches minimum of lap onto the existing metal roof deck around all four (4) sides of the new plate.
- C. Secure the metal plate to the existing metal roof deck with 1-inch-long No. 12 self-drilling, self-tapping screws at 6-inches on center around the plate perimeter. Screws shall be fastened through the upper flutes only. Fasteners shall be located 1-inch minimum from the edge of the metal plate.
- D. The cavity between the metal plate and the bottom flutes of the existing metal roof deck shall be filled with fire safing mineral wool insulation.

3.09 FIELD QUALITY CONTROL

- A. Cooperate with field quality control personnel. Allow inspectors to access scaffolding and work areas, as needed to perform inspections.
- B. Additional inspections and retesting of materials which fail to comply with specified material and installation requirements shall be performed at the Contractor's expense.
- C. Field welds will be subject to inspection.
- D. Remove and replace work that does not comply with specified requirements.

3.10 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division One for additional information.

End of Section

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SECTION 055133

METAL LADDERS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Supply all necessary chutes, disposal facilities, transportation, and labor necessary to dispose of all demolished materials, dirt, and debris associated with this work off-site in a legal dumping area. The Contractor shall obtain all permits necessary to transport and dispose of all materials, rubbish, and debris.
- C. Install temporary protection as needed to protect interior finishes prior to performance of the work of this Section. Remove and dispose of temporary protection after completion of the work.
- D. Remove and replace the existing ladder located between Roof Areas D and G.
- E. Install a new metal ladder at the designated location shown on the Contract Drawings, in conformance with the Commonwealth of Massachusetts State Code and the Contract Documents. Coordinate with Section 075400 – Thermoplastic Membrane Roofing.
- F. Provide all rigging, lifts, hoists, manpower, and equipment necessary to complete the work.
- G. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
- H. Clean and restore all areas affected by the work.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition

- B. Section 040120 – Masonry Restoration and Cleaning
- C. Section 075400 – Thermoplastic Membrane Roofing
- D. Section 076200 – Sheet Metal Flashing and Trim

1.06 ALLOWANCES

- A. Not applicable to this section.

1.07 UNIT PRICES

- A. Not applicable to this section.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Not applicable to this section.

1.10 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
 1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
 - a. ANSI A14.3 - Ladders - Fixed - Safety Requirements
 - b. ANSI H35 - Aluminum and Aluminum Alloys
 2. OCCUPATIONAL HEALTH AND SAFETY ASSOCIATION (OSHA)
 - a. OSHA 1910.27 – Fixed Ladders.
 3. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
 - a. ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - b. ASTM E94 - Standard Guide for Radiographic Testing
 4. AMERICAN WELDING SOCIETY (AWS)
 - a. AWS A2.4 - Standard Symbols for Welding, Brazing and Nondestructive Examination
 5. ALUMINUM ASSOCIATION
 - a. Aluminum Design Manual

1.11 SUBMITTALS

- A. The following shall be submitted in accordance with Section 013300 – SUBMITTAL PROCEDURES:
 1. Shop Drawings: Shop and erection details including members (with their connections) not shown on the Contract Drawings. Welds shall be indicated by standard welding symbols in accordance with AWS A2.4. List

all fastener types, sizes, and embedment depth for securing the ladders to the existing building structure.

2. Statements: Erection plan of ladder required. Erection plan shall conform to the requirements of AISC S303, shall be submitted prior to erection, and shall describe all necessary temporary supports, including the sequence of installation and removal.
3. Certificates: Certified copies of mill test reports for structural steel, structural bolts, nuts, washers, and other related structural steel items.
4. Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.1.
5. A copy of the AISC certificate indicating that the fabrication plant meets the specified structural steelwork category.
6. Samples: Random samples of bolts, nuts, and washers as delivered to the job site if requested, taken in the presence of the Owner's representative, and provided to the Owner's representative for testing to establish compliance with specified requirements.

1.12 QUALITY ASSURANCE

- A. Aluminum fabrication and erection shall be performed by an organization experienced in aluminum work of equivalent magnitude.
- B. The Contractor shall be responsible for correctness of detailing, fabrication, and for the correct fitting of structural members. Connections, for any part of the structure not shown on the Contract Drawings, shall be considered simple shear connections, and shall be designed and detailed in accordance with pertinent provisions of AISC. Substitution of sections or modification of connection details will not be accepted unless approved by the Designer. Welding shall be in accordance with AWS D1.1. High-strength bolting shall be in accordance with AISC S329.
- C. The Contractor shall be approved by the ladder manufacturer in writing to install the new ladder if required by the ladder manufacturer.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

1.14 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.

- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent building and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.15 DISSIMILAR MATERIALS

- A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish, or a neoprene gasket.

1.16 WORKMANSHIP

- A. Metal work shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces.
- B. Welding shall be continuous along the entire area of contact, except where tack welding is permitted.
- C. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment.
- D. Work shall be accurately set to established lines and elevations and shall be securely fastened in place.
- E. Installation shall be in accordance with the manufacturer's installation instructions and the approved drawings, cuts, and details.

1.17 ANCHORAGE

- A. Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place.
- B. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; adhesive anchors for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.18 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of his work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

PART 2 PRODUCTS

2.01 ALUMINUM LADDERS

- A. Basis of Design: O'Keeffe's, Inc., Kattsafe, ErectaStep, or approved equal.
- B. Aluminum alloy products shall conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions, and ASTM B 26/B 26 M or ASTM B 108/B 108 M for castings. Provide aluminum extrusions at least 1/8-inch thick and aluminum plate or sheet at least 0.050-inch thick.
- C. All accessories such as corners, pipe joints, wall plates, etc. shall be as recommended and supplied by the manufacturer.
- D. Structural Performance of Aluminum Ladders: Ladders (including landings) are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI/ASC A14.3.
- E. Rungs are not to be less than 18-inches wide, spaced 12-inches apart, plug welded or shouldered and headed into stringers.
- F. Fixed ladders must be able to support at least two (2) loads of 250 pounds each, concentrated between any two (2) consecutive attachments.
- G. Due to overhand of roof above, the brackets need to be extended to rising wall.
- H. Provide aluminum bent plate welded to the stringer and drilled for not less than two (2) 1/2-inch diameter bolts or epoxy masonry anchors with screen tubes as indicated. Provide intermediate bent plates not over 36-inches on center.

2.02 WELDED CONNECTIONS

- A. All connections shall be welded in accordance with the following AWS Standards:
 - 1. Aluminum: AWS D1.2
- B. Welds exposed to view in the finished work shall be uniformly made and shall be ground smooth.

- C. Welding rods and bare electrodes shall be selected in accordance with AWS specifications for the metal alloy to be welded.
- D. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.

2.03 FASTENERS AND ANCHORS

- A. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
- B. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use. Select fasteners for type, grade, and class required.
- C. Fasteners for anchoring metal fabrications to the existing exterior brick masonry walls shall be 5/8-inch diameter stainless steel epoxy masonry anchors with screen tubes, or as specified by the ladder manufacturer.
- D. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suite the sequence of installation.
- E. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.

PART 3 EXECUTION

3.01 FABRICATION

- A. Codes and Standards: Comply with the latest provisions of the following:
 - 1. AWS Structural Welding Code-Steel D1.1.
- B. Connections:
 - 1. Weld all shop connections, unless otherwise noted on the drawings. Size the connections for 50 percent of the total uniform load capacity of the member as listed in the beam tables of the AISC "Manual of Steel Construction", unless otherwise noted on the construction documents.
- C. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible.
- D. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- E. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, welding splatter, burrs, and other defects.
- F. Bolt field connections, except where welded connections or other connections are indicated.
- G. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

- H. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning.
- I. Coordinate ladder fabrication with new concealed roof sleepers. Coordinate with Section 075400 – Thermoplastic Membrane Roofing.

3.02 LADDER INSTALLATION

- A. Coordinate ladder installation with roof replacement work. Coordinate with Section 075400 – Thermoplastic Membrane Roofing.
- B. Secure to the adjacent construction with the bent plates attached to the stringer.
- C. Secure anchors at the base of the stringers to the wood blocking sleepers below. Back-seal fasteners through sheet metal caps.
- D. Secure anchors through the masonry wall with not less than two (2) 5/8-inch diameter anchors, with full embedment at each support bracket. Confirm thickness of exterior walls prior to ordering fasteners.
- E. Install support brackets not more than 36-inches on center.
- F. Install brackets as required for securing ladders.

3.03 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in “punch-list” form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor’s equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division 01 for additional information.

END OF SECTION

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SECTION 061000

ROUGH CARPENTRY

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Re-secure bottom layer(s) of existing wood blocking at roof penetrations roof perimeters, and the like as required. Re-secure at twenty-four inches (24") on center in accordance with FM recommendations and this specification.
- C. Install new wood blocking at all roof penetrations, roof perimeters, and as required to properly terminate the new roofing and flashing systems.
- D. Install new wood blocking at roof expansion joints.
- E. All wood blocking shall be secured to the roof deck. Refer to the Contract Drawings for additional information.
- F. Install plywood sheathing at rising walls and other locations as indicated on the Contract Drawings.
- G. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
- H. Clean and restore all areas affected by the work.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition
- B. Section 035100 – Gypsum Roof Deck Repairs
- C. Section 040120 – Masonry Restoration and Cleaning

- D. Section 050130 – Maintenance of Metal Decking
- E. Section 055133 – Metal Ladders
- F. Section 075400 – Thermoplastic Membrane Roofing
- G. Section 076200 – Sheet Metal Flashing and Trim

1.06 ALLOWANCES

- A. Not applicable to this section.

1.07 UNIT PRICES

- A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section “Unit Prices” for quantities to be carried in the Base Bid and provided on the Bid Form. Any work in addition to those shown on the Contract Drawings shall be either added or deducted based on the unit costs.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Not applicable to this section.

1.10 REFERENCES

- A. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
- B. APA – THE ENGINEERED WOOD ASSOCIATION
- C. NATIONAL DESIGN SPECIFICATION (NDS)
- D. AMERICAN FOREST AND PAPER ASSOCIATION (AFPA)
- E. AWPA – AMERICAN WOOD PROTECTION ASSOCIATION
- F. FM DATA SHEETS

1.11 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.
- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials

- comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
 3. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- D. Shop Drawings: Submit Shop Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

1.12 QUALITY ASSURANCE

- A. Forest Certification: Provide rough carpentry produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC's "Principles and Criteria for Forest Stewardship."
- B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- C. Lumber: Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces are exposed to view.
- D. Plywood: Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA L870. Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.
- E. Preservative Treated Lumber and Plywood: The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

- F. Fire Retardant Treated Lumber: Mark each piece in accordance with AWPA M6, except pieces that are to be natural or transparent finished. Exterior fire-retardant lumber shall be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of AWPA M6

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Cover store materials in clean, dry, locations to prevent warping, damage, moisture absorption, etc.
- C. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide air circulation around stacks and under coverings.
- D. If delays in the project exceeding one (1) week are anticipated due to inclement weather (or due to any other condition), all wood shall be stored in weatherproof box trailers or storage sheds in locations to be designated by the Owner, at no additional cost to the Owner.

1.14 PROJECT CONDITIONS

- A. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- B. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- C. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. The adjacent building(s) and property areas shall be protected from airborne debris.
- D. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- E. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- F. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.
- G. All surfaces to receive the new wood blocking shall be thoroughly dry. Should surface moisture such as dew exist, the Contractor shall provide the necessary equipment to dry the surface prior to application. Do not dry with open flames.

- H. Do not leave any newly installed wood blocking exposed. Cover and protect all newly installed wood daily with the new flashing system.
- I. Verify condition and securement of existing wood blocking designated to remain. Verify that existing wood blocking fasteners to existing deck are specified fasteners spaced 24-inches on center maximum.

1.15 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

1.16 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
- B. See Division 01 Section "Description of Work" for contractor's warranty.

PART 2 PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by ALSC.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Maximum moisture content at time of dressing: 19 percent, maximum, for 2-inch nominal thickness or less.
- B. Wood blocking and framing shall construction or No. 2 grade and any of following species:
 - 1. Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - 2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
 - 3. Southern pine; SPIB.
 - 4. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
- C. Pressure treated wood blocking/sleepers will only be permitted when wood furring or blocking is in direct contact with concrete, masonry, or exposed to the exterior.

2.02 PLYWOOD SHEATHING

- A. Plywood shall be APA Grade CDX, minimum 3/4-inch for wall systems, unless designated otherwise on the detail drawings. Pressure treated plywood will not be permitted.

2.03 WOOD ACCESSORIES

- A. Shims for roof edge blocking shall be continuous cedar of the size required to provide a sloped surface for the roof edge detail as shown in the Contract Drawings.

2.04 FASTENERS

- A. In general, all fasteners, anchors, nails, straps and other accessories shall be of stainless steel, galvanized steel or fluorocarbon coated steel. Galvanizing shall be hot dip in accordance with ASTM A153 Specifications. Electro galvanized items shall not be used.
- B. Fasteners for securing to pressure treated wood blocking shall be stainless steel.
- C. Dimensional Lumber to Dimensional Lumber: Shall be galvanized annular threaded or ring shank common nails, minimum 3-inches long.
 - 1. Anchors shall be of sufficient length to penetrate the receiving member minimum 1-1/2-inch, except full depth into plywood, unless otherwise by the manufacturer.
- D. Dimensional Lumber and Plywood Sheathing to Steel Decking: Shall be Number 14, self-drilling, self-tapping screws, factory treated with fluorocarbon coating or stainless steel.
 - 1. Anchors shall be of sufficient length to penetrate upper flutes of steel deck 1-inch minimum and 1-1/4-inches maximum, unless otherwise indicated by the manufacturer.
- E. Dimensional Lumber and Plywood Sheathing to Steel Framing: Shall be self-drilling, self-tapping screws, factory treated with fluorocarbon coating or stainless steel.
 - 1. Anchors shall be of sufficient length to penetrate steel framing 1-inch minimum, unless otherwise indicated by the manufacturer.
- F. Dimensional Lumber and Plywood Sheathing to Poured In-Place Gypsum Roof Deck: Shall be 3/8-inch diameter thread with deep course, coated with a corrosion resistant coating and meets FM Approval Standard 4470 and EAD030351-00-0402 as manufactured by OMG (Lite-Deck Fastener) or approved equal.
 - 1. Anchors shall be of sufficient length to penetrate the deck a minimum of 2-inches, unless otherwise required by the manufacturer.
- G. Dimensional Lumber to Vertical Masonry Substrates: Shall be 1/4-inch diameter concrete screws with corrosion resistant coating, as manufactured by TapCon, Red Head, or approved equal.
 - 1. Anchors shall be of sufficient length to penetrate the substrate a minimum of 1-inch, unless otherwise by the manufacturer.
- H. Plywood Sheathing to Masonry Substrates: Shall be 1/4-inch diameter hammer drive anchors with zinc-alloy sheaths and stainless-steel inserts as manufactured by Star Fasteners, Powers Fasteners, OMG or approved equal.
 - 1. Anchors shall be of sufficient length to penetrate the receiving substrate 1-1/4-inch minimum, unless otherwise by the manufacturer.

- I. Plywood Sheathing to Metal Studs: Shall be No. 10 fully threaded, Type 410 Stainless Steel screws.

2.05 BATT INSULATION

- A. Mineral wool insulation shall be a non-combustible, lightweight, and water repellent made from basalt rock and slag. The insulation shall have low moisture absorption properties and a melting point of approximately 2150 degrees Fahrenheit.
 1. Provide a minimum R-13 for new metal stud wall locations.

PART 3 EXECUTION

3.01 GENERAL

- A. Selection of lumber pieces:
 1. Select members so that knots and obvious defects will not interfere with proper fastening and will allow making of proper connections. Cut out and discard defects that render piece unable to serve intended function.
 2. Lumber may be rejected for excessive warp, twist, bow, crook, mildew, fungus, mold, or moisture content, as well as for improper cutting and fitting.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other constructions; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- E. Use specified approved fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.
- F. Refer to FM Data Sheet 1-49 concerning spacing requirements for perimeter blocking anchorage. All anchors and fasteners that attach wood blocking to the structure shall have their spacing halved for an 8-foot length away from all exterior corners of the perimeter.

3.02 REMOVAL OF WOOD BLOCKING AND PLYWOOD SHEATHING

- A. Remove and dispose of all deteriorated or unsound wood blocking and all blocking scheduled to be removed and replaced in accordance with the Contract Drawings and this Specification.
- B. During removal and replacement of woodwork, the Contractor shall report to the Owner and Designer any existing wood blocking designated to remain which is deteriorated or unsuitable. Do not cover unacceptable areas until reviewed by the Designer and provide temporary protection to the area in question. Existing blocking scheduled to remain shall be re-secured with the appropriate fasteners spaced 24-inches on center to the existing roof deck or substrate.

3.03 FASTENING OF WOODWORK

A. General:

1. Countersink fasteners below top plane of nailers.
2. Achieve 1-1/2-inch minimum penetration into substrate when fastening 2x lumber to brick, structural concrete, or 2x lumber. Provide 1-inch minimum and 1-1/2-inches maximum penetration of metal decks.
3. Provide 2 rows of fasteners at the specified frequency for wood blocking 2-inches by 8-inches nominal and wider.
4. When attaching wood to concrete or masonry, through-drill wood 1/16-inch larger than fastener shank.
5. Re-secure existing wood blocking scheduled for reuse with appropriate fasteners spaced at 24-inches on center, staggered off centerline. The Contractor shall be made aware that the re-securement fasteners may need to penetrate multiple layers of existing wood blocking before penetrating the roof deck and shall provide proper length fasteners.

B. Wood Blocking:

1. To wood blocking: With annular-threaded, ring-shank nails, 12-inches on center, maximum, and staggered slightly off centerline of member being installed.
2. To concrete/masonry substrate: With screws spaced 16-inches on center maximum and staggered slightly off centerline of member being secured.
3. At deck penetrations to steel framing and steel decking: With self-drilling, self-tapping screws spaced at 16-inches on center maximum in staggered pattern.
4. To cementitious wood fiber, lightweight concrete, or gypsum decks: With toggle bolts spaced 16-inches on center maximum in staggered pattern.

C. Plywood Sheathing:

1. To concrete/masonry substrates: With specified anchors spaced at 8-inches on center vertically and 16-inches on center horizontally staggered from row to row. Predrill pilot holes in accordance with fastener manufacturer's printed instructions.
2. To wood blocking: With specified screws spaced at 8-inches on center along each framing member.
3. To metal cold-formed metal framing: With the specified fasteners spaced 8-inches on center along each framing member.
4. Countersink fasteners below top plane of plywood.
5. Provide 1/8-inch gap between successive sections of plywood. Align finished surfaces to vary not more than 1/16-inch from plane of surfaces of adjacent units.
6. Place panels with long dimension perpendicular to support.
7. Install roof deck panels in staggered array, with panel ends in successive rows being offset. Minimum panel placement size shall be 48-inches by 48-inches. Each panel shall span a minimum of 3 supports.
8. Center joints accurately over support.

3.04 PERIMETER WOOD BLOCKING INSTALLATION

- A. The perimeter wood blocking shall be installed at a consistent, even height throughout that roof area to provide a flush transition from insulation to blocking and provide an even and continuous line for metal fascia installation.
- B. All butt joints in woodwork shall be flush to provide a smooth, uniform line with no irregularities. Built-up blocking shall have butt joints staggered 4-feet minimum layer to layer. The minimum length of any individual piece of woodwork shall be 2-feet. All lengths of woodwork shall have a minimum of 2 fasteners. Layers of wood blocking at corners shall be interlocked to provide additional stability.
- C. At roof perimeters, the wood blocking and plywood shall be installed as detailed. Provide 8-inch nominal wide blocking at roof perimeters unless otherwise detailed.
- D. Spacing of fasteners should not exceed 12-inches, 8-feet each way from outside corners.
- E. Existing wood blocking and curbs may be required to be cut back or trimmed to provide an even flush assembly as shown on the Detail Drawings. This shall be accomplished with power or hand tools. Should cutting of existing components reduce or eliminate securement of their components, the Contractor shall re-secure with the appropriate fasteners.

3.05 INSTALLATION OF CONCEALED SLEEPERS

- A. Coordinate the installation of concealed sleepers as indicated on the Contract Drawings. The wood blocking installation shall be coordinated with the roof insulation system. Wood blocking shall extend a minimum of 6-inches beyond the limits of the item to be supported.
- B. Placement of the wood sleepers shall be parallel with the direction of the roof slope/drainage wherever practical to prevent the obstruction of roof drainage. Coordinate with Section 075400 – Thermoplastic Membrane Roofing for crickets where they may upset the flow of drainage.
- C. Wood sleepers shall be secured to the existing roof deck with the approved fasteners, unless otherwise shown on the Contract Drawings.

3.06 CURB EXTENSIONS

- A. Coordinate the final roof flashing height(s) with Section 075400 – Thermoplastic Membrane Roofing.
- B. Coordinate the temporary disconnection of the existing rooftop mechanical units and curbs with **Sections 230100 – Temporary Mechanical Disconnects and Section 260100 – Temporary Electrical Disconnects.**
- C. New wood blocking shall be secured to the existing roof deck with approved fasteners and match the thickness of the new roof system.

3.07 PLYWOOD SHEATHING INSTALLATION

- A. Coordinate this work with other trades to provide orderly progress of construction and a watertight condition. It is the intent of these specifications to install plywood sheathing as indicated on the Contract Drawings.
- B. Plywood sheathing shall be installed so that ends align with studs/framing and extend onto adjacent section of stud walls 32-inches minimum. Overlap plywood sheathing onto existing wall and or framing where indicated.

3.08 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division One for additional information.

End of Section

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SECTION 075400

THERMOPLASTIC MEMBRANE ROOFING

(Filed sub-bid with Section 070002)

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work specified within this Section shall be the responsibility of the Roofing and Flashing Filed Sub-Contractor.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Remove the existing roof system. It is the intent to remove the existing roof system down to the roof deck. Clear roof surfaces of debris by sweeping and vacuuming methods as required to remove all debris from the roof deck surface.
- C. Furnish and install a single-ply adhered thermoplastic roofing system, including coverboard, insulation, vapor barrier, baseboard, and all associated components and flashings on properly prepared roof deck.
- D. Install tapered insulation crickets between roof drains as indicated in the Contract Drawings, at large roof curbs, and at mechanical units to shed water toward the drainage system.
- E. Install flashings and membrane termination at unit curbs, rising walls, and other vertical transitions to properly terminate the roof membrane and flashings.
- F. Provide flashings for all roof penetrations as indicated in the Contract Drawings.
- G. Install new conduit supports and roofing manufacturer's walkway pads at designated locations.
- H. Install new roof drain markers at each drain bowl.
- I. Install new portable guardrails and roofing manufacturer's walkway pads at designated locations.
- J. Install new pourable sealers at designated locations.
- K. Remove and replace existing skylights designated for replacement.
- L. Remove and replace existing roof access hatch designated for replacement.

- M. Install manufacturer's walkway pads where indicated on the Contract Drawings.
 - N. Install a liquid applied coating overtop the existing roof membrane system on Roof Area E in lieu of replacing the full roof system as an Alternate scope of work.
 - O. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
 - P. Clean and restore all areas affected by the work.
- 1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION
- A. Not applicable to this section.
- 1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION
- A. Not applicable to this section.
- 1.05 RELATED WORK SPECIFIED ELSEWHERE
- A. Section 024100 – Selective Demolition
 - B. Section 035100 – Gypsum Roof Deck Repair
 - C. Section 040120 – Masonry Restoration and Cleaning
 - D. Section 050130 – Maintenance of Metal Decking
 - E. Section 055133 – Metal Ladders
 - F. Section 061000 – Rough Carpentry
 - G. Section 076200 – Sheet Metal Flashing and Trim
 - H. Section 221426 – Roof Drains
- 1.06 ALLOWANCES
- A. Not applicable to this section.
- 1.07 UNIT PRICES
- A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section "Unit Prices" for quantities to be carried in the Base Bid or Alternate(s) and provided on the Bid Form. Any work in addition to those shown on the Contract Drawings shall be either added or deducted based on the unit costs.
- 1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES
- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Technical requirements for related Alternate work are defined in this section. Refer to Division 01 Section "Alternates" for scope to be carried in the Base Bid or Alternate(s) and provided on the Bid Form.

1.10 REFERENCES

- A. Underwriters Laboratories (UL).
- B. FM.
- C. National Roofing Contractors Association (NRCA).
- D. American Standard of Testing Materials (ASTM).
 - 1. ASTM D4434, "Standard Specification for Polyvinyl Chloride Sheet Roofing.
- E. Single Ply Roofing Institute (SPRI).

1.11 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Flashings: Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations in FM 1-49 Loss Prevention Data Sheet for Perimeter Flashings; FM 1-29 Loss Prevention Data Sheet for Above Deck Roof Components; NRCA Roofing and Waterproofing Manual (Fourth Edition) for Construction Details and SMACNA Architectural Sheet Metal Manual (Fifth Edition) for Construction Details, as applicable.
- D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agent.
- E. Thermal Value: A minimum R-Value of 30 to meet the Long-Term Thermal Resistance (LTTR) value in accordance with ASTM C518 and 225 CMR 23.00: Massachusetts Stretch Energy Code – 2025 Amendments to IECC 2021 and ASHRAE standard 90.1-2019. R-Value shall be calculated separately for each roof area.

1.12 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.

- C. Prior to the review of any roofing submittals, the Contractor must provide the following information on the proposed roof manufacturer's company letter head and signed by a principal of the company:
1. Provide a listing of at least ten (10) projects which are greater than 10,000 square feet and have been in service for at least seven (7) years in either the states of Massachusetts, New Hampshire, Maine, Vermont, Connecticut, or Rhode Island. The listing shall include the following:
 - a. Project Name
 - b. Project Location (City and State)
 - c. Project Contact Name
 - d. Project Contact Name's Phone Number
 - e. Project Designer
 - f. Project Roof Installer
 - g. Project Area (in square feet)
 - h. Project Materials used (roofing ply types and application manor)
 - i. Project Warranty Duration
 - j. Year of installation (if less than seven (7) years, will be excluded from the project consideration)
- D. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- E. A sample roofing system warrantee and letter of confirmation from the roof membrane manufacturer stating that the Contract Documents have been reviewed and that there are no exceptions to the Specifications and Contract Drawings shall be submitted. The roofing system must meet the intent of UL 790, Class A and FM Class indicated for the field, perimeter, and corners respectively, shall be in conformance with all local and state building codes, and shall be accepted by the manufacturer for the required warranty.
- F. A letter from the roofing manufacturer identifying the attachment rates and adhesive rates that are required to place the approved insulation system, and single-ply roof membrane. Specific attention related to the field, perimeters and corners shall be provided in the letter to identify the securement pattern, and distance from the roof edge to meet their specific uplift requirements.
- G. A letter from the roofing manufacturer outlining how the roof inspections will be performed in accordance with the specifications. Inspector resumes will be required at the submittal phase to confirm compliance with the specifications. Refer to the warranty section of this document for additional information.
- H. The Contractor shall submit the following procedural items with their submittal package:
1. Methods of removal of materials
 2. Temporary protection procedures
 3. Fire watch procedures (if needed)
 4. List of local emergency numbers
 5. Staging/set-up procedures
 6. Schedule of roof renovations

- I. Shop Drawings: Submit a complete set of shop drawings for each detail presented in the Contract Drawings to reflect the single-ply roof manufacturers installation modifications for review by the Designer. Such Shop Drawings may include, but are not limited to:
 - 1. Base flashings, cants, and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
- J. Samples for Verification: Before erecting mockup, submit samples of the following:
 - 1. Membrane color.
 - 2. Specified products.
- K. Qualification Data: For Installer and manufacturer.
- L. Material Test Reports.
- M. Inspection Reports: Submit copies of roofing system manufacturer's inspection reports of completed roofing installation.
- N. Maintenance Data: For roofing system to include in maintenance manuals.

1.13 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is FM Approvals approved for membrane roofing system identical to that used for this project.
 - 1. Products used in this specified roof system will be produced by manufacturers regularly engaged in the manufacturing of these products with a minimum twenty (20) year history of successful production and product installation.
 - 2. The manufacturer that submits the specified roof system warranty will have been in business for at least twenty (20) years with successful production and product installation of the specific roof system.
- B. Roofing Inspections: Cooperate and coordinate with inspectors, testing agencies and manufacturers, to facilitate inspection and installation, to include allowance of field sampling. Field sampling will only be performed if moisture intrusion is suspected.
- C. Fire-Test-Response Characteristics: Provide membrane roofing materials with fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
- D. Source Limitations: Obtain components including roof insulation fasteners for membrane roofing system and other specified roofing products from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
- E. Roofing Inspector: The Owner may engage a full-time roofing inspector during installation of the insulation assembly, membrane, flashing and other appurtenances, and when a survey of the roof and roof drains is conducted.

Cooperate with the Owners roofing inspector and allow unlimited access to roofing during construction.

- F. Roofing Signage: At entry points to roof, provide signage-listing type of roofing system, manufacturer, date installed and holder of the warranty.
- G. Pre-installation Conference: Conduct conference at Project site. Comply with requirements in Division 01. Review methods and procedures related to roofing system including, but not limited to, the following:
 - 1. Meet with the Owner, Designer, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect the roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for the roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.
- H. The specified membrane roofing system must consist of the materials required and be installed under the following criteria:
 - 1. UL Listing: provide materials bearing Underwriters Laboratories (UL) marking / label on the packaging or containers indicating materials have been produced under UL classification and follow-up services.
- I. The Contractor shall maintain an adequate number of skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and methods necessary for the proper performance and progression of the work. No allowance will be made for lack of skill on the part of the workers or an inadequate number of workers.
- J. Any deviations from the contract, drawings and/or specifications must be submitted in writing for approval prior to implementation to the design professional representing the Owner for acceptance / approval by both parties.
- K. Upon completion of the roof installation the Contractor shall arrange for a quality assurance / warranty inspection by the Technical Service Department of the approved roof manufacturer. Notice of the inspection date and time will be given to the Owner/Owner's representative at least 72 hours prior to the inspection taking place.

1.14 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- 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. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof coverboard, baseboard, and insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation. Manufacturer's shrink-wrap is not an approved weather protection covering. The Contractor shall use tarps to cover stored insulation/coverboard materials.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.15 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent buildings and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.

- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.
- I. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- J. Roofing shall not be applied when ambient temperature is less than 40°F unless approved in writing by the Designer and the membrane manufacturer.
- K. Materials which are at a temperature other than the recommended application temperatures of the manufacturer or applicable standard shall not be applied.
- L. All surfaces to receive new insulation, membrane, or flashings shall be thoroughly dry. Should surface moisture such as dew exist, the Contractor shall provide the necessary equipment to dry the surface prior to application. No open flames shall be permitted on the roof at any time.
- M. Remove only as much existing roofing as can be replaced and made weathertight each day, including all flashing work.
- N. All new and temporary construction, including equipment and accessories, shall be secured from wind damage or blowoff. Special attention shall be given to wind considerations as this building is located within a high wind prone region.
- O. Equipment required to hoist materials to the roof and to remove debris from the roof shall be supplied, maintained, and operated by the Contractor.
- P. Any mechanical/electrical disconnections/reconnections required for this project shall be performed by a licensed tradesperson. Coordinate with multiple Sections of Division 23 and Division 26.
- Q. The Contractor shall clean all debris that may have infiltrated through the roof decking into the interior prior to demobilization from the site. This shall include, but not be limited to, floors, cabinets, ceilings, and other interior spaces.
- R. The Contractor shall notify the Owner at least 72-hours in advance of doing any interior demolition work so that the Owner may coordinate interior access.
- S. No removal, replacement, repair, or covering of potentially deteriorated roof deck shall be performed without authorization from both the Designer and the Owner.
- T. The Contractor is cautioned to take all necessary precautions and make all investigations necessary to install the work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.
- U. Remove rubbish and debris from the project site daily; do not allow accumulation inside or outside of the buildings.
- V. The Contractor is cautioned that oil and penta based materials and preservatives are not compatible with thermoplastic membranes.

- W. The Contractor is hereby notified that any damage to the gymnasium floor as a result of poor temporary tie-ins, falling debris, lack of protection, material staining, etc. shall be fully repaired/replaced to the satisfaction of the Owner prior to the beginning of the school year at no additional cost to the Owner.

1.16 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.
- B. The duration of the Contractor's two (2) years warranty shall run concurrent with the roofing system's manufacturer's twenty (20) year warranty.

1.17 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
- B. Provide complete roof system, including insulation, to be covered by roof membrane manufacturer's system warranty. Provide materials not included in Specifications where required by manufacturer to obtain requested warranty, without additional charge to Owner.
- C. Roof membrane manufacturer's system warranty meeting following minimum criteria:
1. Coverage to repair damage to system components resulting from leaks due to failure of materials or workmanship.
 2. Non-prorated, non-penal sum (no dollar limit), 20-year warranty period.
 3. Coverage of cost of removal and replacement of wet or damaged insulation due to failure of materials or workmanship.
- D. Roofing Systems Manufacturer's Warranty: The roofing manufacturer shall guarantee the roof to be in a watertight condition, for a period of twenty (20) years, starting at the date of Substantial Completion. The warranty shall be twenty (20) years, no dollar limit (NDL), non-prorated total system labor and material warranty, for wind speeds up to 74 miles per hour. Total system warranty shall include all roofing materials, related components and accessories including, but not limited to the baseboard, vapor barrier, insulation board, coverboard, roofing membrane, membrane flashings, fasteners, adhesives, metal roof copings, metal roof edges and termination metals and roof drain assemblies. The manufacturer shall repair defects in materials and workmanship promptly after observation as weather and site conditions permit.
- E. Roofing Systems Manufacturer's Roof Inspections: The Contractor is to include the roofing system manufacturer's on-site monitoring for one (1) day each week, for a minimum of four (4) hours on-site to monitor the roof and flashing installations during the construction duration and monitor the project operations and provide comment(s) on the activities that are taking place. The roof system's manufacturer will be required to provide written reports for each field day noting the work conditions and acceptance of the work that was performed. This coverage shall

include, but not be limited to, all material installations that will be covered under the manufacturer's warranty requirements, including the perimeter edge metals. The inspector will be subject to approval, and may be one of the following:

1. A technical representative who is employed full-time by the manufacturer.
- F. Roof Hatch Manufacturer's standard five (5) year warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.
- G. Skylight Manufacturer's standard five (5) year warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.
- H. See Division 01 Section "Description of Work" for contractor's warranty.

PART 2 PRODUCTS

2.01 PVC BARE-BACK ROOFING MEMBRANE

- A. PVC Sheet: ASTM D 4434, Type II, fiberglass scrim reinforced or Type III, polyester scrim reinforced.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sika Sarnafil, Inc.
 - b. Carlisle Syntec, Inc.
 - c. Duro-Last Roofing, Inc.
 - d. Approved equal.
 2. Thickness: 60 mil nominal.
 3. Exposed Face Color: White or Light Gray. Color to be selected by the Owner.

2.02 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane.
- C. Adhesives: application technique and coverage rates will vary according to substrate and environmental conditions.
1. Bonding Adhesive: A VOC compliant solvent borne, contact (two sided) bonding adhesive, designed for bonding non-fleece back membrane / flashing to properly prepared and pre-authorized vertical substrates and as approved by the manufacturer.
- D. Slip Sheet: Manufacturer's standard, of thickness required for application.

- E. Miscellaneous Accessories: Provide pourable sealer boxes, preformed cone, and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.
- F. Termination bar for membrane flashing(s) restraint/termination seals shall be nominal 1/8-inch x 1-inch x 10' 6060-T5 extruded aluminum bar or stainless-steel bar with pre-punched slots, 8-inch on center, or as indicated on Contract Drawings.
- G. Hot Pipe Insulation: Insulation for use at hot pipe shall be minimum 2-inch thick and capable of withstanding temperatures of 2,100 degrees F minimum such as Thermal Ceramics Cerablanket as manufactured by Kaowood Thermal Ceramics, Ferrawool – F11400 as manufactured by Ferralloy, Inswool HP Blanket as manufactured by Empire Refractory or approved equal.

2.03 VAPOR BARRIER

- A. Self-Adhering Sheet Vapor Barrier: Minimum 32-mil- thick film laminated to a layer of rubberized asphalt adhesive, or as required by the manufacturer for their specific warranty; maximum permeance rating of 0.1 perm; cold-applied, and release paper backing.
 - 1. Provide primer when recommended by the vapor barrier manufacturer.
- B. Nailable Base Sheet: Reinforced, Trilaminare Base-Ply: Highly reinforced, SBS modified, trilaminare base-ply sheets, reinforced with fiberglass and polyester, weighing 40 pounds per square minimum and conforming to ASTM D 4601, Type II. Tear strength shall be 260 lbf/min (MD).
 - 1. Fasteners for securing base sheet shall be as approved by the roof manufacturer for the substrate and depth and shall meet the project's requirements/wind uplift rating.
 - 2. Fastener pull-out testing will be required for the Contractor and manufacturer prior to submitting roof assembly letter.

2.04 BASEBOARD

- A. Baseboard shall be as required by the manufacturer to meet the warranty requirements, and provide additional dead load to match that of the existing roof system being removed, and shall conform to the following:
 - 1. Approved Baseboard, 1/2-inch minimum thick baseboard:
 - a. Gypsum-based Type X.
 - b. Securock Gypsum Fiber, as manufactured by US Gypsum.
 - c. DensDeck, as manufactured by Georgia Pacific.
 - d. Or approved equal.

2.05 ROOF INSULATION AND ACCESSORIES

- A. Roof insulation system materials shall be manufactured by or acceptable to roof membrane manufacturer for inclusion in full system warranty to be issued by manufacturer.
- B. Flat stock and tapered polyisocyanurate insulation shall be skinned with factory-applied fiberglass bituminous felt as supplied by the membrane manufacturer as required to meet the membrane manufacturer's requirements.

1. The polyisocyanurate insulation shall have a minimum R-Value of 30 to meet the Long-Term Thermal Resistance (LTTR) value in accordance with ASTM C518 and the Massachusetts State Building Code.
 2. Tapered insulation shall be required to provide a minimum 1/2-inch per foot at crickets, saddles, drain sumps (4'x4'), and around mechanical equipment.
 3. The polyisocyanurate insulation board shall conform to ASTM Specification C 1289, Type II, Class 1, Grade 2 (20 psi minimum).
 4. Flat stock insulation shall have a maximum board size of 4' x 4', or as required by the manufacturer if the membrane manufacturer calls for lesser size boards.
 5. Tapered insulation shall have a maximum board size of 4' x 4', or as required by the manufacturer if the membrane manufacturer calls for lesser size boards.
 6. Insulation fillers shall be of the thickness required to match surrounding insulation when step tapering tapered edge strips.
 7. Polyisocyanurate insulation shall be approved in writing by the insulation and membrane manufacturer that the methods of attachment are covered under the membrane manufacturer's labor and material warranty. Copies of the written acceptance shall be forwarded to the Designer.
 8. Refer to the Contract Drawings for the slope of each roof system.
- C. Tapered edge strips:
1. Tapered edge strips shall be 18-inches wide and 1-5/8-inch thick, tapering to a feathered edge.
 2. Tapered edge strips shall consist of either wood fiberboard or polyisocyanurate insulation.
 - a. Wood fiberboard shall be high density; non-asphalt impregnated and conform to ASTM C208 specifications.
 - b. Polyisocyanurate insulation tapered edge strips shall meet ASTM C1289, Type II, Class 1, Grade 3 specifications.
 3. Fiberboard insulation shall be approved in writing by the membrane manufacturer. A copy of the written acceptance shall be forwarded to the Designer.

2.06 COVERBOARD

- A. Coverboard shall be as required by the manufacturer to meet the warranty requirements, shall conform to the following:
1. Approved Coverboard:
 - a. High-density polyisocyanurate insulation board.
 - b. Or approved equal.
 - 1) Thickness: 1/2-inch, minimum.

2.07 ADHESIVE FOR INSULATION AND COVERBOARD SECUREMENT

- A. Adhesive to adhere the coverboard and insulation shall be a two-component, cold-process, asbestos free, low VOC, low-rise polyurethane foam adhesive conforming to ASTM D276, D2556, D1875, D429, D816, D1876, D412. The

adhesive shall be approved in writing by the membrane manufacturer and included as part of the warranty coverage. Adhesive shall be:

1. I.S.O. stick as manufactured by Elevate.
2. Insta-Stik Commercial Roofing Adhesive as manufactured by DuPont.
3. Olybond by OMG.
4. Or an approved equal as recommended by the roofing manufacturer to achieve a full system warranty for the new roof system.

2.08 FASTENERS

- A. In general, fasteners, straps and other hardware shall be stainless steel, galvanized steel or fluorocarbon coated steel. Galvanizing shall be hot dip in accordance with ASTM A153 specifications. Electro-galvanized items shall not be used.
- B. All accessories, including, but not limited to nails, screws, clips, fastening strips, etc. shall be completely compatible with the material being fastened to prevent galvanic reaction and premature deterioration.
- C. Fasteners for securing membrane sheeting shall be as approved by the manufacturer for the substrate and depth and shall meet the project's requirements/wind uplift rating.
- D. Fasteners for termination roof membrane and flashing at concrete substrates shall be minimum 1-1/2-inch long by 1/4-inch diameter removable drive pins in zinc sheaths as manufactured by Star, OMG Roofing Products, Simplex Building Products or approved equal. Embedment into the substrate shall be 1-1/4" minimum.
- E. Nails for flashing securement at wood substrates shall be No. 12 Stubbs gauge, large head, threaded shank, stainless steel nails, of sufficient length for 1-1/4-inch embedment.
- F. Fasteners for securing fan and vent unit covers and termination bars to existing wood construction shall be stainless steel hex head self-drilling screws. Use stainless steel capped EPDM washers of the next larger size than the existing fastener to re-secure existing fan unit covers.

2.09 ROOF ACCESSORIES

- A. Insulation for the use of expansion joints shall be a fibrous, mineral batt, non-faced, roll insulation as manufactured by Owens-Corning, Roxul Mineral Wool, Johns Manville Mineral Wool Batt Insulation or approved equal.
- B. Fire barrier protection system for use at expansion joints shall be a pliable metallic carrier which contains insulation materials such as FB 400 Fire Barrier as manufactured by Erie Metal Specialties, Monoflex Fire Barrier as manufactured by Construction Specialties, or Pyro-Flex Fire Barrier as manufactured by MM Systems.
- C. Backer rod shall be continuous length, compressible, closed-cell polyethylene foam sized to be compressed 30% of the maximum joint width and as approved by the membrane manufacturer.

- D. Sealant required for fire safing at roof deck openings or at other gaps in the roof deck, shall be single component, neutral-cure silicone sealant conforming to ASTM E 814 (UL 1479), such as 3M Fire Barrier Silicone Sealant 2000+, or approved equal.
- E. Furnish accessories manufactured, marketed or approved by MRSM required to complete the roof installation to manufacturer's specification including (as applicable) but not limited to the items listed below.
- F. Sealant: a one-component gun-grade polyurethane sealant to seal flashing termination.
- G. Pre-Molded Flashings injection molded vent stack and inside/outside corner flashing using the manufacturer's roof product.
- H. Walkway and Protection Pads: high grade walkway/protection material with "slip resistant" design. Walkway pads should be factory-formed, non-porous, heavy-duty vinyl pads or rolls of approximately 3/16-inch thickness and as approved by the membrane manufacturer. The walkway pads should be 36" x 36" minimum or as indicated in the Contract Documents.

2.10 CONDUIT SUPPORT

- A. Conduit Support:
 - 1. Galvanized steel strut with high-density polypropylene base, 10-inches by 16-inches by 3-inches with stainless steel hardware, and stainless steel hardware, capable of supporting up to six (6) individual conduits.
 - 2. Conduit supports shall have a minimum load capacity of eight hundred pounds (800 lbs) or greater per support.
 - 3. Conduit supports shall be Height Adjustable Pipe Struts, as manufactured by OMG Roofing Products, MAPA Products, or equal.

2.11 ROOF HATCHES

- A. Roof Hatches: Roof hatches shall have insulated double-wall lids and frames with integral deck mounting flange and lid frame counterflashing. Curbs and lids shall have fully welded corners. Units shall be provided with continuous weather-tight perimeter gasketing. Hatch shall be Type S as manufactured by Bilco, or as manufactured by SafePro or Aor A-Mezz Industrial Structures.
 - 1. Type and Size: Single-leaf lid, 30 by 36-inches
 - 2. Curb and Lid Material: Aluminum (0.0907-inch)
 - 3. Curb height shall be twelve inches (12") minimum and formed with a three and a half inch (3-1/2") flange.
 - 4. Lid Insulation: concealed fiberglass
 - 5. Curb Insulation: Fiberboard insulation
 - 6. Curb Height: 12-inches.
 - 7. Hardware: Stainless-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
 - 8. Provide OSHA compliant fixed hatch railing system with self-locking gate. Attachment shall be directly to hatch.

2.12 ROOF DRAIN MARKERS

- A. Roof Drain Marker as manufactured by Roof Drain Marker Co., LLC: Drain dome-mounted vertical fiberglass flag marker secured in aluminum socket in turn secured with pre-punched aluminum bracket configured for through-bolting to roof drain dome.
- B. Flag Marker: Pultruded fiber-reinforced polymer rod, 1/2-inch diameter by 48-inch long, with reflective dual-colored reversible ends enabling marking of selected drains.
 - 1. Flexural Strength, minimum, ASTM D 790, 700,000 psi (689 MPa).
 - 2. Impact Strength, minimum, ASTM D 256: 40 ft-lb/in.
- C. Marker Base: 1 x 1 x 4-inch extruded aluminum bar, ASTM B 209 (ASTM B 209M), with milled flag receiver, threaded flag set screw retainer, and threaded base.
- D. Flag Bracket: 1 x 11 x 0.063-inch aluminum plate bracket, ASTM B 221 (ASTM B 221M).
- E. Fasteners: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.13 DOME SKYLIGHTS

- A. Replacement skylights shall have lens frame in accordance with ASTM B221; extruded aluminum thermally-broken frame, mitered and welded at corners, watertight corners and construction, integral condensation gutters and interior weep system to weep condensation to the exterior, lens to rest on an elastomeric gasket and be held in place by a 6063-T5 extruded aluminum cap, continuously welded at corners for a water-tight construction, sized to meet the existing curb dimensions, such as Bristol Alumilite as manufactured by Kingspan Light + Air, Summit Series as manufactured by DalYTE, or similar construction by Wasco or approved equal.
- B. Replacement skylights shall be double glazed with a co-polyester exterior clear harvesting lens and interior opaque co-polyester distribution and diffusing lens.
- C. Replacement skylights shall incorporate manufacturer's standard formed or extruded aluminum, including flashing flange to receive roof flashings and counter flashings.
- D. Fasteners to secure pre-manufactured skylight unit to wood shall be #14-13, heavy duty threaded steel #3 Phillips truss, self tapping corrosion resistant fastener; or as required by the manufacturer.
- E. Replacement skylights shall meet OSHA fall protection standards or skylight fall protection screens shall be installed over to skylight frames as required by the manufacturer. If required to conform to OSHA Regulation 29CFR 1910.23 (e) (8), the skylight fall protection screens shall match the size of the new replacement skylight as required to meet the OSHA fall protection regulations. The skylight fall protection screens shall be hot dipped galvanized steel.

2.14 POURABLE SEALER BOXES

- A. Inorganic filler for pourable sealer boxes shall be a pre-mixed spray applied polyurethane foam such as Froth-Pak by Insta-Foam Products, Inc., or approved equal. Filler shall be approved by the membrane manufacturer.
- B. Pourable sealer for boxes shall be two-part, fluid applied polyurethane based material of 100% solids as manufactured by the membrane manufacturer.
- C. Coordinate with Section 076200 – Sheet Metal Flashing and Trim for sheet metal caps for pourable sealer boxes.

2.15 PORTABLE GUARDRAILS

- A. Non-roof penetrating portable guardrails shall be:
 - 1. RailGuard 200 Safety Guardrail, manufactured by Garlock Equipment Company.
 - 2. Safety Rail 2000 Guardrail System, manufactured by BlueWater Manufacturing.
 - 3. SRC360 Mobile Rail System, manufactured by Safety Rail Co.
 - 4. Approved equal.
- B. Finishes and custom color of the safety rails and bases shall be selected by the Owner. Color shall not be yellow unless otherwise requested by the Owner in writing.
- C. Portable guard rails shall be 1-5/8-inch outer diameter steel tubing.
- D. Guardrail bases shall be 108 pounds minimum, 21-1/4 inches wide and have four (4) rail receiving posts. The guardrail manufacturer shall provide a spacing layout, noting if returns perpendicular to the perimeter edge rail will be required to meet the fall arrest requirements. Each post shall have slots utilized for a positive locking system and securement pin. Base plates shall be configured to accept toe boards for future renovation projects.
- E. Securement pins for the positive locking system shall be zinc plated and yellow chromate dipped 1010 carbon steel. Securement pins shall consist of a collared pin a lanyard connecting to a lynch pin.
- F. Guardrails shall be configured to meet all OSHA requirements for safety rails including, not limited to, guardrail spacing and strength.
- G. The Contractor shall provide the necessary accessories to connect the new guardrails to adjacent rising walls or other stairs or ladders to minimize “gaps” or “openings” greater than 3-inches.
- H. Protection pads for use under the bases shall be 30-inches by 30-inches protection walkway pads.

2.16 LIQUID APPLIED COATING (ALTERNATE SCOPE OF WORK)

- A. Cold Applied Polyurethane Fluid-Applied System: single component fluid-applied roofing membrane formulated for application over prepared existing roofing substrate.

1. Polyurethane Roof Coating System Base Coat: a single component, cold, fluid applied, moisture triggered, aliphatic, polyurethane base coat membrane, low-odor low-VOC, for use with a compatible top coat.
 - a. Basis of design product: Sikalastic 641 Lo-VOC.
 - b. Minimum Thickness, Base Coat reinforced over single-ply thermoplastic membrane: 50 mils wet.
 - c. VOC Content, ASTM D-2369-81: < 50 g/l
 - d. Volume Solids, ASTM D2697: 89% minimum.
 - e. Weight Solids: ASTM D1644: 92% minimum.
 - f. Sag Resistance, ASTM D4400: No sag at 700 micrometers (0.028 in. / 28 mil)
 - g. Tensile Strength (Tension): ASTM D412: Minimum 1.86 MPa (270lb/in²)
 - h. Elongation: ASTM D412 : MIN 200%.
 - i. Accelerated Weathering FL/UV – 5000 Hours, ASTM G 154, No cracking or checking.
 - j. Water Vapor Transmission, Permeability / Permeance: ASTM E96: Maximum 8.5 gms/m²/ day (0.033 perm-inches).
 - k. Flexibility – Mandrel Bend, ASTM D522: Pass, no cracking or flaking.
 - l. Tear Resistance, ASTM D625: Minimum 5.8 kN/m (33 lbf/in)
 - m. Indentation Hardness, ASTM D2240: 82 Durometer Units (+/- 5 units)
 - n. Dynamic Puncture Resistance, ASTM D5635: Minimum 15 joules (357 ft.poundals)
 - o. Static Puncture Resistance, ASTM D5602: Minimum 20.7 kg. (45.5 lbs.)
2. Polyurethane Roof Coating System Top Coat: a single component, cold, fluid applied, moisture triggered, aliphatic, polyurethane topcoat membrane, low-odor low-VOC, for application over compatible base coat.
 - a. Basis of design product: Sikalastic 641 Lo-VOC.
 - b. Minimum Thickness, reinforced system: 30 mils wet.
 - c. Color: White.
 - d. VOC Content, ASTM D-2369-81: < 50 g/l
 - e. Volume Solids, ASTM D2697: 89% minimum.
 - f. Weight Solids: ASTM D1644: 92% minimum.
 - g. Sag Resistance, ASTM D4400: No sag at 700 micrometers (0.028 in. / 28 mil)
 - h. Tensile Strength (Tension): ASTM D412: Minimum 1.86 MPa (270lb/in²)
 - i. Elongation: ASTM D412 : MIN 200%.
 - j. Accelerated Weathering FL/UV – 5000 Hours, ASTM G 154, No cracking or checking.
 - k. Water Vapor Transmission, Permeability / Permeance: ASTM E96: Maximum 8.5 gms/m²/ day (0.033 perm-inches).
 - l. Flexibility – Mandrel Bend, ASTM D522: Pass, no cracking or flaking.
 - m. Tear Resistance, ASTM D625: Minimum 5.8 kN/m (33 lbf/in)

- n. Indentation Hardness, ASTM D2240: 82 Durometer Units (+/- 5 units)
 - o. Dynamic Puncture Resistance, ASTM D5635: Minimum 15 joules (357 ft.poundals)
 - p. Static Puncture Resistance, ASTM D5602: Minimum 20.7 kg. (45.5 lbs.)
- B. Primers:
- 1. PVC membrane roofing primer shall be Sikalastic® EP Primer/Sealer by Sika Corp., a two-component, cyclo-aliphatic, amine cured material.
 - 2. SikaFast 3341 a two-component methyl methacrylate-based (MMA) adhesive used to adhere RoofPro membrane system to PVDF (Kynar) finished edge metal.
- C. Fluid-Applied Membrane Reinforcing Fabric:
- 1. Reinforcement for the roofing/waterproofing membrane system shall be Sika Fleece by Sika Corp., a non-woven, needle-punched polyester fleece specifically designed to provide greater impact resistance and greater resistance to excessive thermal and structural movement while maintaining elasticity and membrane film integrity.
 - 2. Supplemental reinforcement of the waterproofing membrane system specifically designed for local reinforcement of the waterproofing membrane at structural cracks, expansion joints and transitions between dissimilar materials shall be Sika Joint Tape SA by Sika Corp., a self-adhering polymeric rubberized tape with woven polyester facer.
- D. Accessories:
- 1. Sealant for fillet bead applications and membrane penetrations shall be Sikaflex® 11FC by Sika Corp., a one-part polyurethane sealant suitable for fillet bead transition compound to be applied prior to the installation of the membrane system at changes in substrate direction, cove beads, cracks in the substrate and penetrations of the roof /waterproofing system.
 - 2. Exposed finish sealant shall be Sikaflex Hyflex 150 LM by Sika Corp., a one-part low modulus hybrid sealant OR Sikasil WS-295. A one-part, low-modulus, weather sealing, silicone sealant suitable for finishing terminations at saw cuts and all UV exposed sealant terminations. SikaHyflex-150 LM is also suitable for fillet bead transition, changes in substrate direction, cracks in the substrate and penetrations of the roof before installation of the RoofPro membrane system.

PART 3 EXECUTION

3.01 GENERAL

- A. Do not deliver to site or install any material or system that has not been approved. Materials installed without approval may be required to be removed.
- B. Maintain temporary protection of the new and existing roof systems. The roof system will be cleaned to the satisfaction of the Owner and Designer prior to final payment. All areas of stained membrane will be cut out and replaced by the

Contractor at no additional cost to the Owner. Multiple patches in close proximity will not be acceptable and will require one (1) large patch.

- C. Provide interior protection of existing occupied space where the existing building components will be open to the exterior.
- D. The prepared roof deck surface must be dry, clean, and smooth. All bituminous materials shall be removed prior to installing the new roof system. Provide dryers, if necessary, to dry deck surfaces prior to installing new work. Open flame devices shall not be used.
- E. Comply with the manufacturer's written instructions and these Specifications for all renovations and associated work.
- F. Flashings shall be installed along with the membrane to ensure weathertight termination.
- G. Partial or unmarked cans or rolls of materials cannot be used and are not to be on site.
- H. Handle materials to prevent damage to building components and project site areas.
- I. Do not cut any material with a solvent or dilutant unless approved by the Designer in writing prior to use.
- J. Keep covers tightly sealed on all canned and evaporative products to prevent premature curing.
- K. Do not store rolls of membrane or flashings on the roof without the written consent of the Designer.
- L. The Contractor is cautioned to investigate all existing conditions and materials of construction. All replacement items, including but not limited to drain bowls, clamps, hangers, supports, strainers, and caulking must be completely compatible and match the existing system.
- M. All debris shall be transported to rubbish receptacles by enclosed chute, crane and scaling bucket, or other method acceptable to the Owner. Uncontrolled dropping of debris to ground level will not be permitted.
- N. Follow all applicable local, state, and federal requirements regarding construction of scaffolding and protection of the public safety for the work items included in this section. Specific reference should be made to OSHA Construction Safety Regulations. Provide warning lines, barricades, and similar items as required to restrict pedestrian access to hazardous areas. Job site safety shall be the Contractor's responsibility.
- O. Coordinate with **Sections 230100 – Temporary Mechanical Disconnects and 260100 – Temporary Electrical Disconnects** for requirements regarding the disconnection and reinstallation of roof top equipment to perform the roofing work.
- P. Coordinate with Section 221426 – Roof Drains to snake/clean all roof drains prior to roof replacement.
- Q. The latest manufacturer specifications and installation techniques are to be followed along with the following additional requirements. These specific minimum

requirements must be accounted for in the Contractor's bid / proposal and shall not be altered.

- R. The Contractor is responsible for providing a suitable substrate surface for the proper installation of the Membrane Roofing System, roof insulation and specified components.
- S. Commencement of roofing operations indicates the Contractor's acceptance of the roofing substrate for roof application.

3.02 PREPARATION

- A. The Contractor shall examine all areas and conditions whereby work in this section is to be installed. Examine substrates, areas, and conditions for compliance with the following requirements and other conditions:
 - 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 blocking, curbs, and nailers are of sound quality and are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Repair areas of deteriorated concrete roof deck prior to installation of the new roof system.
 - 4. Verify that the concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 5. Proceed with installation only after any and all unsatisfactory conditions have been corrected.
- B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- C. 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.
- D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of each workday. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Coordinate installing membrane roofing system components so coverboards and insulation is not exposed to precipitation or left exposed at the end of the workday.
- F. Ensure insulation boards have been properly installed and are free of defects including but not limited to, broken corners, excessive moisture, dimensional irregularities and the like. Defective insulation boards shall be marked and immediately removed and replaced.

3.03 REMOVAL OF EXISTING SYSTEM

- A. Remove the existing roof systems and associated components down to the existing roof decks.

- B. Clean the deck surfaces using brooms, air spray, or other means necessary to provide a clean, smooth, uniform substrate for installation of the new roof systems.
- C. Notify the Owner and Designer of any areas of unsuitable substrates to remain.
- D. Remove abandoned curbs, roof penetrations, and/or equipment where indicated on the Contract Drawings. Remove rooftop equipment, where indicated, without damaging the deck and/or framing. The Contractor shall repair damages as a result of removal operations.
- E. Remove only as much existing roofing and flashings as can be replaced and made weathertight on the same day with the new work. Arrange each day's termination point to prevent interruption of rooftop drainage.

3.04 ROOF DECK PREPARATION

- A. Refer to Section 035100 – Gypsum Roof Deck Repair for any repairs to the existing gypsum roof decking.
- B. Refer to Section 050130 – Maintenance of Metal Decking for any repairs to the existing metal roof decking.

3.05 WOOD BLOCKING

- A. Coordinate the re-securement of upper layers of wood blocking to remain, the removal and replacement of deteriorated or unsuitable wood blocking, and any modifications to the roof perimeter and mechanical curb units with Section 061000 – Rough Carpentry.

3.06 BASEBOARD INSTALLATION

- A. Install new baseboard over properly prepared metal roof deck at designated locations and secure with specified fasteners prior to installing the vapor barrier at one (1) fastener per 2-square feet, unless otherwise indicated by the roof manufacturer.
- B. Install baseboard per the manufacturer's recommendations and accommodate any required spacing along the side and butt joints between boards.
- C. The Contractor shall monitor and clean the interior of the building daily for any displaced existing sprayed-applied fireproofing mounted to the underside of the roof deck.
- D. The Contractor shall make repairs to any displaced fireproofing materials at no additional cost to the Owner.

3.07 VAPOR BARRIER INSTALLATION

- A. The Contractor, along with the roof manufacturer, shall perform bond tests throughout the roof areas to confirm the type of vapor barrier based on compatibility, based on compatibility of the existing substrate.
- B. Install vapor barrier to properly prepared substrate, allowing any deck repairs to cure properly to avoid trapping moisture. Comply with the manufacturer's written instructions. Lap sides 2-inches and ends 6-inches minimum. Use vapor barrier

transition membrane to turn up vapor barrier a minimum 6-inches, or the full height if less than 6-inches, at roof edges or roof penetrations. Seal all laps and vertical terminations with manufacturer's approved tape or mastic.

- C. Self-Adhering Sheet Vapor Barrier Transition Membrane: Prime substrate if required by manufacturer. Install the self-adhering sheet vapor barrier over area to receive vapor barrier, side, and end lapping each sheet a minimum of 3-1/2-inches and 6-inches, respectively. Seal laps by rolling.
- D. Completely seal vapor barrier at side laps, end laps, terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.08 INSTALLATION OF INSULATION / COVERBOARD (ADHERED)

- A. The multi-layer insulation system shall be installed on properly prepared, clean, dry surfaces. The finished system will be capable of achieving the project attachment requirements for installation of the specified assembly over the roof deck(s).
- B. Allow moist deck sections to dry prior to application of roof insulation. Open flames are strictly prohibited from the roof areas. Ensure that the deck surface and joints are clean of all debris and roofing materials.
- C. Insulation boards shall be free of defects including but not limited to, broken corners, improperly adhered facers, excessive moisture, dimensional irregularities, and the like. Defective insulation boards shall be marked and immediately removed from the site.
- D. In the event that the existing roof decks have anchor bolts or fasteners that extend above the main roof deck surface, all insulation boards shall be notched to allow for flat installation onto the roof deck.
- E. Adhere the base layers of the flat stock and tapered insulation to the vapor barrier using the specified and recommended adhesives. Stagger all end joints to the middle of the long dimension of adjacent insulation boards and stagger insulation layer to layer. Stagger joints between insulation layers 12-inches minimum. Gaps between boards shall not exceed 1/8-inch. Install the wood fiberboard tapered edge strips atop the properly installed insulation with the manufacturer's approved adhesive rates.
- F. The minimum dimension on cut insulation boards shall be 12-inches with a minimum surface area of 2 square feet.
- G. Utilize tapered edge strips and fiberboard fillers at drain location. Step-taper the surrounding insulation system down to the drain bowl location. Provide maximum sumps in conjunction with the tapered insulation system.
- H. Utilize tapered edge strips along curb units and large roof penetrations.
- I. Install specified fiberboard cants at all rising wall locations.
- J. All insulation boards shall be installed tightly butted to adjacent insulation or wood blocking. If gaps greater than 1/8-inch exist between boards, the board shall be cut out and replaced.

- K. Insulation boards set in cold-process adhesive shall immediately be "walked-in" to ensure full embedment. Poorly adhered boards shall be removed and replaced at no additional cost to the Owner.
- L. Ensure that boards are totally adhered prior to application of roof membrane.

3.09 COVERBOARD INSTALLATION (ADHERED)

- A. Install coverboard in cold adhesive applied in strict accordance with the adhesive manufacturer's printed installation instructions to achieve the required warranty.
- B. Install the coverboard and immediately "walk" the system into place to spread the adhesive for maximum contact. Stagger all end joints to the middle of the long dimension of adjacent boards, 24-inches minimum. Continue to "walk" the coverboard every 5 to 7 minutes until firm adhesion is achieved. Ballast the boards to prevent cupping. Redistribute ballast to ensure full bonding of the system.
- C. Ensure that boards are totally adhered prior to application of roof membrane.

3.10 FULLY ADHERED ROOF MEMBRANE INSTALLATION

- A. Adhere membrane roofing over properly installed insulation and coverboard and install according to membrane roofing system manufacturer's written instructions.
- B. Refer to Section 061000 – Rough Carpentry, concerning the installation of the wood blocking, nailers and similar accessory woodwork. Confirm the proper installation of the wood blocking, nailers and similar accessory woodwork. Be sure all loose or deteriorated bituminous substances are removed with the original system. Clean any items designated to remain of all remaining bitumen or cover with acceptable buffer material.
- C. Inspect the surface of the coverboard prior to installation of roof membrane. The coverboard surface shall be clean and smooth with no excessive roughness. Contaminated surfaces or unsound surfaces such as broken or delaminated boards or insulation voids should be removed and disposed of. Coverboards shall be swept and blown clean of all dust prior to applying bonding adhesives.
- D. Adhere thermoplastic roof membrane system in accordance with the recommendations and requirements of the membrane materials manufacturer, as amended in these Specifications. Follow manufacturer requirements concerning application rates for cleaners, solvents, adhesives, and similar materials. The application rates for these items given in these Specifications are to be considered nominal and the actual rates will vary manufacturer to manufacturer.
- E. Do not apply any bonding adhesive to lap areas that are to be welded to flashings or adjacent sheets. Apply all sheets in the same manner, lapping all sheets as required by welding techniques.
- F. Apply bonding adhesive to the coverboard and membrane at the manufacturer's recommended application rates. Bonding adhesive shall be applied in strict accordance with the environmental limitations required by the manufacturer.
- G. Press the bonded sheet firmly in place with a large foam covered lawn roller. Fold back the remaining unbonded half of the sheet and repeat the bonding procedure.

- H. The Contractor shall flash all roof drains in conjunction with the new roof system. Extend membrane 1-inch minimum inside clamping ring with a continuous full bead of water cut-off mastic under the membrane. Ensure installation of roofing membrane will not allow for the penetration of mechanical fasteners within the central sump location.
- I. Provide horizontal termination bars over membrane at vertical surfaces over 40-inches in height.
- J. Provide peel stops as required by the roof manufacturer.

3.11 HOT-AIR WELDING OF MEMBRANE SEAMS

- A. All seams are to be hot-air welded. Seam overlaps to be a minimum 3-inches wide, or as required by the membrane manufacturer. Welding equipment shall be provided or approved by the membrane manufacturer. All workers intending to use the equipment shall have completed a training course by the manufacturer's representative prior to initiating roof replacement operations. Certification of trained welders is required. Manufacturer to supply confirmation of welder training.
- B. All field seams exceeding 10-feet in length shall be welded utilizing an automatic welder. All seams to be clean and dry. Remove foreign materials from seams (dirt, oils, etc.) with MEK, Acetone, or an authorized alternative. Use clean white cotton cloth and allow five minutes for solvents to dissipate prior to initiating welding. Follow the manufacturer's strict requirements, instructions and local codes for electric supply, grounding and overcurrent protection. The automatic welding machines power requirement is 218 to 230 volts at 30 amps. The availability of this voltage shall be verified at the work site on the roof before using the automatic welding machine. The use of portable generators, as required, will be at no additional cost to the Owner. Prior to utilizing the automatic welding machine on the roof, detailed instructions and operating procedure shall be obtained from the manufacturer's technical representatives.
- C. All seams are to be welded in accordance with the manufacturer's instruction. The job foreman or supervisor shall inspect all completed seams on a daily basis. Inspection shall include, but not be limited to, the probing of all field welded seams with a blunted, pointed instrument to assure quality of the application and to ensure that any operator or equipment deficiencies are immediately resolved. 1-inch wide cross section samples of welded seams shall be taken at least three (3) times daily. Correct welds display failure from shearing of membrane prior to weld separation. Each patch shall be patched by the Contractor at no extra charge to Owner. Each weld will be forwarded to the Owner's representative with approximate roof location and date labeled on each.
- D. Hand welded seams shall be completed in two stages. Warm up equipment for at least one minute prior to welding.
 - 1. Weld the back edge of the lap with a thin, continuous weld to prevent loss of the hot-air during the final weld.
 - 2. Insert the hot-air nozzle into the lap, keeping the welding equipment at a 45-degree angle to the side lap. Once the material starts to flow, apply the hand roller at a right angle to the welding gun and press lightly. For straight laps, use the 1-1/2-inch-wide nozzle. Correct weld speed will complete

approximately 20"/minute. The hot-air welding equipment shall have temperature adjustments to provide this proper speed and weld.

- E. Secure the membrane at all roof perimeters and roof penetrations once all welding of adjacent sheet seams is completed. Extend membrane over and beyond all wood blocking as detailed. The membrane at all perimeter and flashing locations shall be anchored at 6-inches on center maximum with the specified fasteners through continuous bars or specified fasteners should the installation of edge sheet metal not be installed on the same working day.

3.12 WATERSTOPS

- A. All flashings shall be installed concurrently with the roof membrane in order to achieve a watertight condition as the work progresses. When a situation arises where a break in the day's work occurs in the central area of a roof, a temporary waterstop shall be constructed to provide a 100% watertight seal utilizing a raised temporary waterstop. Sweep back and totally clean the existing roof and set a 2x4 wood stud atop the prepared area in roof cement as recommended by the membrane manufacturer. Where stopping work on the new system, maintain the stagger of the insulation joints by installing partial fillers.
- B. Carry the new membrane up and over 2x4 waterstop. Seal the edge of the membrane in a continuous heavy application of roof cement. Weigh the membrane down in the sealant with a 2x10 wood member with ballast on top. Ballast should be approximately 20 lb./l.f. When restarting work, remove all sealant, membrane, insulation fillers, etc. from the work area. Do not reuse any of the material in the new work. Cut off contaminated roof membrane and dispose of immediately. If inclement weather occurs while a temporary waterstop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition. Do not impede drainage when installing waterstops.

3.13 MEMBRANE FLASHING INSTALLATION

- A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the job progresses. No temporary membrane flashings shall be allowed without the prior written approval of the Owner. Approval, if given, will only be for specific locations on specific dates.
- B. Ensure that all substrates are free from contamination prior to the installation of the new flashing membranes. Install the manufacturer's buffer or protection sheets as required.
- C. Follow the membrane manufacturer's requirements and recommendations and these specifications. Do not proceed with work until all Shop Drawings and submittals are reviewed.
- D. Flashing shall be fully adhered to compatible, smooth, dry and solvent resistant surfaces. Reinforced/flashing sheets shall be used for flashing purposes as much as practical. Prefabricated components are to be used where practical at vent pipes, inside/outside corners, seams in sheet metal flashings or at any other location where forming of membrane flashings is required.

- E. No adhesive shall be applied in seam areas that are to be hot air welded. All flashing shall use longest possible lengths of flashing membrane. Over cap vertical seams and field membrane as required by the manufacturer for hot air welding.
- F. Install membrane securement disks and fasteners into structural deck(s) or vertical walls at the base of penetrations. Securement disks and fasteners may be required by the membrane manufacturer at the base of tapered edge strips, ridges or other transitions. Contractor to comply with manufacturer's requirements if more stringent than these specifications.
- G. Apply bonding adhesive to face of wood, metal, or other material or surface to be flashed and allow adhesive to dry to the touch. Do not allow adhesive to cure for more than one (1) hour prior to applying flashing membrane. Position the flashing sheet and apply bonding adhesive to flashing membrane making sure bonding adhesive is not applied to overlap area of flashing to be welded. Use the longest possible lengths of flashing membrane. Apply bonding adhesive using rollers or brushes 100% to all surfaces at a smooth, uniform rate, free of holidays, light spots, globs or similar irregularities, all at the manufacturer's application rate. Allow membrane flashing surface of adhesive to dry to a tacky condition, such that adhesive strings occur when touched with a dry finger. After bonding adhesive becomes tacky on membrane flashing surfaces, roll flashing onto surface carefully to prevent wrinkles, fishmouth, bridging or similar flaws. Unless otherwise detailed, the top of membrane flashings must be minimum 8-inches above the surface of the roof membrane, 3-inch minimum above the bottom of metal counterflashing, and a minimum 3-inch past the limits of nail heads or other fasteners. Membrane flashings shall extend the full width of horizontal metal flashing flanges (i.e., gravel stops). After setting, roll membrane into place using a padded roller and heavy hand pressure. Roll 100% of the surface to assure total adhesion with no wrinkles or bridging. After rolling, hot air weld vertical, side, and field membrane overlaps, laps of flashing sheet using minimum 4-inch-wide overlaps. After hot air welding of the flashing sheet and overlaps, check all welds with blunted instrument and re-weld deficiencies.
- H. Inside and outside corners and other changes in direction of flashing sheets shall not be butt-type splices at the point of direction change. All flashing sheets shall be jointed past the change in direction. Prefabricated corners to be utilized where suitable. Outside vertical corners, such as around curb units, shall extend a minimum of 2-inch around the corner for each flashing sheet. Adhere flashing sheets in place with light pressure. All field fabricated interior/exterior corners and miters shall be cut and hot air welded in place. All flashings shall be installed in accordance with the approved Shop Drawings and the manufacturer's instruction, unless amended. Flashings shall be turned up and over the tops of curbs as much as practical.
- I. Vent pipe flashings can utilize prefabricated or field fabricated components. Prior to installation of flashings, the Contractor is to remove all bituminous contaminants or apply an approved separation layer to pipes as a barrier against membrane contamination. Vent pipe flashing to utilize membrane cap which turns into vent pipe. Coordinate providing the vent pipe extensions with the Plumbing Contractor.

- J. Where approved by the Designer, in lieu of membrane cap termination, provide a continuous bead of sealant between membrane and pipe and install a stainless-steel hose clamp at top of flashing sheet. Install a buffer strip of membrane behind hose clamp to protect flashings.
- K. Membrane flashing terminating on a vertical surface shall be mechanically fastened to the substrate.

3.14 LIQUID APPLIED COATING INSTALLATION (ALTERNATE SCOPE OF WORK)

- A. Surface Preparation:
 - 1. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters. Verify that all roof openings or penetrations through the roof are secured back to solid blocking. Ensure all preparatory Work is complete prior to applying membrane.
 - 2. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.
 - 3. All surfaces shall be blown clean using best methods to remove any remaining loose debris.
 - 4. All cracks and voids greater than 1/16th inch shall be routed and caulked with a polyurethane sealant. Allow to cure per roof /waterproofing membrane manufacturer's technical data sheets prior to over-coating with the specified roof /waterproofing membrane system.
 - 5. At all inside corners, gaps or voids at the juncture of the deck and penetrations apply a minimum 3/4-inch fillet bead of polyurethane sealant and allow to cure per roof /waterproofing membrane manufacturer's technical data sheets prior to installing the roof /waterproofing membrane system.
 - 6. At all moving cracks, moving joints between dissimilar materials, and similar conditions, create a minimum 1-inch wide bond break utilizing bond breaker tape, centered over the crack or joint.
 - 7. Membrane terminations shall be established prior to project start-up and documented in shop drawings. Terminations shall occur in raked-out mortar joints, saw cut terminations or under installed counter-flashing materials.
 - 8. Use tape lines to achieve a straight edge detail. Remove tape while application is still wet for clean lines.
- B. Substrate Preparation:
 - 1. Acceptable substrates include concrete, concrete block, solid wood and plywood sheathing, approved cover boards, metal, existing roofing and gravel roofing.
 - 2. Existing Roofing/Waterproofing Membrane:
 - a. Acceptable existing roofing/waterproofing membrane must be sound, well adhered and free of any trapped moisture. Verification that the membrane is free of trapped moisture must be established with a moisture scan and a copy of the moisture scan must be provided to the manufacturer.

- b. Ensure that there is no trapped moisture via an infrared scan.
 - c. Pressure wash the roof with a low sudsing detergent such as Simple Green and rinse with water to remove all dust, dirt and debris from the surface. Allow surface to dry before applying coating materials.
 - d. Validate primer adhesion to Single-ply membranes to determine the level of surface preparation required.
 - e. New PVC flashing tie in or Sarnaclad metal, scuff sand/degloss only the area for RoofPro tie in followed by solvent wipe with acetone before specified primer application.
- C. Priming:
- 1. Metal:
 - a. Apply specified primer for metal surfaces to clean and prepared drain bowls and other metal surfaces by brush or roller at the application rate shown on the technical data sheet. High porosity and roughness of the substrate will decrease coverage rates.
 - b. Allow to cure and dry in accordance with manufacturer's technical data sheets.
 - 2. PVC:
 - a. Mix and apply the specified primer per the instructions on the technical data sheet.
 - b. Allow to cure and dry in accordance with manufacturer's technical data sheet.
- D. Membrane Reinforcement:
- 1. Reinforcement of Cracks, Plywood and Cover Board Joints, and Base/Curb Flashing Transitions:
 - 2. For all locations where the specified membrane system is to be applied directly to the substrate surface, provide reinforcement of cracks and joints prior to applying the specified membrane system
 - 3. For all moving cracks and joints, create a minimum 1-inch wide bond break centered over the crack or joint by applying bond break tape centered over each crack or joint.
 - 4. For all non-moving cracks and joints, rout and seal with Sikaflex polyurethane sealant.
 - 5. For all horizontal-to-vertical transitions, provide a ¾" x ¾" Sikaflex polyurethane sealant cant.
 - 6. Apply a minimum of a 3-inch wide strip of Sika Joint Tape SA directly and pressure roll for best adhesion. Then after apply liquid roofing/waterproofing membrane saturating woven polyester fabric or alternatively apply a minimum 3-inch wide strip of Sika Flexitape Heavy membrane reinforcement of into a bed of liquid roofing/waterproofing membrane at 40 -45 wet mils. Back roll reinforcement to fully embed reinforcement into the wet liquid polyurethane membrane. Add more liquid membrane as needed to fully saturate the embed reinforcement.
 - 7. Ensure reinforcement is not in tension during embedment.
- E. Fluid-Applied Field Membrane Application:

1. Install roofing/waterproofing membrane system in accordance with current technical data sheets.
 2. Apply base embedment coat to horizontal deck and vertical wall surfaces by brush or 1/2 inch nap roller to achieve a continuous and uniform minimum wet film thicknesses as specified in Part 2 Section 2.2. For fleece application, approximately 2/3 of the total resin shall be applied as the base embedment coat.
 3. Immediately lay specified conformable membrane reinforcement into the wet base embedment coat. Reemat reinforcement is typically precut before application; Fleece reinforcement is typically precut at flashings only before application.
 4. Apply pressure to the membrane reinforcement with roller to fully embed and saturate the membrane reinforcement into liquid roofing/waterproofing material. Remove air pockets from under the membrane by rolling them out.
 5. Apply additional liquid material as required to ensure the membrane reinforcement is fully embedded and has conformed to the substrate without tenting, visible pinholes, air pockets, fish mouths or wrinkles.
 6. Overlap sheets of Fleece membrane reinforcement a minimum of 3 inches at side laps and 6 inches at end laps.
 7. Extend membrane reinforcement vertically at adjacent wall surfaces in accordance with project details and specifications.
 8. When using polyester fleece reinforcement, immediately apply the resin topcoat wet-on-wet.
 9. Apply topcoat by nap roller or brush to achieve a continuous and uniform minimum wet film thickness as specified.
 10. Install all flashings in accordance with manufacturer's and/or project specific construction details.
- F. Flashings:
1. Clean, prepare and prime flashing substrate surfaces ready to receive membrane flashing applications.
 2. All parapet, wall, and curb flashings shall be provided with a cant bead of Sika 11FC sealant with Flexitape or Sika SA Tape reinforcement prior to Sika Reemat Premium/Sika Fleece flashing application.
 3. Penetration flashings typically consist of two components. A vertical flashing component extends up the penetration and is torn (if Reemat reinforcement) or finger cut (if fleece reinforcement) at the bottom so that it can be extended horizontally onto the deck/substrate. A horizontal flashing component covers all of the tears/finger cuts and extends vertically up the penetration. The intent is to achieve a 2-3-inch overlap of the two flashing components.
 4. Roof Drains:
 - a. Remove strainer baskets and clamping rings from the drain bowl assembly. Temporarily replace the bolts back into assembly to avoid miss-alignment of connections after membrane applications are completed.
 - b. Extend the liquid roofing/ waterproofing material and membrane reinforcement directly into the bowl of the prepared drain.

- c. Remove drain blocks and allow the roofing/waterproofing system to fully cure dry prior to re-connecting the drain bowl assembly.

3.15 ROOF EXPANSION JOINT INSTALLATION

- A. Construct expansion joint as detailed using thermoplastic roof membrane. Coordinate with Section 061000 – Rough Carpentry for the installation of the new wood blocking.
- B. Provide temporary protection on the interior to prevent dust infiltration into the building.
- C. Install the fire blanket to support the insulation where detailed.
- D. Install backer rod atop looped membrane and wood blocking. Butt all ends of foam rod to prevent voids. Adhere in place with adhesive if required.
- E. The new backer rod and looped membrane shall extend vertically onto parapet walls up to the new sheet metal fascia components. Sheet metal fascia metal should be installed to allow for expansion and contraction across the expansion joint. Coordinate with Section 076200 – Sheet Metal Flashing and Trim.
- F. Install membrane over the foam tube and extend onto adjacent membrane areas 4-inches minimum. Fully weld all seams.

3.16 WALKWAY PAD INSTALLATION

- A. Install the membrane manufacturer's protection mats on the roof surface where requested by the Owner/Designer. Typical locations include around rooftop mechanical units, and below exposed wood sleepers or prefabricated mechanical unit supports. Avoid installing walkway pads within 15-feet of roof perimeter and/or fall hazard (greater than 30-inches), unless otherwise directed by Owner. Walkway pad installation shall be completed under the unit price scope of work. Refer to Section 012200 – Unit Prices for additional information.

3.17 HATCH, FAN AND VENT CURB INSTALLATION

- A. At roof hatch and fan and vent curbs where existing curbs are being reused, provide continuous wood blocking to match insulation height.
- B. Coordinate the installation of new sheet metal enclosure around the interior portion of the wood blocking and roof membrane to conceal the limits of the new construction with that of the interior finishes. See Section 076200 – Sheet Metal Flashing and Trim.
- C. Set curb flange on wood blocking and secure with specified fasteners, minimum 2 per side and maximum 24-inches on center.

3.18 CONDUIT SUPPORTS

- A. Place protection layer on completed roof membrane to extend beyond base minimum 3-inches in each direction.
- B. Set supports to provide stable base for ducts and conduits. Adjust as necessary. Accurately locate and align.

- C. Set duct supports at same locations as existing supports.
- D. Set pipe supports at 4-feet on center.
- E. Secure ducts and conduit to supports.

3.19 ROOF DRAIN MARKERS

- A. Examine roof drain strainer conditions to verify secure attachment to drain base and compatible alignment with roof drain marker mounting bracket.
- B. Install roof drain markers on each roof drain strainer. Install in accordance with manufacturer's instructions.
- C. Attach bracket to drain strainer using manufacturer-furnished corrosion-resistant fasteners, securely tightened.
- D. Thread marker base to threaded stud on marker bracket and tighten securely.
- E. Insert flag marker into marker base and secure using set screw.

3.20 DOME SKYLIGHT

- A. At curbs where existing curbs are being reused, provide continuous wood blocking to match insulation height.
- B. Provide temporary protection on the interior of the skylight to prevent debris from entering the building.
- C. Remove existing skylights down to the top surface of the rough openings or curbs. Scrape, vacuum and sweep clean the exposed surfaces. Notify the Owner and Engineer of any areas of unsuitable framing or associated components.
- D. Coordinate the installation of new sheet metal enclosure around the interior portion of the wood blocking and roof membrane to conceal the limits of the new construction with that of the interior finishes. See Section 076200 – Sheet Metal Flashing and Trim.
- E. Install the new skylight in accordance with the manufacturer's instructions.

3.21 POURABLE SEALER BOXES

- A. It is the intent of this project to use the least amount of pourable sealer boxes as possible. Use pipe wrap details, manufacturers approved liquid membrane, or other approved flashing configurations where practical.
- B. Pourable sealer pockets shall be filled with pourable elastomeric sealer and tooled along the top surface to shed water. Pockets shall extend 8" minimum above the roof surface.
- C. Inorganic fillers may be used to provide a sealant depth of 2" minimum. See Detail Drawings.
- D. Install two (2) – piece sheet metal cap over the pourable sealer box once the sealer has set, and final applications to the top of the unit off are complete to shed water; caps are intended to protect the sealer from exposure of ultraviolet rays; secure to prevent wind displacement.

3.22 GUARDRAIL INSTALLATION

- A. It is the intent of these specifications to provide perimeter railings at the designated locations on the roof area plan.
- B. Install in accordance with manufacturer's instructions.
- C. Perform cutting and fitting required for installation of handrails. Set handrails accurately in location, alignment, and elevation, measured from established lines.
- D. Coordinate the installation of new walkway pads under the rail base plates.
- E. Confirm with the rail manufacturer if perpendicular runs are required to provide the lateral support of the railing system where straight runs are anticipated to be installed.

3.23 REINSTALLATION

- A. Reinstall equipment disturbed or disconnected by work of this section. Extend and reconnect electrical and mechanical connections. Restore normal operation of equipment.

3.24 COMPLETION

- A. Remove all debris, excess materials and scrap of any kind from the roof and surrounding premises prior to demobilization.
- B. Inspect all field welds, detailing and terminations to ensure a 100% watertight installation.

3.25 PROTECTING AND CLEANING

- A. Protect membrane-roofing system from damage and wear. Inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Designer and the Owner.
- B. Correct deficiencies in or remove membrane-roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane-roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by the manufacturer of affected construction.
- D. Refer to close-out procedures described in Division one of these Specifications for additional information.

3.26 FIELD QUALITY CONTROL

- A. Testing Agency: The Owner may engage a qualified firm to perform 3rd party monitoring and inspections.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Owner.
- C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

3.27 WARRANTY INSPECTION

- A. Upon receipt of the notice of completion, a Technical Representative of the roof manufacturer shall schedule an inspection with a representative of the Contractor to thoroughly review the installation and verify compliance with the specifications.
- B. Any corrections or modifications necessary for compliance with the specifications and acceptance for warranty (punch list) will be noted on the Final Inspection for Warranty Form.
- C. Upon completion of all punch list items and final acceptance of the installation, a warranty as authorized by the roof manufacturer will be issued.

3.28 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division One for additional information.

END OF SECTION

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SECTION 076200

SHEET METAL FLASHING AND TRIM

(Filed sub-bid with Section 070002)

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work specified within this Section shall be the responsibility of the Roofing Filed Sub-Contractor.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Provide all necessary underlayment, miscellaneous flashing, attachment clips, and closure members to ensure a weathertight installation.
- C. Remove and replace sheet metal edge fascia systems and associated components as shown on the Contract Drawings at designated locations.
- D. Install sheet metal counter-flashings at roof membrane terminations.
- E. Install sheet metal skirt flashings around roof top equipment/units.
- F. Install sheet metal concealed roof sleeper caps.
- G. Install sheet metal hood flashings at designated roof penetrations.
- H. Install sheet metal blind nailers at all vertical roof membrane and sheet metal termination locations.
- I. Install cleats, hook strips, and clips to secure sheet metal flashings as indicated on the Contract Drawings.
- J. Install high-temperature resistant self-adhered butyl-based flashing membrane at locations designated on the Contract Drawings.
- K. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
- L. Clean and restore all areas affected by the work.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition
- B. Section 040120 – Masonry Restoration and Cleaning
- C. Section 055133 – Metal Ladders
- D. Section 061000 – Rough Carpentry
- E. Section 075400 – Thermoplastic Membrane Roofing

1.06 ALLOWANCES

- A. Not applicable to this section.

1.07 UNIT PRICES

- A. Not applicable to this section.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Not applicable to this section.

1.10 REFERENCES

- A. Sheet Metal and Air Conditioning Contractors' National Association's (SMACNA's) "Architectural Sheet Metal Manual."
- B. National Roofing Contractor's Association's (NRCA's) Roofing Manual, Latest Edition.
- C. Copper Development Association's (CDA's) "Copper in Architecture Design Handbook".
- D. Revere Copper Product's "Copper and Common Sense – Sheet Copper Design Principles and Construction Techniques Manual, Latest Edition."
- E. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. FM data sheet FM1-49.

1.11 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install roof edge flashing and copings capable of resisting the Wind Zone forces required by Code according to recommendations in FM Loss Prevention Data Sheet 1-49.
- C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing 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 sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.
- D. Water Infiltration: Provide sheet metal flashing and trim that does not allow water infiltration to building interior.

1.12 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.
- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- D. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 - 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- E. Samples for Verification: Before erecting mockup, submit samples of the following:
 - 1. Sheet Metal Flashing: 12-inches long. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim: 12-inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: Full-size Sample.

1.13 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.
 - 1. Meet with the Owner, Designer, User Agency's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 - 2. Review methods and procedures related to sheet metal flashing and trim.
 - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.14 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
- D. Before full scale work is commenced, execute the following work for trial work areas to be reviewed by the Owner as to acceptability of color, texture, and appearance match with the existing construction. Test areas will be at locations established by the Owner.
 - 1. Two linear feet (2 LF) of each roof edge metal configuration.

1.15 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.

- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent building(s) and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.
- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.16 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

1.17 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
 - 1. Finish Warranty Period: 20-year standard warranty.

PART 2 PRODUCTS

2.01 SHEET METAL

- A. Tin-Zinc Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
 - 1. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "FreedomGray" by Revere Copper Products, Inc.
 - 2. Weight (Thickness): 16-oz./sq. ft., 20-oz./sq. ft., uncoated weight, with 0.787-mil coating thickness applied to each side.
 - a. Refer to the fabrication schedule.
- B. Aluminum shall be Kynar 500 Fluoropolymer painted aluminum architectural sheet and coil conforming to ASTM B209. Aluminum shall have a mill finish for concealed surfaces. Aluminum shall be 3003 alloy, H-14 temper.
 - 1. Thickness: 0.040-inch, 0.050-inch
 - a. Refer to the fabrication schedule.

2. Color(s) to be selected by the Owner.
- C. Stainless steel shall be AISI 18-8 Type 304, 2D finish. Sheet length shall be 8-feet maximum. Note, stainless steel is only anticipated to be used as hot pipe storm hoods, unless otherwise indicated.
- D. Thermoplastic Clad Metal: to fabricate metal flashing, sheets of minimum 0.023-inch-thick hot dipped galvanized steel laminated with a 20 mil TriPolymer Alloy, or as required by the MRSM to meet the warranty requirements.
- E. Pre-manufactured, Edge Fascia Systems: Pre-formed, architectural metal edge and system. The Contractor-shop fabricated metal will NOT be accepted for the perimeters of the roofs. Edge fascia shall include:
 1. Tested per ANSI/SPRI/FM 4435 ES-1 Standard to meet or exceed design pressures noted on the Contract Drawings to comply with the International Building Code requirements.
 2. Color(s) to be selected by the Owner.
- F. All accessories, including but not limited to nails, screws and clips shall be stainless steel or galvanized steel and completely compatible with the surrounding metal to prevent galvanic reaction. Galvanizing shall be per ASTM A153-09.
- G. Termination bars shall be 1/8-inch x 1-inch stainless steel or aluminum bar (as required to prevent galvanic action with the flashings being secured) with pre-punched holes at 8-inches on center, or as required by the membrane manufacturer.
- H. Clamps shall be screw adjustable stainless-steel hose clamps with a minimum 3/8-inch band width.
- I. Rivets shall be 3/16-inch diameter copper or stainless steel as required by the metal being secured.
- J. Sheet metal flashings shall be shop fabricated. All breaks, bends and hems shall be uniform, clean, straight lines.
 1. All aluminum joints shall be adequately overlapped, backsealed, and riveted.
 2. Flanges shall be 4-inch wide minimum.
 3. Drip edges shall be hemmed 3/4-inch wide and break at a 30-degree angle.
 4. Clips shall be 2-inches wide.
 5. All flanges to be covered with roofing or flashing membranes shall have a 1/4-inch minimum hem on the edge.
 6. All sheet metal joints shall have a 6-inch-wide cover and backer plates.
 7. Blind nailers shall be 4-inch wide, folded to 2-inch-wide final dimension.
 8. Fascia reveals shall not exceed 8-inch. Fascia requiring a greater vertical face than 8-inch shall be fabricated as a two-piece system with each face of equal exposure.
 9. Maintain equal fascia height around the entire perimeter of each roof area and where fascias abut.

2.02 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.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength copper, tin-zinc, aluminum, or stainless-steel rivets.
- C. Solder:
 - 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - 2. For Red Copper: ASTM B 32:
 - a. Grade Sn50 tin-lead (50/50) for general use.
 - b. Grade Sn60 tin-lead (60/40) for lead-coated copper.
 - c. Grade Sn95/Ag5 (95/5) tin-silver for lead-free.
 - 3. For Zinc-Tin Alloy-Coated Copper: ASTM B 32, 100 percent tin.
- D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.03 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, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

- C. Fabricate 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.
 - 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with elastomeric sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.
- H. Hanging Gutters: Fabricate to cross-section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
 - 1. Gutter Style: As indicated on Drawings.
 - 2. Expansion Joints: Lap type.
 - 3. Gutters with Girth up to 20-Inches: Fabricate from the following materials:
 - a. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft.
- I. Downspouts: Fabricate downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Downspout Shape: As indicated on Drawings.
 - 2. Hanger Style: As indicated on Drawings.
 - 3. Downspouts: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft.
 - b. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft.
- J. Splash Blocks Where Downspout is Not Connected to Storm Drainage System: Provide precast concrete splash blocks below the downspouts such that water flowing from the downspouts will deposit onto the concrete splash.

2.04 FABRICATION SCHEDULE

- A. Note, similar flashing components have been listed under multiple metal fabrications type and thicknesses. The Contractor shall coordinate the use of

compatible metals to prevent galvanic corrosion and coordinate painted finish components at visible locations.

1. 0.040" Thick Coated Aluminum
 - a. Pre-manufactured Edge Metal
 - b. Concealed Sleeper Cap
 - c. Pourable Sealer Cap
 - d. Skirt Flashing
 - e. Blind Nailers
 - f. Cover Plates
 - g. Backer Plates
 - h. Counterflashing
 - i. Skylight Enclosure Metal
 - j. Hatch Enclosure Metal
2. 0.050" Thick Coated Aluminum
 - a. Inside/Outside Corners
 - b. Clips
 - c. Hook Strips
3. 24-gauge Stainless Steel
 - a. Hot Pipe Cone Flashing
4. Thermoplastic Clad Metal
 - a. Edge Metal
 - b. Overflow Scupper
 - c. Pourable Sealer Box
 - d. Closure Metal
 - e. Hot Pipe Curb
 - f. Blind Nailers
5. 16 oz. Tin-Zinc Alloy Coated Copper
 - a. Counterflashings (for throughwall flashing)
 - b. Blind Nailers
 - c. Wall Transitions
6. 20 oz. Tin-Zinc Alloy Coated Copper
 - a. Cleats
 - b. Clips
 - c. Hook Strips

2.05 FINISHES

- 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: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. 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 fabricator or manufacturers of dissimilar metals.
 - 1. Coat side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. 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 underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
- E. 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.
 - 1. Space cleats not more than 12-inches apart. Anchor each cleat with two (2) fasteners. Bend tabs over fasteners.
- F. 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 or bayonet-type 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 elastomeric sealant concealed within joints.

- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4-inches for nails and not less than 3/4-inch for wood screws.
 - 1. Galvanized or Pre-painted, Metallic-Coated Steel: Use stainless-steel fasteners.
 - 2. Aluminum: Use aluminum or stainless-steel fasteners.
 - 3. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric sealant as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1-inch into sealant. Form joints to completely conceal sealant. When ambient temperature at the time of installation is moderate, between 40 and 70 deg F set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-join edges of sheets to be soldered to a width of 1-1/2-inches except where pre-tinned surface would show in finished Work.
 - 1. Do not solder aluminum sheet.
 - 2. Stainless-Steel Soldering: Pre-join edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
 - 3. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.
- J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.03 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4-inches over base flashing. Install stainless steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4-inches over base flashing. Lap counterflashing joints a minimum of 4-inches and bed with elastomeric sealant.
 - 1. Secure in a waterproof manner by means of snap-in installation and sealant.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for flashing on vent piping.

3.04 PRE-MANUFACTURED EDGE METAL

- A. Install flashing system in accordance with manufacturer's instructions at locations indicated on the Contract Drawings.
- B. Pre-Manufactured Fascia:
 1. Confirm that the roof membrane extends down, beyond the transition of the wood blocking as shown on the Contract Drawings.
 2. Should the fascia not provide a minimum of 2-inch coverage over the existing wall cladding, a two-piece flashing system, of equal dimension, shall be installed around the perimeter of the roof edge to provide a uniform height.
 3. Install a sacrificial piece of roof membrane between the finished roof edge membrane, and the extruded aluminum hook strip. The membrane shall be sealed to both the finished roof surface, and the extruded aluminum hook strip to prevent water infiltration under the detail.
 4. Fasteners:
 - a. Install fascia system using concealed fasteners in accordance with manufacturer's instructions.
 - b. Do not penetrate Horizontal roofing surface with fasteners.
 5. Sealant: Apply continuous beads of sealant in accordance with manufacturer's instructions.
 6. Thermal Expansion: Create gap between retainer sections and between fascia sections in accordance with manufacturer's instructions to allow for thermal expansion.
 7. Review lengths of straight pieces of exterior fascia covers before cutting to avoid creating relatively short sections adjacent to full-length sections.
 8. Where the fascia edge meets a rising wall, install a sheet metal blind nailer at these locations to terminate the roof membrane.
- C. Pre-Manufactured Gutters:
 1. Install products to allow water to drain from edge of roof.
 2. Install products to allow for thermal movement.
 3. Joint Sealants: Apply joint sealants in accordance with manufacturer's instructions.
 4. Review lengths of straight pieces before cutting to avoid creating relatively short sections adjacent to full-length sections.

3.05 SHOP FABRICATED SHEET METAL FLASHINGS

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Fascia Extenders: Fabricate fascia extenders to the configurations shown on the Contract Drawings.

1. Fascia extenders shall provide a minimum of 2-inch coverage over the existing wall cladding.
 2. Backer plates shall be installed between each seam.
 3. Pre-manufactured fascia shall overlap a minimum of 3-inches over the fascia extender.
 4. Secure fascia extender with approved fasteners through pre-drilled fastener holes to avoid buckling and the appearance of oil canning.
- C. Pipe, Hot Pipe, or Post Counterflashing: Install 2-piece counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4-inches over base flashing.
1. Two-piece flashing shall consist of an interlocking standing-seam joint.
 2. Install stainless steel draw band and tighten.
- D. Counterflashings: Fabricate counterflashings to the configurations shown on the Contract Drawings. Coordinate installation of counterflashing with other trades should new counterflashing require mutual connections.
1. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4-inches minimum over base flashing. Lap counterflashing joints a minimum of 4-inches and bed with elastomeric sealant.
 2. Secure in a waterproof manner by means of snap-in installation and sealant.
 3. Utilize 2-inch-wide sheet metal slips of same material to secure lower limits of counterflashing.
- E. Skirt Flashings: Fabricate skirt flashings to the configurations shown on the Contract Drawings.
1. Insert flashings beneath new or existing flashings as detailed. Overlap adjacent sections a minimum of 3-inches.
 2. Secure skirt flashing with clips at 12-inches on center, unless otherwise indicated on the Contract Drawings, and a minimum of two (2) clips per section. All fasteners shall be concealed.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
1. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for flashing on vent piping.
- G. Securement Clips: Fabricate clips to the configurations shown on the Contract Drawings.
1. Secure clips to substrate with the specified fasteners at minimum 12-inches on center, or as indicated on the Contract Drawings.
 2. Bend clips a minimum of 1-inch over bottom drip edge of flashing and crimp tightly.
- H. Blind Nailers: Fabricate and install blind nailer with a 2-inch minimum leg inserted behind membrane. Fasten flashing through leg of blind nailer.
1. Fold blind nailer to 2-inch-wide final dimension with 1/2-inch hemmed edge over fastener.
 2. Provide continuous beads of sealant at back and leading edges.

- I. Hook Strips and Cleats: Fabricate hook strips and cleats to the configurations shown on the Contract Drawings.
1. Fabricate continuous cleats/hook strips with 3/4-inch kicks, bent out at a 30° angle to the face or wall. Height of continuous cleats/hook strips shall be as indicated on the Detail Drawings.
 2. Secure continuous cleats/hook strips to wood blocking with the specified fasteners spaced at 3-inches on center, staggered along the center line.
 3. Provide 1/8-inch butt joints between hook strip sections.
- J. Cover and Backer Plates: Fabricate cover and backer plates 8-inches wide, with 4-inch-wide deck flanges, unless as indicated. Hem edges of cover plates to fit snug against edge metal and fascia sections.
1. Prime metal and install a 6-inch-wide strip of self-adhering flashing centered on the 1/8-inch-wide edge metal joint.
 2. Install cover and backer plates over and underneath (respectively) the edge metal and set in beads of sealant plates centered over self-adhering flashing strip and joints.
 3. Secure edge metal cover plate flanges with five (5) fasteners driven into the flanges and crimped to edge metal drip.
 4. Hook fascia cover plates to drip edge and secure flanges to wood blocking with five (5) fasteners per cover plate flange.
- K. Secondary Through-Parapet Overflow Scupper: Fabricate overflow scupper sleeves to the configurations shown on the Contract Drawings.
1. Scupper sleeves shall extend through the total width of the finished parapet wall.
 2. The scupper sleeves shall be fabricated with the longitudinal seam located along the top of the opening and fit snugly into place.
 3. Scupper sleeve shall have hemmed flanges for securement on the inside of the parapet where shown.
 4. Secure the sleeve to the parapet wall with the specified fasteners and flash the flanges as specified.
 5. Extend the scupper sleeve 1-inch minimum beyond the exterior wall surface, keeping it flush with the interior wall surface.
 6. Install sheet metal blind nailer on the exterior face of scupper (top and sides).
- L. Miscellaneous Sheet Metal Flashings: Fabricate miscellaneous sheet metal flashings to the configurations shown on the Contract Drawings.
- M. Thermoplastic Clad Sheet Metal: Fabricate clad sheet metal flashings to the configurations shown on the Contract Drawings.
1. Flashings shall be installed to provide adequate resistance to bending and allow normal thermal expansion and contraction.
 2. Fabricated Fascia:
 - a. Secure thermoplastic clad edge fascia to an aluminum hook strip.
 - b. Thermoplastic clad metal flashings shall be fastened into solid wood nailers with two (2) rows of the specified fasteners, 3-inches on center, staggered.
 - c. Thermoplastic clad flashings shall be spaced 1/4-inch apart and joints covered with 2-inch-wide aluminum tape with a 4-inch-wide

cover strip of thermoplastic flashing membrane hot air welded over the joint, or as recommended by the manufacturer.

3. Provide blind nailers at exposed ends where thermoplastic clad fascias meet rising walls as necessary and other locations as required to provide an aesthetic watertight termination of metal flashings.
4. Fabricate pourable sealer boxes with the thermoplastic clad sheet metal in the dimensions and profiles as shown on the Contract Drawings.

3.06 FIELD QUALITY CONTROL

- A. Cooperate with field quality control personnel. Allow inspectors to access scaffolding and work areas, as needed to perform inspections.
- B. Additional inspections and retesting of materials which fail to comply with specified material and installation requirements shall be performed at the Contractor's expense.

3.07 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.
- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division One for additional information.

End of Section

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SECTION 221426

ROOF DRAINS

(Filed sub-bid with Section 220001)

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All work specified within this Section shall be the responsibility of the Plumbing Filed Sub-Contractor.

1.02 DESCRIPTION OF WORK

- A. In general, the Contractor shall supply all labor, equipment, temporary protection, tools, and appliances necessary for the proper completion of the work as required in the Specifications, in accordance with good construction practice, and as required by the materials manufacturer, as amended.
- B. Remove and replace the existing drain bowls, clamping rings, drain strainers, hardware, and no-hub connections as shown on the Contract Drawings. Provide and install new extendable collars, and hardware as required to install the new roof system.
- C. Provide vent pipe extensions to meet a minimum height of 18-inches.
- D. Clean all low slope roof drain systems from roof level to the point where it exits the building to achieve a free-flowing system. Perform prior to roof replacement and after roofing operations are completed. Notify Owner immediately should there be any obstructions.
- E. Coordinate the work in this section with the appropriate trades to ensure the proper work sequence.
- F. Clean and restore all areas affected by the work.

1.03 PRODUCTS FURNISHED/SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Not applicable to this section.

1.04 PRODUCTS INSTALLED BUT NOT FURNISHED/SUPPLIED UNDER THIS SECTION

- A. Not applicable to this section.

1.05 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 024100 – Selective Demolition
- B. Section 035100 – Gypsum Roof Deck Repair

- C. Section 050130 – Maintenance of Metal Decking
- D. Section 075400 – Thermoplastic Membrane Roofing

1.06 ALLOWANCES

- A. Not applicable to this section.

1.07 UNIT PRICES

- A. Not applicable to this section.

1.08 MEASUREMENT AND FIELD VERIFICATION PROCEDURES

- A. All dimensions, quantities, and existing conditions shall be determined or verified by the Contractor. The Contract Drawings have been compiled from various sources and may not reflect the actual condition at the moment of construction. The Contractor is cautioned to take all precautions and make all investigations necessary to install the proposed work. The Owner will not consider unfamiliarity with the job conditions as a basis for additional compensation.

1.09 ALTERNATES

- A. Not applicable to this section.

1.10 REFERENCES

- A. Occupational Safety and Health Act (OSHA).
- B. FM, if applicable to project.
- C. Underwriters' Laboratories (UL).
- D. American National Standards Institute (ANSI).
- E. American Society for Testing and Materials (ASTM).
- F. Cast Iron Soil Pipe Institute (CISPI)

1.11 SUBMITTALS

- A. Refer to Section 013300 – Submittal Procedures for additional information.
- B. Provide a project specific safety plan and job hazard analysis.
- C. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

1.12 QUALITY ASSURANCE

- A. Qualifications: Use adequate numbers of skilled, licensed plumbers who are thoroughly trained and certified in the installation and testing of the specified system(s) and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
 - 1. The supervising plumbing foreman shall be thoroughly familiar with the equipment and scope of work.

- B. Substitutions: Comply with Division 01 requirements.
- C. Codes and Regulations: In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies and authorities having jurisdiction.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Pipe, Valves, and Fittings: Deliver new materials and components to the site clean and ready for service. Store material in a secured, cleaned area off the ground, floor or roof.
- C. Replacements: In case of damage, immediately make all repairs and replacements necessary to the approval of the Designer at no change in Contract Sum.

1.14 PROJECT CONDITIONS

- A. The Contractor shall supply, install and maintain all shoring, supports, barriers, protection, temporary heat, warning lines, lighting and personnel required to support the structure, fixtures and facilities affected by his work and segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, occupants and the surrounding landscaped and paved areas.
- B. The building occupants are highly sensitive to fumes, odors, noise, and disturbances. The Contractor shall submit a detailed sequence schedule for the building area prior to the start of work and shall coordinate daily schedules with the Owner.
- C. Schedule and execute all work without exposing the interior building areas to inclement weather. Protect the existing building and its contents against all risks, and repair or replace all damage to the Owner's satisfaction.
- D. Coordinate the work in this section with the work by other trades to ensure the orderly progress of the work.
- E. Under no circumstances shall the Contractor remove existing materials and systems to the ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent buildings and property areas shall be protected from airborne debris.
- F. During removal operations, the Contractor is responsible for the containment of all dust, dirt, debris, overspray, and run-off resulting from the work. The Contractor shall collect and contain all materials and repair any resulting damage to adjacent surfaces, site fixtures or personal property. Specific attention is drawn to the use of chemicals and cleaners.
- G. Fully charged, inspected, and approved fire extinguishers shall be on site at all times. No cutting, grinding, or welding of any kind shall proceed without an approved, fully charged fire extinguisher.

- H. The Contractor shall utilize skilled and experienced specialty workers to install all aspects of the work.

1.15 CONTRACTOR GUARANTEE

- A. Upon completion of the work and prior to final payment, the Contractor shall submit a guarantee of their work as free from defect in materials and workmanship. The guarantee shall be for a period of two (2) years. The guarantee shall be signed by an officer of the Contractor's firm and sealed if a corporation.

1.16 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.
- B. See Division 01 Section "Description of Work" for the Contractor's warranty.

PART 2 PRODUCTS

2.01 ROOF DRAIN COMPONENTS

- A. Roof Drains: Coated cast iron with bottom outlets, large-sump style, with wide roof flanges, such as:
 - 1. "Series 21500" manufactured by Josam Company
 - 2. Zurn.
 - 3. JR Smith
 - 4. Or approved equal.
 - 5. Outlet diameters shall match the existing leader pipe diameters.
- B. Drain strainers: Coated cast iron of suitable size and configuration to be installed on the new drain bowl assemblies.
- C. Clamping rings: Non-puncturing type, with integral gravel stops, either coated cast iron or stainless steel, sized to match the drain bowls. Bolts, nuts, and washers required for securement of clamping rings to drain bowls shall be stainless steel.
- D. Underdeck clamps: Coated cast iron, provided by the drain bowl manufacturer for application beneath roof decks.

2.02 ACCESSORIES

- A. Leader pipe: Schedule 40 PVC pipe. Pipe and connections shall be sized to tie into existing leader piping. Coated cast iron, conforming to ASTM A74 specifications. Pipe and connections shall be sized to tie into existing leader piping.
- B. Drain bowl to leader pipe connections: 4 band, no hub, neoprene connections.
- C. Hangers and fittings: Conforming to Manufacturer's Standardization Society of Valve and Fittings Industry (MCC) SP-58 and SP-59 guidelines. Hangers and strapping material shall be of approved material that will not promote galvanic reaction. Cast iron fittings shall conform to the American Society of Mechanical Engineers (ASME) B16.4 and B16.12.

- D. Steel plate for drain bowl locations shall be minimum 24-gauge hot dipped galvanized plate as provided by the drain bowl manufacturer. Plate shall be a minimum size of 16-inches by 16-inches with central hole of suitable size to receive new drain bowl.
- E. Insulation for drain bowls and leader piping: Fibrous glass batt type with pre-molded PVC jackets. Insulation shall be a minimum of 1-inch thick.

2.03 VENT PIPE EXTENSIONS

- A. Vent pipe extensions: Schedule 40-coated cast iron conforming to ASTM A74 sized to match existing pipe diameter. Pipes shall extend 18-inches minimum above completed roof surface.
- B. No-hub connections for vent pipe extensions shall consist of neoprene couplings conforming to ASTM C-654 with stainless steel clamps, sized to match the existing pipe diameter. Provide a minimum of four (4) grade 304 stainless steel hose clamps per pipe.

2.04 ACOUSTICAL SUSPENDED CEILING

- A. Replacement tiles for damaged acoustical suspended ceiling tiles shall be match the existing in size, color, texture, thickness, and quality.

PART 3 EXECUTION

3.01 PREPARATION

- A. The Owner shall be notified at least 72-hours prior to all underdeck work. All materials, equipment and daily clean-up shall be the responsibility of the Contractor.
- B. All flashing-in of the roof drains and membrane repairs as a result of the plumbing work shall be the responsibility of and provided by the Contractor.
- C. The Contractor is cautioned to investigate all existing conditions and materials of construction. All replacement items must be completely compatible with and match the existing system.
- D. Comply with Division 01 General Requirements for preparation, protection and clean-up of interior and exterior work areas.

3.02 CLEANING OF DRAINAGE SYSTEM

- A. Water jet clean all roof drains and sub-grade drain lines (associated with exterior downspouts) prior to and after re-roofing construction. Once the new replacement roof system has been installed, clear all roof drain leader piping of debris and clogs such that the system is free flowing.
- B. The Contractor shall notify the Designer and Owner a minimum of 72-hours in advance prior to cleaning drainage system, to allow the Designer and Owner to be present during the cleaning operations.

- C. The Contractor shall clear the existing leader pipe with from the roof deck level to the point where the leader pipe exits the building. Flush the drain line with water upon completion of the cleaning.

3.03 CEILING REMOVAL

- A. Do not remove any ceiling areas without the prior approval of the Owner and Owner's Representative. The limits of ceiling removal to facilitate installation of the new plumbing work shall be clearly defined. All precautions shall be taken to protect the building interior and occupants during ceiling removal and replacement.
- B. Do not damage or cut any of the ceiling support system without the Owner's and Owner's Representative's approval. Should the support system be damaged or removed to facilitate plumbing work installation, it shall be replaced with a new support system equal to the existing, at no additional cost to the Owner.
- C. All floor and adjacent areas, both interior and exterior, damaged or stained by the installation of the plumbing work shall be cleaned of all dust, debris and any other materials to the Owner's satisfaction.

3.04 REMOVAL OF ROOF DRAIN COMPONENTS

- A. Remove the existing drain components from the roof so as to cause minimum damage to the deck.
- B. Remove and replace the drain bowl insulation and a minimum of 6-ft of leader pipe insulation.
- C. The Contractor shall provide all interior and roof deck protection, should drain removal be required.
- D. All drains installed shall be completed and flashed in the same day's operation.

3.05 DRAIN BOWL ASSEMBLY INSTALLATION

- A. Install new roof drains such that the bowl flange with clamping ring and integral gravel stop are level (see Detail Drawings for assembly position).
- B. Provide manufacturer supplied, prefabricated, galvanized steel plate over opening. Mechanically attach plate to steel deck with specified fasteners, 2 per side.
- C. Make drain to leader connections watertight and of proper strength using no hub connections.
- D. Install drain bowl insulation and PVC jackets. Join sections with tape or other methods indicated by the manufacturer. Extend insulation to the first elbow or 2-feet.
- E. Drain components shall be completed and flashed in the same day's operation.
- F. Check all drain joints with a water test once the roofing and flashing are completed.

3.06 INSTALLATION OF LEADER PIPE

- A. Flexible joint coupling may be used only to tie new leader piping to existing drain leaders. Mechanical joint couplings shall be installed in accordance with the manufacturer's instructions.
- B. New leader piping shall slope at 1/8-inch per foot minimum or as indicated on the Drawings.
- C. Hangers shall be spaced 5-feet maximum for horizontal leader runs and 10-feet maximum for vertical leader runs.
- D. Pipes shall be sited to run adjacent to structural steel framing components. Do not cut holes through structural members to facilitate installation.
- E. Insulate new interior piping with PVC clad fiberglass insulation. Provide 1-inch high block letters at 3-foot spacing indicating piping as "storm water" piping.

3.07 ROOF DRAIN TESTING

- A. The Contractor shall water test all no-hub joints, lead and oakum joints, collar extension joints, and roof flashings-to-drain bowl connections following completion of the project.
- B. All testing shall be performed by the Contractor. The Contractor shall coordinate interior access to witness potential leaks and address such leak(s) immediately.
- C. Perform water tests on roof drain assemblies, including leader piping, and on gutter assemblies and scuppers. Using 3/4-inch garden hose, run water into the drainage components for thirty minutes. Inspect all drainage components for leakage and repair as required. Inform Owner of test findings.

3.08 VENT PIPE EXTENSIONS

- A. It is the intent of the project to cut or extend all existing vent pipes to provide an 18-inch minimum and 24-inch maximum clearance height from the finished roof surface to the top of the pipe. Coordinate the finished roof height with that of the Roofing Contractor. The configuration varies and will be strongly dependent on the final insulation heights of the new roof system.
- B. Field configurations will be required. Any vent pipe which will provide a minimum 8-inch flashing height under the no-hub connector, may simply be extended so that a pipe wrap detail may be installed.
- C. Any vent pipe which will not provide the 8-inch flashing height due to their current low height, shall be cut within the insulation layer and extended in conjunction with the roof installation.

3.09 CLEAN-UP

- A. The Contractor shall not demobilize the site until the completed work is toured by the Owner and Designer. Any unsatisfactory items observed will be reported in "punch-list" form. These items shall be corrected immediately by the Contractor prior to demobilization from the job site.

- B. All scaffolding, barriers, temporary facilities, and the like shall be removed upon completion of the work. Areas damaged as a result of the Contractor's equipment shall be restored to their original condition, all to the satisfaction of the Owner.
- C. Refer to the Close-Out Procedures described in Division 01 for additional information.

End of Section

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