PROJECT MANUAL FOR:

VARIOUS LOCATION - ROOF REPLACEMENT

PROJECT NUMBER: CP243181

AT
UNIVERSITY OF MISSOURI – COLUMBIA
COLUMBIA, MISSOURI

FOR:

THE CURATORS OF THE UNIVERSITY OF MISSOURI

PREPARED BY:

RMT ROOFING & WATERPROOFING CONSULTANTS
410 SOVEREIGN COURT #18
PO BOX 1632
MANCHESTER, MO 63011
(636) 391-2185

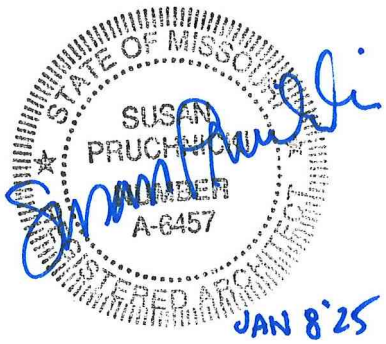
February 11, 2025

ARCHITECTURAL

The Architects seal on these contract documents has been affixed in accordance with the requirements of Chapter 327, RSMO. In affixing this seal, the Architect takes responsibility for the attached architectural specifications. The Architect hereby disclaims any and all responsibility for project specifications other than these, included in these project documents, they being the responsibility of the other design professionals, whose seals and statements appear herein.

Specification Section 02 8213 and the Hazardous Building Material Survey are technical documents that have been prepared by a qualified third party hazardous materials testing lab. The specification was not prepared under the direct supervision of the architect and therefore is not included as part of the architect's certification.

(seal) Signature: Susan Pruchnow



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END OF SECTION

PLANNING DESIGN & CONSTRUCTION

900 E. Stadium, Ste. 130
Columbia, Missouri 65211
Telephone: (573) 882-6800

ADVERTISEMENT FOR BIDS

Sealed bids for:

VARIOUS LOCATIONS –
ROOF REPLACEMENT
UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
PROJECT NUMBER: CP243181 CONSTRUCTION ESTIMATE: $577,080 - $641,200

will be received by the Curators of the University of Missouri, Owner, at Planning, Design & Construction, Room L100 (Front Reception Desk), General Services Building, University of Missouri, Columbia, Missouri 65211, until 10:30 a.m., C.T., March 12, 2025 and then immediately opened and publicly read aloud.

Drawings, specifications, and other related contract information may be obtained at http://operations-webapps.missouri.edu/pdc/adsite/ad.html. Electronic bid sets are available at no cost and may be printed as desired by the plan holders. No paper copies will be issued. If paper copies are desired, it is the responsibility of the user to print the files or have them printed.

Questions regarding the scope of work should be directed to Ryan O'Connell with RTM Roofing & Waterproofing Consultants at (636) 391-2185 or ryan@rmtroof.com. Questions regarding commercial conditions should be directed to Emily Johnson at (573) 882-1108 or johnsonemilym@missouri.edu.

A prebid meeting will be held at 2:00 p.m., C.T., March 3, 2025 in the General Services Bldg., Room 194B, followed by a site walk-through.

A Diversity Participation goal of 10% MBE, 10% WBE, DBE and Veteran; 3% SDVE has been established for this contract.

The Owner reserves the right to waive informalities in bids and to reject any and all bids.

Individuals with special needs as addressed by the Americans with Disabilities Act may contact (573) 882-6800.

Advertisement Date: February 25, 2025

UNIVERSITY OF MISSOURI
BIDDER'S STATEMENT OF QUALIFICATIONS

Submit with Bid for Lump Sum Contract in separate envelope appropriately labeled. Attach additional sheet if necessary.

1. Company Name_____

   Phone# _____ Fax #:_____

   Address _____

2. Number of years in business _____. If not under present firm name, list previous firm names and types of organization.

3. List contracts on hand (complete the following schedule, include telephone number).

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

4. General character of work performed by your company personnel.

5. List important projects completed in the last five (5) years on a type similar to the work now bid for, including approximate cost and telephone number.

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed

6. Other experience qualifying you for the work now bid.

7. No default has been made in any contract complete or incomplete except as noted below:
   (a) Number of contracts on which default was made _____
   (b) Description of defaulted contracts and reason therefor

8. (a) Have you or your company participated in any contract subject to an equal opportunity clause similar to that described in the General Conditions?
   Yes _____ No ____

   (b) Have you filed all required compliance reports?
   Yes _____ No ____

(c) Is fifty percent or more of your company owned by a minority?
Yes _____ No ____

(d) Is fifty percent or more of your company owned by a woman?
Yes _____ No ____

(e) Is fifty percent or more of your company owned by a service disabled veteran?
Yes _____ No ____

(f) Is fifty percent or more of your company owned by a veteran?
Yes _____ No ____

(g) Is your company a Disadvantaged Business Enterprise?
Yes _____ No ____

9. Have you or your company been suspended or debarred from working at any University of Missouri campus?
Yes _____ No ____ (If the answer is "yes", give details.)

_____

_____

10. Have any administrative or legal proceedings been started against you or your company alleging violation of any wage and hour regulations or laws?
Yes _____ No ____ (If the answer is "yes", give details.)

_____

_____

11. Workers Compensation Experience Modification Rates (last 3 yrs): ____/____/____

Incidence Rates (last 3 years): _____/____/_____

12. List banking references.

_____

_____

13. (a) Do you have a current confidential financial statement on file with Owner?
Yes _____ No ____ (If not, and if desired, Bidder may submit such statement with bid, in a separate sealed and labeled envelope.)

(b) If not, upon request will you file a detailed confidential financial statement within three (3) days?
Yes _____ No ____

Dated at _____ this _____ day of _____ 20____

_____
Name of Organization

_____
Signature

_____
Printed Name

_____
Title of Person Signing

END OF SECTION

SECTION 1.A

BID FOR LUMP SUM CONTRACT

Date: _____

BID OF _____
(hereinafter called "Bidder") a corporation * organized and existing under laws of the State of _____,
A partnership * consisting of _____,
An individual* trading as _____,
A joint venture* consisting of _____
_____.
*Insert Corporations(s), partnership or individual, as applicable.

TO: Curators of the University of Missouri
Planning, Design and Construction
General Services Building Room L100
University of Missouri Columbia, Missouri 65211

1. Bidder, in compliance with invitation for bids for construction work in accordance with Drawings and Specifications prepared by RMT Roofing & Waterproofing, Inc., entitled "VARIOUS LOCATION - ROOF REPLACEMENT" project number CP243181, dated February 11, 2025, having examined Contract Documents and site of proposed work, and being familiar with all conditions pertaining to construction of proposed project, including availability of materials and labor, hereby proposed to furnish all labor, materials and supplies to construct project in accordance with Contract Documents, within time set forth herein at prices stated below. Prices shall cover all expenses, including taxes not covered by the University of Missouri's tax exemption status, incurred in performing work required under Contract documents, of which this Bid is a part.

   Bidder acknowledges receipt of the following addenda:

   Addendum No. _____ Dated _____
   Addendum No. _____ Dated _____
   Addendum No. _____ Dated _____
   Addendum No. _____ Dated _____

2. In the following Bid(s), amount (s) shall be written in both words and figures. In case of discrepancy between words and figures, words shall govern.

3. BID PRICING

a. Base Bid:
The Bidder agrees to furnish all labor, materials, tools, and equipment required to replace the roof at Mizzou Athletic Training Complex; all as indicated on the Drawings and described in these Specifications for a sum of:

_____
_____DOLLARS ($ _____).

AND/OR

b. The Bidder agrees to furnish all labor, materials, tools, and equipment required to replace the at 417 S. 5th; all as indicated on the Drawings and described in these Specifications for a sum of:

_____
_____DOLLARS ($ _____).

OR

c. The Bidder agrees to furnish all labor, materials, tools, and equipment required to replace the roofs at Mizzou Athletic Training Complex and 417 S. 5th; all as indicated on the Drawings and described in these Specifications for a sum of:

_____
_____DOLLARS ($ _____).

4. PROJECT COMPLETION

a. Contract Period – Contract period begins on the day the Contractor receives unsigned Contract, Performance Bond, Payment Bond, and "Instructions for Execution of Contract, Bonds, and Insurance Certificates." Bidder agrees to complete project within sixty (60) calendar days from receipt of aforementioned documents. Fifteen (15) calendar days have been allocated in construction schedule for receiving aforementioned document from Bidder.

b. Commencement – Contractor agrees to commence work on this project after the "Notice to Proceed" is issued by the Owner. "Notice to Proceed" will be issued within seven (7) calendar days after the Owner receives properly prepared and executed Contract documents listed in paragraph 4.a. above.

5. SUPPLIER DIVERSITY PARTICIPATION GOALS

a. The Contractor shall have as a goal, subcontracting with Minority Business Enterprise (MBE), of ten (10%) and with Women Business Enterprise (WBE), Disadvantage Business Enterprise (DBE), and/or Veteran Owned Business Enterprise, of ten percent (10%), and with Service-Disable Veteran Owned Business (SDVE) of three percent (3%) of awarded contract price for work to be performed.

b. Request for waiver of this goal shall be submitted on the attached Application For Waivers form. A determination by the Director of Facilities Planning & Development, UM, that a good faith effort has not been made by Contractor to achieve above stated goal may result in rejection of bid.

c. The Undersigned proposed to perform work with following Supplier Diversity participation level:

MBE PERCENTAGE PARTICIPATION:
_____ percent (_____%)

WBE, DBE, and/or VETERAN PERCENTAGE PARTICIPATION
_____ percent (_____%)

SDVE PERCENTAGE PARTICIPATION:
_____ percent (_____%)

d. A Supplier Diversity Compliance Evaluation form shall be submitted with this bid for each diverse subcontractor to be used on this project.

7. BIDDER'S ACKNOWLEDGEMENTS

a. Bidder declares that he has had an opportunity to examine the site of the work and he has examined Contract Documents therefore; that he has carefully prepared his bid upon the basis thereof; that he has carefully examined and checked bid, materials, equipment and labor required thereunder, cost thereof, and his figures therefore. Bidder hereby states that amount, or amounts, set forth in bid is, or are, correct and that no mistake or error has occurred in bid or in Bidder's computations upon which this bid is based. Bidder agrees that he will make no claim for reformation, modifications, revisions or correction of bid after scheduled closing time for receipt of bids.

b. Bidder agrees that bid shall not be withdrawn for a period of ninety (90) days after scheduled closing time for receipt of bids.

c. Bidder understands that Owner reserves the right to reject any or all bids and to waive any informalities in bidding.

d. Accompanying the bid is a bid bond, or a certified check, or a cashier's check payable without condition to "The Curators of the University of Missouri" which is an amount at least equal to five percent (5%) of amount of largest possible total bid herein submitted, including consideration of Alternates.

e. Accompanying the bid is a Bidder's Statement of Qualifications. Failure of Bidder to submit the Bidder's Statement of Qualifications with the bid may cause the bid to be rejected. Owner does not maintain Bidder's Statements of Qualifications on file.

f. It is understood and agreed that bid security of two (2) lowest and responsive Bidders will be retained until Contract has been executed and an acceptable Performance Bond and Payment Bond has been furnished. It is understood and agreed that if the bid is accepted and the undersigned fails to execute the Contract and furnish acceptable Performance/Payment Bond as required by Contract Documents, accompanying bid security will be realized upon or retained by Owner. Otherwise, the bid security will be returned to the undersigned.

8. BIDDER'S CERTIFICATE

Bidder hereby certifies:

a. His bid is genuine and is not made in interest of or on behalf of any undisclosed person, firm or corporation, and is not submitted in conformity with any agreement or rules or any group, association or corporation.

b. He has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.

c. He has not solicited or induced any person, firm or corporation to refrain from bidding.

d. He has not sought by collusion or otherwise to obtain for himself any advantage over any other Bidder or over Owner.

e. He will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin in connection with performance of work.

f. By virtue of policy of the Board of Curators, and by virtue of statutory authority, a preference will be given to materials, products, supplies, provisions and all other articles produced, manufactured, mined or grown within the State of Missouri. By virtue of policy of the Board of Curators, preference will also be given to all Missouri firms, corporations, or individuals, all as more fully set forth in "Information For Bidders."

END OF BIDDER'S CERTIFICATE

9. BIDDER'S SIGNATURE

Note: All signatures shall be original; not copies, photocopies, stamped, etc.

Authorized Signature	Date
Printed Name	Title
Company Name	
Mailing Address	
City, State, Zip	
Phone No.	Federal Employer ID No.
Fax No.	E-Mail Address
Circle one: Individual Partnership Corporation Joint Venture	
If a corporation, incorporated under the laws of the State of_____	
Licensed to do business in the State of Missouri? ____yes _____no	

(Each Bidder shall complete bid form by manually signing on the proper signature line above and supplying required information called for in connection with the signature. Information is necessary for proper preparation of the Contract, Performance Bond and Payment Bond. Each Bidder shall supply information called for in accompanying "Bidder's Statement of Qualifications.")

END OF SECTION

SECTION 1.E

SPECIAL CONDITIONS

1. DEFINITIONS

a. "Drawings"

Drawings referred to in and accompany Project Manual consist of Drawings prepared by and bearing the name of the below defined Architect, bearing Date of February 11, 2025, entitled "VARIOUS LOCATION - ROOF REPLACEMENT", project number CP243181.

b. Bond Architects, Inc
222 South Central Avenue
Suite 501
St. Louis, MO 63105
(314) 863-4994

c. RMT Roofing & Waterproofing Consultants, Inc
410 Sovereign Ct. Suite 18
Manchester, MO 63011
Ryan O'Connell
(314)391-2185

2. SPECIAL SCHEDULING REQUIREMENTS

a. Contractor shall perform all work in the designated areas during regular working hours, which are **7** a.m. to 4 p.m., Monday through Friday.

Contractor to start at Mizzou Athletic Training Complex (MATC) as priority with a construction start within ten [ten] days of the start of the Contract Period.

3. SCOPE OF WORK

a. The Contractor shall furnish all labor, materials, tools, equipment necessary for, and incidental to, construction of this project as indicated on the Drawings and specified herein.

b. Work shall include everything requisite and necessary to finish work properly, notwithstanding that every item of labor or materials or accessories required to make project complete may not be specifically mentioned.

c. General Description of Work:

(1) **Energy Management:**
The project consists of: replacing 2 roof areas referred to as roof area's 1 and roof area 2. The existing roof systems will be removed down to structural deck followed by the installation of new insulation, a roof coverboard and new EPDM roofing membrane with a 20-year manufactures warranty.

Installation of a new safety rail system at a roof vent will be included followed by a new OSHA approved stairway to access the roof level 2. Installation of new sheet metal components will be included with the installation of the roof system. An approved walkway system will be installed at the completion of the project. Adjacent roof areas will be protected through the course of the roof replacement project.

(2) **Missouri Athletic Training Complex:**
The project consists of replacing 5 roof areas referred to as roof area's 9, 13, 14A, 14 B and18. The existing roof systems will be removed down to structural deck followed by the installation of new gypsum substrate, a vapor barrier, insulation, a roof coverboard and new EPDM roofing membrane with a 20-year manufactures warranty.

Installation of a new OSHA approved stairway to access an adjacent roof from roof 9. Installation of an OSHA approved ladder from roof section 9 onto roof section 12 will be required. The installation of new sheet metal components will be included with the installation of the roof system. An approved walkway system will be installed at the completion of the project. Adjacent roof areas will be protected through the course of the roof replacement project.

4. LOCATION

a. Work shall be performed under this Contract on the campus of the University of Missouri – Columbia, Mizzou Athletic Training Complex (MATC), 2-198 E. Stadium Blvd, Columbia, MO 65203 and Energy Management, 417 S. Fifth St, Columbia, MO 65211.

5. NUMBER OF CONSTRUCTION DOCUMENTS

a. The Owner’s Representative will furnish the Contractor a copy of the executed Contract and a complete set of Drawings and Specifications in PDF format.

b. The contractor may obtain printed sets from the architect at cost of reproduction.

c. The Owner will furnish explanatory and changed Drawings to the Contractor in PDF format as issued during project.

d. The Owner will provide electronic data files to the Contractor for their convenience and use in progressing the Work and the preparation of shop drawings or other submittal requirements required for construction of the reference project. The

electronic data files shall reflect Construction Documents and Bid Addenda only. These files will be transmitted subject to the following terms and conditions:

(1) The Owner makes no representation as to the compatibility of these files with the Contractor's hardware or software.

(2) Data contained on these electronic files shall not be used by the Contractor or anyone else for any purpose other than as a convenience in progressing the Work or in the preparation of shop drawings or other required submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at their own sole risk and without liability or legal exposure to Owner. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Owner and its consultants, contractors, agents, employees, and representatives that may arise out of or in connection with the use of the electronic files transmitted.

(3) Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless the Owner and its consultants, contractors, agents, employees, and representatives, against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

(4) These electronic files are not contract documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. The Owner makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by the Consultant and the electronic files, the signed and sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents.

(5) Because information presented on the electronic files can be modified, unintentionally or otherwise, the Owner reserves the right to remove all indications of ownership and/or involvement from each electronic display.

(6) Under no circumstances shall delivery of the electronic files be deemed a sale by the Owner and no warranties are made, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Owner be liable for any loss of profit, or any consequential damages as a result of use or reuse of these electronic files.

6. SUBMITTALS

a. The Contractor shall submit for approval to the Architect, equipment lists and Shop Drawings, as expediently as possible. Failure of the Contractor to submit Shop Drawings in a timely manner will result in the Owner holding back Contractor payments. (See General Conditions)

b. The material and equipment lists shall be submitted and approved before any material or equipment is purchased and shall be corrected to as-built conditions before the completion of the project.

c. The Contractor shall submit electronic versions of all required Shop Drawings, material and equipment lists. The Contractor shall upload all Shop Drawings to a secure information sharing website determined by the Owner notifying the Owner and Consultant that these shop drawings are available for review. Each submittal shall have the General Contractors digital stamp affixed to the first page signifying their review and acceptance. Review comments, approvals, and rejections will be posted on this same site with notification to the contractor. Submittals requiring a professional seal shall be submitted hard copy with a manual seal affixed.

(1) The Contractor shall identify each submittal item with the following:
   (a) Project Title and Locations
   (b) Project Number
   (c) Supplier's Name
   (d) Manufacturer's Name
   (e) Contract Specification Section and Article Number
   (f) Contract Drawing Number
   (g) Acrobat File Name: Spec Section_Times Submitted_Spec Title: 033000_01-Cast in Place Concrete.pdf

(2) Reference the accompanying Shop Drawing and Submittal Log at the end of this section (1.E.4) for the required submittal information.

d. The Contractor shall submit to the Architect four (4) bound copies of all required Operating Instructions and Service Manuals for the Architect's and the Owner's sole use prior to completing 50% of the adjusted contract. Payments beyond 50% of the contract amount may be withheld until all Operating Instructions and Service Manuals are received as referenced in the accompanying Operating Instructions and Service Manual Log at the end of this section (1.E.5).

e. The Contractor shall submit to the Owner's Representative all items referenced in the accompanying Closeout Log (1.E.6) within 30 days following substantial completion of the work. The Owner's Representative will maintain the closeout log and include as an agenda item at all coordination meetings.

7. USE OF PREMISES

a. Access: Access to construction site shall be as indicated on the drawings and as directed by the Owner's Representative.

b. Parking:

(1) The Owner will issue Contractor two (2) service vehicle parking permits for use in University Parking. The permits will be issued at no cost to the contractor up to the contract completion date. After the contract completion date, the permits will be re-issued on an as available basis at the contractor's expense. These permits are to be used for general contractor or subcontractor owned and labeled vehicles only. Personal vehicles are prohibited from use of these permits. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

(2) Parking of personal vehicles within project access/lay down/staging areas is prohibited. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

(3) Parking or driving on sidewalks, landscaped areas, within fire and service lanes or generally in areas not designated for vehicular traffic is prohibited except as allowed in the contract documents. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.

(4) Sidewalk(s) and Hardscape – Parking/driving on hardscapes is strictly prohibited unless specifically directed by the Owner's Representative through the MU sidewalk permitting process. Restricted use permits will be limited to activities that are constrained by an absolute need to access from a sidewalk. Such activities shall be considered the exception and not the norm. Adequate signage, fencing and alternate routes must be provided in the immediate and adjacent areas.

(5) Free parking for contractor employees is available in the Ashland Road Contractor lot on an as available basis. This space is for use by contractor employees for parking their personal vehicles only and is not to be used for staging or storage.

(6) Vendor Permits may be purchased by contractor management personnel on an as available basis by contacting the Parking and Transportation office in the General Services Building. These permits will allow contractor management personnel to park in various University lots while conducting business on University construction projects.

(7) Temporary University parking permits may be purchased by contractor employees for use with their personal vehicles on an as available basis by contacting the Parking and Transportation office in the General Services Building.

(8) Conley Avenue between Missouri Avenue and University Avenue and Hitt Street between University Avenue and the Memorial Union are designated for pedestrian use only during the work week between the hours of 8:15 AM and 3:45 PM. Unless otherwise indicated in the contract documents, this area is strictly off limits to vehicular traffic without authorization from the Owner's Representative.

c. Storage of materials: The Contractor shall store all materials within project limits. The Contractor shall confine apparatus, materials, and operation of workers to location established by the Owner's Representative. The Contractor shall not unreasonably encumber premises with materials. In addition, storage trailer locations may be available within 1-1/2 miles of the project site as directed by the Owner's Representative. Storage trailer locations shall be subject to approval by the Owner's Representative and are available to the Contractor without cost.

d. Restroom: The Contractor shall provide and maintain, in a sanitary condition, chemical type portable toilet facilities at work site for use by his personnel. Toilets and toilet location shall be subject to approval by the Owner's Representative.

e. Smoking is prohibited at the University of Missouri and all properties owned, operated, leased or controlled by the University of Missouri. Violation of the policy is defined as the use of any tobacco or marijuana products, including e-cigarettes, cigarettes, and vaping.

f. Care of Project Work Site: The contractor shall be responsible for maintaining the construction site in a reasonably neat and orderly condition by regular cleaning and mowing of the premises as determined by the Owner's Representative.

g. Artifacts Found During Construction: Contractor shall immediately notify the Owner's Representative when artifacts are uncovered or found during the demolition or construction process. Artifacts include, but are not limited to, tools, drawings (construction or other), photographs, books and other objects/devices which may hold historical importance/significance. Do not remove or disturb the object(s) in question. Artifacts are not considered part of demolished materials and shall remain the property of the University of Missouri.

8. PROTECTION OF OWNER'S PROPERTY

a. The Contractor shall be responsible for repair of damage to building exterior and interior, drives, curbs, streets, walks, grass, shrubbery and trees, which was caused by workmen or equipment employed during progress of work. All such repairs

shall be made to satisfaction of the Owner's Representative, at no cost to the Owner, or reimburse the Owner if the Owner elects to make repairs. For landscape damage, the Owners shall make such repairs. Compensation for these repairs shall be determined by the Owner's Representative using the "Valuation of Landscape Trees, Shrubs, and other Plants" as published by the International Society of Arboriculture, as last revised.

b. Construction Project Fencing:

(1) Fencing requirements, as indicated on Drawings and/or described in Specifications and where necessary to protect public and Owner's property shall be constructed of woven wire or plastic woven fencing not less than five (5) feet in height and supported by metal tee posts anchored securely in ground at not more than ten (10) foot intervals.

(2) Using existing landmarks, lamp posts, trees or other Owner property for support of fencing is strictly prohibited unless a written waiver is obtained from Owner's Representative.

(3) Use of ribbon, snow fence, chicken wire, rope, and wooden barricades as fencing is prohibited.

(4) Fencing shall be maintained in an "as-installed" condition throughout the life of the project.

(5) The Contractor may use used fencing provided it is in good condition and is satisfactory to the Owner's Representative.

9. SUBSTITUTIONS AND EQUALS

a. Substitutions are defined in general conditions Article 3 point 11.84 and equals are defined in general conditions article 3.12.

b. Substitutions and/or Equals of the item(s) listed below will be allowed only prior to receipt of bids provided that a written request for approval has been received by both the Architect and the Owner at least ten calendar days prior to the date for receipt of Bids. All other substitution and/or Equals items shall follow the procedures set forth in the General Conditions.

To be considered, bidder's proposal shall include a complete description of the proposed substitution and/or equal and a comparison of significant qualities of the proposed substitution and/or equal with those specified including drawings, performance and test data, and other information necessary for an evaluation. The Architect's decision on the approval or disapproval of a proposed substitution and/or equal shall be final.

10. CODES AND STANDARDS

a. The Contractor shall comply with applicable codes and standards as listed in the General Conditions. The following codes and standards shall also apply:

12. PERMITS

a. The Owner will secure and pay for specific necessary approvals, easements, assessments, and charges required for construction, use or occupancy of permanent structures, or for permanent changes in existing facilities except as noted in Article 3.2 of the General Conditions.

13. SPECIALTIES

a. Scaffolding or stairs towers will be erected/used to provide roof access as per drawings.

b. Staging area locations are as per drawings.

c. MATC - Contractor is responsible for opening and locking the security gate daily and placing cones in front of gate during work hours. Gate to be locked after entry and after departure for the day.

d. Energy Management - No vehicles are allowed to drive over the truck scale. Scale location as per drawings.

e. Energy Management – Contractors to complete pre-job safety orientation prior to the start of the project.

14. PRE-BID INSPECTION

a. All pre-bid inspections of work areas shall be scheduled with pre-bid inspection guide, telephone. Emily Johnson, Project Manager, (573) 882-6800.

15. ROOF CERTIFICATION AND WARRANTY REQUIREMENT

a. The Contractor shall submit a copy of the University of Missouri Roof System Manufacturer's Certification for each proposed roofing system, within two business days following receipt of bids by the Owner. The Certification shall be submitted to the Owner and the Architect of Record and shall be manually signed by an authorized representative of Manufacturer of each proposed roofing system. Certification shall have original signature.

b. The Contractor shall submit a sample copy of the Roof Manufacturer's Warranty for each proposed roofing system, within two (2) business days following receipt of bids by the Owner, clearly labeled as "SAMPLE". The sample warranty(s) shall be submitted to the Owner and the Architect of Record.

c. The Owner and Architect of Record will review both documents for compliance with the Contract Documents and will notify the Contractor with required modifications.

d. Within two weeks following final inspection and acceptance of the roofing system(s) by the Owner and the roofing system manufacturer(s), the Contractor shall submit a manually signed standard warranty agreement, in the same form as the sample, provided and executed by the roofing system manufacturer for each roofing system provided. Standard warranty agreement(s) shall be of the duration specified in Division 7.

e. University of Missouri three (3) year Contractor's Roofing/Flashing/Sheetmetal Guarantee shall be signed by the roofing contractor after final inspection and acceptance of each roofing system by Manufacturer and by Owner.

16. MODIFICATIONS TO INFORMATION TO BIDDERS

a. Information to Bidders:

(1) Referenced Information to Bidders, Page IFB/6.
Add new Article 15.9.2 as follows:

15.9.2.1 Within 48 hours of the receipt of bids, the apparent low bidder shall submit to the Director of Facilities Planning and Development an "Affidavit of Supplier Diversity Participation" for every diverse subcontractor or supplier the bidder intends to award work to on the contract. The affidavit will be signed by both the bidder and the diverse firm.

17. MODIFICATION TO INFORMATION FOR BIDDERS: BIDDERS STATEMENT OF QUALIFICATIONS

a. Information For Bidders

(1) Reference: Information for Bidders, Article 8.4

Add new Article 8.4 to read as follows:

In addition to the Bidder's Statement of Qualifications, the Bidder must also submit evidence and meet the following qualifications:
The project requires the services of a prime contractor who has demonstrated success in completing process/power plant work in an operating plant environment with little or now interruption of plant operations.

(a) MINIMUM QUALIFICATIONS

(i) The schedule for the project is aggressive and requires a contractor with a successful track record of managing projects with average monthly expenditures of more than $1 million

(ii) Successful completion of one project of similar type and scope.

(iii) Successful completion of at least three projects of $15 million or greater value. Submit references for the three most recent projects over $15 million in value.

(iv) Successful and sustained track record of effectively utilizing project/schedule management software for at least the last two years.

(b) QUALIFICATION SUBMITTALS

(i) Submitted qualification packages should include the following information:

- Project and Schedule
  - Management Experience managing project with equal or greater schedule demands.
  - Demonstrated and consistent on-time completion success
- Project Organization / Personnel
  - Key project team members and their resume
  - Project team roles and responsibilities of team members
  - Reporting/accountability procedures
  - Quality control program and procedures
- Organizational Support
  - Home office support
  - Labor and subcontractor relations
  - Submittal processing procedures
  - Material ordering/tracking/delivery procedures
  - Cost accounting support
  - Financial stability/capacity
  - Record of mentoring and supporting Supplier Diversity Subcontractor Participation

(ii) Packages must include the following items:

- Corporate Organizational Charts
- Project Organizational Charts

- Summary of Similar Projects
- Client References
- Resumes – resumes for each key individual proposed for the project, include position in the firm, project responsibility, education, license or registration and relevant experience over the last five years.
- Financial Statements and/or Evidence of Bonding Capacity
- Sample progress reports and schedules
- Brief narratives indicating how the Contractor intends to manage this project, including subcontractors.

(c) QUALIFICATION PROCEDURE

(i) All qualification information and supporting materials must be submitted with your bid. Following the bid date, the Owner reserves the right to request additional information material to evaluate qualifications. Failure of the Contractor to demonstrate their ability to comply with these qualifications may be grounds for the Owner not recommending aware of the Contract.

18. PROJECT SCHEDULING

a. Contractor Schedule – Contractor is responsible for the schedule, that may be provided with in-house personnel or hired a third-party scheduling consultant. See Contractor Schedule Requirements included in these documents.

b. Contractor Schedule Requirements

(1) GENERAL

(a) Time is of the essence for this contract. The time frames spelled out in this contract are essential to the success of this project. The University understands that effective schedule management, in accordance with the General Conditions and these Special Conditions is necessary to insure to that the critical milestone and end dates spelled out in the contract are achieved.

(b) Related Documents

(i) Drawings and general provisions of the Contract, including General Conditions' Article 3.18 shall apply to this Section.

(c) Stakeholders

(i) A Stake holder is anyone with a stake in the outcome of the Project, including the University, the University Department utilizing the facility, the Design Professionals, the Contractor and Subcontractor(s).

(d) Weather

(i) Contractor acknowledges that there will be days in which work cannot be completed on weather sensitive activities, due to the weather, and that a certain number of these lost days are to be expected under normal weather conditions in Missouri.

(ii) Rather than speculate as to what comprises "normal" weather at the location of the project, Contractor agrees that it will assume a total of 44 lost days, on weather sensitive activities of critical path work, due to weather over the course of a calendar year and include same in its as planned schedule. For projects of less than a calendar year, lost weather days should be prorated for the months of construction in accordance with the following schedule.

(iii) Anticipated weather days for allocation/proration only. For projects lasting 12 months or longer, the 44 days per year plus whatever additional months are included will constitute normal weather.

Jan – 5 days	Feb – 5 days	Mar – 4 days	Apr – 4 days
May – 3 days	Jun – 3 days	Jul – 2 days	Aug – 2 days
Sep – 3 days	Oct – 4 days	Nov – 4 days	Dec – 5 days

(iv) The Contractor shall notify the Owner's Representative via email on the same day a lost weather day occurs and shall maintain a log of weather days to be included in the Narrative described in 2.3.4 herein.

(2) SCHEDULING PROCESS

(a) The intent of this section is to ensure that a well-conceived plan, that addresses the milestone and completion dates spelled out in these documents, is developed with input from all stakeholders in the project. Input is limited to all reasonable requests that are consistent with the requirements of the contract documents, and do not prejudice the Contractor's ability to perform its work consistent with the contract documents. Further, the plan must be documented in an

understandable format that allows for each stakeholder in the project to understand the plan for the construction and/or renovation contained in the Project.

(b) Contractor Requirements

(i) Schedule Development

Contractor shall prepare the Project Schedule using the latest version of Phoenix Project Management scheduling software or other software as approved by the Owner's Representative prior to receipt of bids.

Contractor shall review each major subcontractor's schedule with the sub and obtain the subcontractor's concurrence with the schedule, prior to submitting to the University.

(ii) Schedule Updates

1. Schedule Updates will be conducted once a month, at a minimum. Actual Start and Finish dates should be recorded regularly during the month. Remaining Duration shall be updated as of the data date, just prior to Contractor's submittal of the updated data.

2. Contractor will copy the previous months schedule and will input update information into the new monthly update version.

3. Contractor will meet with the Owner's Representative to review the draft of the updated schedule. At this meeting, Owner's Representative and Contractor will:

(a) Review out of sequence progress, making adjustments as necessary.

(b) Add any fragnets necessary to describe changes or other impacts to the project schedule and

(c) Review the resultant critical and near critical paths to determine any impact of the occurrences encountered over the last month.

(b) Schedule Narrative

After finalization of the update, the Contractor will prepare a Narrative that describes progress for the month, impacts to the schedule and an assessment as to the Contractor's entitlement to a time extension for occurrences beyond its control during the month and submit in accordance with this Section.

(c) Progress Meetings

(i) Review the updated schedule at each monthly progress meeting. Payments to the Contractor may be suspended if the progress schedule is not adequately updated to reflect actual conditions.

(ii) Submit progress schedules to subcontractors to permit coordinating their progress schedules to the general construction work. Include four (4) weeks look ahead schedules to allow subs to focus on critical upcoming work.

(3) CRITICAL PATH METHOD (CPM)

(a) This Section includes administrative and procedural requirements for the critical pay method (CPM) of scheduling and reporting progress of the Work.

(b) Refer to the General and Special Conditions and the Agreement for definitions and specific dates of Contract Time.

(c) Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.

(d) Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.

(e) Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.

(f) Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling, the construction project. Activities included in a construction schedule consume time and resources.

(g) Critical activities are activities on the critical path.

(h) Predecessor activity is an activity that must be completed before a given activity can be started.

(i) Milestone: A key or critical point in time for reference or measurement.

(j) Float or Slack Time: The measure of leeway in activity performance. Accumulative float time is not for the exclusive use or benefit of the Owner or Contractor but is a project resource available to both parties as needed to meet contract milestones and the completion date.

(k) Total float is herein defined as the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

(l) Weather: Adverse weather that is normal for the area must be taken into account in the Contractor's Project Schedule. See 1.(d)(iii), above.

(m) Force Majeure Event: Any event that delays the project but is beyond the control and/or contractual responsibility of either party.

(n) Schedule shall include the following, in addition to Contractor's work.

(i) Phasing: Provide activity codes in the schedule to show how the sequence of the Work is affected by the following:

1. Requirements for phased completion and milestone dates.
2. Work by separate contractors.
3. Work by the Owner
4. Coordination with existing construction.
5. Limitations of continued occupancies.
6. Uninterruptible services.
7. Partial occupancy prior to Substantial Completion.
8. Area Separations: Use Activity Codes to identify each major area of construction for each major portion of the Work. For the purposed of the Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.
9. Required delivery dates for Owner furnished equipment, if applicable
10. Post substantial completion activities and closeout

11. Floor or Level: Use separate activity codes to identify each floor or level.
12. Subcontractor: Use Activity Codes to identify each subcontractor's work activities.
13. Type Work or Craft: Use Activity Codes to identify the type of work, or craft that will execute each activity.

(4) TIME EXTENSION REQUEST

(a) Refer to General Conditions of the Contract for Construction, Article 4.7 Claims for Additional Time.

(b) Changes or Other Impacts to the Contractor's Work Plan. The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment. The Update must include:

(i) An activity depicting the event(s) impacting the Contractors work plan shall be added to the CPM schedule, using the actual start date of the impact, along with actually required predecessors and successors.

(ii) After the addition of the impact activity(ies), the Contractor will identify subsequent activities on the critical path, with finish to start relationships that can be realistically adjusted to overlap using good, standard construction practice.

1. If the adjustments above result in a completion date beyond the contract completion date, the delay shall be deemed excusable, and the contract completion date shall be extended by the number of days indicated by the analysis.
2. Contractor agrees to continue to utilize its best efforts to make up the time caused by the delays. However, the Contractor is not expected to expend costs not contemplated in its contract, in making those efforts.

(c) Questions of compensability of any delays shall be held until the actual completion of the project. If the actual substantial completion date of the project based on excusable delays, excluding allocated weather delays, exceeds the original contract completion date, AND there are no delays that are the responsibility of the contractor to consider, the delays days may be considered for equitable

adjustment. In review of time extension requests for compensable days, the Owner will consider the actual number of weather days incurred.

(d) Home office expenditures and staff are NOT compensable.

19. GENERAL REQUIREMENTS FOR CRANE AND HOISTING OPERATIONS

a. All crane and hoisting operations shall be performed in compliance with OSHA 29 CFR 1926. All Operators, riggers, and signal persons must have the proper qualifications and training necessary to perform the intended hoisting activities for this project.

b. Only fully certified and evaluated Operators shall perform equipment operations. Operators in an "Operator in Training" status shall not be used.

c. Submittal requirements:

(1) Submit copies of Operator certifications, licenses, and evaluations to the Owners Representative.

(2) Submit Rigger and Signal Person qualifications to the Owners Representative.

(3) Unless otherwise directed by the Owners Representative, submit a lift plan and conduct a lift coordination meeting for hoisting or crane operations for any lift greater than 2,000 pounds, or for any multi pick lift. Include protective measures for existing underground utilities, occupied buildings, pedestrian and vehicle pathways, adjacent buildings and overhead power lines. If the lift is to occur over an occupied building, provide a registered structural engineer's review and verification that the building can resist the impact of a dropped load for the intended lift. If evacuation of an occupied building is necessary to conduct the lift, the decision for building evacuation or scheduling the lift for off-hours will be determined by the Owner.

20. CONSTRUCTION WASTE MANAGEMENT

a. The goal of Construction Waste Management is to divert waste from the sanitary landfill. This shall be accomplished through reuse, recycling and/or salvage of non-hazardous construction and demolition debris to the greatest extent practical. Track and report all efforts related to reuse, recycling and/or salvage materials from the project (including clean fill material). Report all material types and weights, where material was diverted, type of diversion, documentation of diversion (waste or recycling tickets), and applicable dates. In order to calculate the diversion percentage, total wights of all non-hazardous landfill material must be reported. This information shall be updated monthly utilizing the Construction Waste Management Worksheet. Copies of all applicable receipts, tickets and tracking logs

shall be uploaded to the Owner's information sharing website or reported as required by the Construction Project Manager.

b. A summary worksheet is required prior to substantial completion.

21. WARRANTY WALKTHROUGH

a. Contractor shall attend a walk-thru with the Owner at eleven (11) months after acceptance to review and document any warranty items to be addressed as part of the twelve (12) month warranty stated in article 3.1 of the General Conditions.

END OF SECTION

SECTION 1.E.1

UNIVERSITY OF MISSOURI
ROOF SYSTEM MANUFACTURER CERTIFICATION
(Revised 06/24)

TO: _____

Title: VARIOUS LOCATION - ROOF REPLACEMENT
Project No. CP243181
Locations: 2-198 E. Stadium Blvd, Columbia, MO 65203 and 417 Fifth St., Columbia, MO 65211

Our technical staff has examined the Architect/Engineer's Drawings, Specifications and required warranty for the roofing work on this project. We do not wholly endorse the building design or any materials or services not part of our advertised roofing system.

CERTIFICATION

We hereby certify that:

1. All materials we will furnish and deliver to the project shall be of good merchantable quality, shall meet or exceed the Specifications required and shall, if properly applied by one of our approved roofing applicator firms in accord with our instructions, provide a sound weather/watertight roofing system.
2. Upon completion of the installation in accord with the Drawings and specifications and our recommended installation procedures, we shall issue a total system warranty specified in the project Specifications.
3. The Drawings and Specifications follow the recommendations of our roofing manual for this type of roofing system with:

   No exceptions.

   The following exceptions: (The roofing system will be approved for this project if the following changes are made to the Contract Documents. The bid provided with this Document includes the required changes).

   NOTE: Exceptions may cause Owner to reject bid.
   Exceptions are as follows:

_____
_____
_____
_____

4. The Warranty will be issued for the following proposed roofing system:

_____
_____
_____

ROOFING SYSTEM MANUFACTURER: _____

Authorized Signature: _____

Title: _____ Date _____

Telephone Number: ( )

Fax Number: ( ) _____

SECTION 1.E.2

UNIVERSITY OF MISSOURI
CONTRACTOR'S ROOFING/FLASHING/SHEET METAL GUARANTEE
(Revised 06/24)

WHEREAS (NAME AND ADDRESS OF COMPANY) _____
herein referred to as Roofing Contractor, certify that they have furnished and installed all roofing, flashing, sheet metal and related components in accordance with the Contract Documents and as required by the Roofing System Manufacturer=s installation instructions on the facility described below:

Facility: _____

Owner: University of Missouri-(CAMPUS)
2-198 E. Stadium Blvd, Columbia, MO 65203 and 417 Fifth St., Columbia, MO 65211

Date of Full Completion: _____

Approximate Area of Roof: _____

Type of Roofing Material: _____

Manufacturer's Specification Number: _____

Thickness and Type of Roof Insulation: _____

NOW, THEREFORE, Roofing Contractor guaranties to the Owner, subject only to the exclusions stated hereinafter, that all roofing, flashing and sheetmetal work is fully and integrally watertight and is free from faults and defects in material or workmanship, and is guaranteed for a period of three (3) years from date of full completion of work.

EXCLUSIONS: This guarantee does not cover, and Roofing Contractor shall not be liable for the following:

1. Damage to the roofing system caused by fire, lightning, tornado, hurricane or hailstorm.

2. Damage to roofing system caused by significant settlement, distortion or failure of roof deck, walls, or foundations of building, excepting normal building expansion and contraction is not a part of this exclusion.

3. Abuse by the Owner and/or third parties.

REPAIRS: Owner shall promptly notify Roofing Contractor, in writing, of the need for repair of roofing, flashing, or sheet metal:

1. Roofing Contractor, within eight (8) hours after receipt of such notice, shall make emergency repairs at its expense, as required to render the facility watertight.

2. Within five (5) days after receipt of such notice, Roofing Contractor shall at its expense correct any faults or defects in material or workmanship.

3. Should needed repairs not be covered by this guarantee, Roofing Contractor, after having obtained Owner's written consent, shall make such repairs at Owner's expense. Following said repairs, this guarantee shall thereafter remain in effect for the unexpired portion of the original term. If Owner does not so consent or repairs are made by others than the Roofing Contractor, this guarantee shall terminate for those parts of the roof affected by the repair.

4. In the event that Owner has notified the Roofing Contractor of the need for repairs and (i) Roofing Contractor does not immediately make repairs, or (ii) Roofing Contractor disclaims responsibility for the repairs and Owner disagrees, or (iii) Owner considers Roofing Contractor=s quoted cost for repairs not covered by this guarantee to be unreasonable and, an emergency condition exists which requires prompt repair to avoid substantial damage or loss to Owner, then, Owner may make such temporary repairs as he finds necessary and such action shall not be a breach of the provisions of this guarantee.

ANNUAL INSPECTIONS: Roofing Contractor shall inspect roof installation prior to each of the three anniversary dates from date of full completion of the work.

1. Inspection team to include Roofing Contractor, Roof Manufacturer, and Owner=s Representative.

2. Inspection of total roof system will be included in the annual inspections.

3. All defects in total roof system will be corrected by the Roofing Contractor within 30 days of inspection.

4. Roof manufacturer will certify by a written report that roof inspection has been completed, defects are acknowledged, and will warrant any repairs.

5. All corrective work completed by Roofing Contractor shall be warranted as approved by the Roofing Manufacturer.

ROOF MODIFICATION: Should Owner require work to be done on roof of said facility including modifications, alternations, extensions or additions to roof and including installation of vents, platforms, equipment, bracings or fastenings, Owner shall notify Roofing Contractor and give Roofing Contractor an opportunity to make recommendations as to methods necessary to safeguard against damage to roofing covered by this guarantee. Failure of Owner to give Roofing Contractor such opportunity or failure to follow methods recommended by Roofing Contractor shall render this guarantee null and void to the extent such failure should result in damage to roofing covered by this guarantee.

NOTICES: Notification of Roofing Contractor by Owner, shall be fulfilled by sending notice to Roofing Contractor.

IN WITNESS WHEREOF, we set our hands this _____ day of _____, 20___.

By:_____

Title:_____

For Roofing Contractor

Name:_____

Address:_____

Phone:_____

SECTION 1.E.3

SHOP DRAWING AND SUBMITTAL LOG

Project: VARIOUS LOCATION - ROOF REPLACEMENT
Project Number: CP243181
Contractor:

Section	***Description***	***Contractor***	***Date Received***	***Date Returned***	***Comments***
03 1000	Concrete Forms and Accessories				
03 2000	Concrete Reinforcement				
05 3150	Steel Deck Repair – Replacement				
06 150	Wood Decking and Lumber				
06 1000	Carpentry Work				
07 540.2	MATC (EPDM)				
07 540.3	Energy Management (EPDM)				
07 5900	Preparation of Reroofing – Product Data				
07 6000	Sheet Metal Flashing and Trim – Shop Drawings				
07 7000	Non-Penetrating Rooftop Pipe and Duct Supply				
07 7200	Roof Accessories – Product Data				
07 9000	Joint Sealers				
26 4113	Lightning Protection for Structures				

SECTION 1.E.4

OPERATING INSTRUCTIONS AND SERVICE MANUAL LOG

Project: VARIOUS LOCATION - ROOF REPLACEMENT
Project Number: CP243181
Contractor:

Section	Description	Catalog Data	Wiring Diagrams	Installation Instructions	Service & Maintenance Instructions	Parts List & Availability	Performance Curves	Startup & Operating Instructions
03 1000	Concrete Forms and Accessories							
03 2000	Concrete Reinforcement							
05 3150	Steel Deck Repair - Replacement							
06 150	Wood Decking and Lumber							
06 1000	Carpentry Work							
07 540.2	EPDM (MATC)							
07 540.3	EPDM (EM)							
07 5900	Preparation of Re-roofing					x		
07 6000	Sheet Metal Flashing and Trim							
07 7000	Non-Penetrating, Rooftop Pipe and Duct Supports							
07 7200	Roof Accessories							
07 9000	Joint Sealers							
26 4113	Lightning Protection for Structures							

SECTION 1.E.5

CLOSEOUT LOG

Project: VARIOUS LOCATION - ROOF REPLACEMENT
Project Number: CP243181
Contractor:

Section	***Description***	***Contractor / Subcontractor***	***Date Rec'd***	***# of Copies***	***CPM Initials***	***Remarks***
GC / 3.11	As-built drawings					
GC/13.5.6	Final Affidavit of Supplier Diversity Participation for each Diverse Firm					
07 540.2	EPDM Membrane Roofing MATC – 20 year NDL					
07 540.3	EPDM Membrane Roofing EM- 20 year NDL					

SECTION 1.F

INDEX OF DRAWINGS

Drawings referred to in and accompanying this Project Manual consist of the following sheets dated February 11, 2025.

A100 COVER SHEET

A101 ENERGY MANAGEMENT SITE COORDINATION PLAN

A102 ENERGY MANAGEMENT DEMOLITION ROOF PLAN

A103 ENERGY MANAGEMENT RENOVATION ROOF PLAN

A201 ENERGY MANAGEMENT DETAILS

A202 ENERGY MANAGEMENT DETAILS

A203 ENERGY MANAGEMENT DETAILS

A301 MATC SITE COORDINATION PLAN

A302 MATC DEMOLITION ROOF PLAN

A303 MATC RENOVATION ROOF PLAN

A401 MATC DETAILS

A402 MATC DETAILS

A403 MATC DETAILS

A404 MATC DETAILS

A405 MATC DETAILS

A406 MATC DETAILS

A407 MATC DETAILS

END OF SECTION

SECTION 1.G

PREVAILING WAGE RATES

1. The prevailing wage rates for Boone County as issued by the Missouri Division of Labor on the following pages.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 31

Section 010
BOONE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: **March 8, 2024**

Last Date Objections May Be Filed: **April 8, 2024**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$61.30
Boilermaker	$32.35*
Bricklayer-Stone Mason	$55.22
Carpenter	$51.42
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$45.65
Plasterer	
Communication Technician	$57.87
Electrician (Inside Wireman)	$58.36
Electrician Outside Lineman	$32.35*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$32.35*
Glazier	$65.64
Ironworker	$69.98
Laborer	$43.79
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$59.96
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$65.05
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$41.79
Plumber	$72.46
Pipe Fitter	
Roofer	$55.00
Sheet Metal Worker	$58.29
Sprinkler Fitter	$65.10
Truck Driver	$32.35*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.
**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$63.45
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$80.19
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$50.35
General Laborer	
Skilled Laborer	
Operating Engineer	$66.32
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$32.35*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 03 1000 – CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Work includes, but is not necessarily limited to:
   1. Furnish all labor, materials, equipment, and services necessary or incidental to completion of formwork for cast-in-place concrete, with shoring, bracing, and anchorage; openings for other work; form accessories, and form stripping.

B. Related Documents: The Contract Documents apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
   1. Section 03 2000 – Concrete Reinforcement.
   2. Section 03 3000 – Cast-in-place Concrete
   3. Section 07 5900 – Preparation for Reroofing

1.02 SUBMITTALS

A. Submittal Procedures: Procedures for submittals
   1. Shop Drawings: Submit formwork and shoring shop drawings; indicate: Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
   2. Means of leakage prevention for concrete exposed to view in finished construction.
   3. Sequence and timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.
   4. Vertical, horizontal and special loads in accordance with ACI 347, Section 2.2 and camber diagrams, if applicable.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347, ACI 301, and ACI 318.

B. For wood products furnished for Work of this Section, comply with applicable provisions of AF&PA National Design Specifications for Wood Construction.

C. Maintain one copy of each document on site.

D. Design formwork under direct supervision of a professional engineer experienced in design of this work and licensed in the State of Missouri.

1.04 DELIVERY, STORAGE AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products

B. Deliver materials to the job site in original, unopened bundles. Materials are to be stored off the ground with one end elevated to provide drainage and are to be protected from the elements with weatherproof tarps ventilated to avoid condensations. Cut plastic wrappers to encourage ventilation. Keep materials dry.

C. Keep all materials clearly identified with all identifying marks legible. Keep all damaged material clearly identified as damaged and stored separately to prevent its inadvertent use.

D. Do not allow installation of damaged or otherwise non-complying material.

E. Use all necessary means to protect the materials in this section before, during, and after installation, and to protect the work and materials of all other trades.

F. In the event of damage, immediately make all necessary repairs and replacements subject to the approval of, and at no additional cost to the Owner.

G. Roof surfaces shall be protected from damage at all times.

1.05 REFERENCES

A. ACI 117 - Tolerances for Concrete Construction and Materials.

B. ACI 301 - Structural Concrete for Buildings.

C. ACI 318 - Building Code Requirements for Reinforced Concrete.

D. ACI 347 - Recommended Practice For Concrete Formwork.

E. AF&PA - National Design Specifications for Wood Construction.

F. ASME A17.1 - Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks

G. ASTM D 1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous types).

H. SPIB - 1994 Standard Grading Rules for Southern Pine Lumber (and Supplements).

I. WCLIB Rule No. 17 - Standard Grading and Dressing Rules.

1.06 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.07 COORDINATION

A. Coordinate this Section with other sections of work, which require attachment of components to formwork.

B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Owner Representative.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

A. Form Materials: At Contractor's discretion.

B. Plywood: Douglas Fir or Spruce species; solid one side grade; sound undamaged sheets with clean, true edges.

C. Lumber Forms: Use for edge forms and unexposed finish concrete. Boards shall be 6 inches or 8 inches in width, shiplap or tongue and groove, Standard Grade Douglas Fir, conforming to WCLIB Standard Grading and Dressing Rule No. 17. Surface boards on four sides.

D. Plywood Forms: Use for exposed finish concrete. Forms shall conform to PS-1. Each panel shall carry the grade trademark of the APA/EWA and shall be full size 4-foot by 8-foot panels. Use release agent at exposed finish concrete.
   1. Plywood for surfaces to receive membrane waterproofing shall be a minimum of 5/8-inch thick and shall be APA Exterior grade.
   2. Plywood where Smooth Finish is required shall be HD Overlay Plyform Structural I Exterior grade, minimum of 3/4-inch thick.

2.02 FORMWORK ACCESSORIES

A. Spreaders: Standard, noncorrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. No wire ties, wood spreaders or through bolts will be permitted.

B. Form Anchors and Hangers: Anchors and hangers used for exposed concrete shall not leave exposed metal at surface. Hangers supporting forms from structural steel shall be symmetrically arranged on supporting members to minimize twisting or rotation of member. Penetration of structural steel members will not be permitted.

C. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
   1. Arcal Chemical Corporation, "Arcal-80".
   2. Nox-Crete Company, "Nox-Crete Form Coating".
   3. Industrial Synthetics Company, "Synthex".
   4. Owner Approved Equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Execution Requirements: Verification of existing conditions before starting work

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

C. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with Shop Drawings.

D. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

E. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 INSTALLATION

A. Formwork - General: Sloped surfaces steeper than 1.5 horizontal to 1 vertical should be provided with a top form to hold the shape of the concrete during placement, unless it can be demonstrated that top forms can be omitted. Construct forms to the correct shape and dimensions, mortar-tight, of sufficient strength, and so braced and tied together that movement of workers, equipment, materials, or the placing and vibrating of concrete shall be strong enough to maintain their shape under all imposed loads. Camber where necessary to assure level finished soffits unless otherwise shown on Drawings. Verify horizontal and vertical positions of forms and correct inaccuracies before placing concrete in any form. Complete wedging and bracing before placing concrete.

B. Forms for Smooth Finish Concrete: Use steel, plywood or lined board forms. Clean and smooth plywood and form liners, uniform in size, and free edges and holes from damage. Form lining shall have close-fitting square joints between separate sheets and shall not be sprung into place. Sheets of form lines and plywood shall be full size wherever possible, and joints shall be taped to prevent protrusions in concrete. Use special care in forming and stripping wood forms to protect corners and edges. Level and continue all horizontal joints. Wet wood forms at all times until stripping.

C. Framing, Studding and Bracing: Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood. Framing, bracing, centering, and supporting members shall be of adequate size and strength to carry safely, without deflection, all dead and live loads to which forms may be subjected and shall be spaced sufficiently close to prevent any bulging or sagging of forms. Soffits of all beam forms shall be constructed of material a minimum of 2 inches thick. Distribute bracing loads over base area on which bracing is erected.

D. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

F. Install void forms in accordance with manufacturer's recommendations.

G. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.03 APPLICATION – FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

3.04 FIELD QUALITY CONTROL

A. Quality Control: Field-testing and inspection.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

C. Notify Owner representative after placement of reinforcing steel in the forms, but prior to placing concrete, so that review may be made.

3.05 APPLICATION – FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and the removal has been approved by Owner representative.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

D. Forms shall be left in place for not less than the total number of days as specified in ACI 347.

3.08 ERECTION TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

B. Tolerances: Construct formwork so that concrete surfaces shall be within construction tolerances specified in ACI 117.

END OF SECTION 03 1000

SECTION 03 2000 – CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Work includes, but is not necessarily limited to:
   1. Furnish all labor, materials, equipment, and services necessary or incidental to completion of formwork for cast-in-place concrete, with shoring, bracing, and anchorage; openings for other work; form accessories, and form stripping.

B. Related Documents: The Contract Documents apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
   1. Section 03 1000 – Concrete Forms and Accessories
   2. Section 03 3000 – Cast-in-place Concrete
   3. Section 07 5900 – Preparation for Reroofing

1.02 SUBMITTALS

A. Submittal Procedures: Procedures for submittals
   1. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
   2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   3. Submit certified copies of mill test report of reinforcement materials analysis.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301, ACI SP-66, and ACI 318.

B. Maintain one copy of each document on site.

C. Provide Owner Representative with access to fabrication plant to facilitate review of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow review.

D. Detail reinforcement and prepare shop drawings in accordance with ACI 315.

E. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on Work, verifying AWS qualification within previous 12 months.

1.04 DELIVERY, STORAGE AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products

B. Deliver materials to the job site in original, unopened bundles. Materials are to be stored off the ground with one end elevated to provide drainage and are to be protected from the elements with weatherproof tarps ventilated to avoid condensations. Cut plastic wrappers to encourage ventilation. Keep materials dry.

C. Keep all materials clearly identified with all identifying marks legible. Keep all damaged material clearly identified as damaged and stored separately to prevent its inadvertent use.

D. Do not allow installation of damaged or otherwise non-complying material.

E. Use all necessary means to protect the materials in this section before, during, and after installation, and to protect the work and materials of all other trades.

F. In the event of damage, immediately make all necessary repairs and replacements subject to the approval of, and at no additional cost to the Owner.

G. Roof surfaces shall be protected from damage at all times.

1.05 REFERENCES

A. ACI 301 - Structural Concrete.

B. ACI 318 - Building Code Requirements for Structural Concrete.

C. ACI SP-66 - Detailing Manual.

D. ASTM A 82 - Steel Wire, Plain, for Concrete Reinforcement.

E. ASTM A 184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

F. ASTM A 497 - Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.

G. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

H. ASTM A 617 - Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.

I. ASTM A 641 - Zinc-Coated (Galvanized) Carbon Steel Wire.

J. ASTM A 704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.

K. ASTM A 706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

L. ASTM A 767 - Zinc-Coated (Galvanized) Bars for Concrete Reinforcement.

M. ASTM A 775 - Epoxy-Coated Reinforcing Steel Bars.

N. ASTM A 884 - Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.

O. ASTM A 934 - Epoxy-Coated Prefabricated Reinforcing Bars.

P. ASTM A 996 - Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

Q. ASTM D 3963 - Practice for Selection of Coating Specimens for Appearance Measurements.

R. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

S. CRSI - Manual of Practice.

1.06 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.07 COORDINATION

A. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615, 60 ksi yield grade; deformed billet steel bars, unfinished.

B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A 704, ASTM A 615, Grade 60; steel bars or rods, unfinished.

C. Stirrups Steel: ASTM A 82, unfinished.

D. Welded Steel Wire Fabric: ASTM A 497 Deformed Type; in flat sheets; unfinished.

2.02 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type; epoxy coated.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.

C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel type; size and shape as required.

2.03 FABRICATION

A. Fabricate concrete reinforcement in accordance with ACI SP-66, ACI 318 & ASTM A 184.

B. Where applicable, weld reinforcement in accordance with AWS D1.4.

C. Locate reinforcement splices not indicated Drawings, at point of minimum stress. Review location of splices with Owner Representative.

PART 3 EXECUTION

3.01 EXAMINATION

A. Execution Requirements: Verification of existing conditions before starting work

B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

C. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with Shop Drawings.

D. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

E. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 INSTALLATION

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Conform to applicable code for concrete cover over reinforcement.

3.03 FIELD QUALITY CONTROL

A. Quality Control: Field-testing and inspection.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

C. Notify Owner representative after placement of reinforcing steel in the forms, but prior to placing concrete, so that review may be made.

END OF SECTION 03 2000

SECTION 05 3150 - STEEL DECK REPAIR / REPLACEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Work includes, but is not necessarily limited to:
   1. Remove existing steel decking, where deterioration has caused an unsafe environment or where otherwise specified for replacement by roof mounted equipment modifications.
   2. Framed openings up to 10 inches by 10 inches

B. Related Documents: The Contract Documents, Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:
   1. Division 6 Section "Carpentry (for Roofing)" for wood nailers, cants, curbs, and blocking.
   2. Division 7 Section “Membrane Roofing.”

1.02 REFERENCES

A. American Iron and Steel Institute (AISI):
   1. Specification for the Design of Cold Formed Steel Structural Members

B. American Society for Testing and Materials (ASTM):
   1. ASTM A 611 - Specification for Steel, Sheet, Carbon, Cold Rolled, Structural Quality

C. Steel Deck Institute (SDI):
   1. Design Manual for Composite Decks, Form Decks, Roof Decks, (Publication No. 25).
      a. Code of Recommended Standard Practice
      b. Specifications and Commentary for Steel Roof Deck
   2. SDI Diaphragm Design Manual 1st Edition

D. Steel Structures Painting Council (SSPC):
   1. SSPC-Paint 20 Type II - Zinc Rich Primers - Organic
   2. SSPC-Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Replacement of damaged or deteriorated steel decking:
   1. Basis for Measurement: By square feet
   2. Basis of Payment: Replace Metal Deck: Replace any steel deck which is damaged or has scaling or flaking corrosion (rust) with new, mechanically attached decking of the

same type, thickness, and cross section to match existing if damaged or corroded area covers an area larger than 24 inches square.

B. The cleaning and coating of the steel decking having surface rust:
   1. Basis for Measurement: By square feet
   2. Basis of Payment: Prime Metal Deck: Steel decking with surface rust shall be cleaned with a stiff wire brush or with rotating steel wheel brush. The steel deck shall be cleaned of all loose rust; then coated with Owner approved rust inhibiting primer. Allow rust inhibitor to dry prior to proceeding with roofing installation.

C. Roof Deck Repair:
   1. Basis for Measurement: By each – unit cost
   2. Basis of Payment: Repair steel decking with deck openings less than 12 inches x 12 inches in size, G-90 galvanized sheet metal may be used for the repair, overlapping the adjacent decking 18 inches on all sides. Steel metal repair shall be fastened to existing steel deck units with side and end lap fasteners spaced 6 inches on center.

D. Roof Deck Repair:
   1. Basis for Measurement: By each – unit cost
   2. Basis of Payment: For openings less than 24 inches x 24 inches in size but greater than 12 inches x 12 inches, a partial steel deck panel (matching the existing steel deck profile and gage) shall be used for the repair, overlapping the adjacent decking 18 inches minimum at the end laps. Fasten the steel deck panel to the existing decking with the end and side laps fasteners spaced 6 inches on center. Should structural members be present; fasten the steel deck panel to the steel structural member as specified in FM 1-29 guidelines - 2.2.13.1.2.3.

E. Roof Deck Securement:
   1. Basis for Measurement: By individual roof area
   2. Basis of Payment: Contractor shall verify the existing steel decking has been secured to the steel bar joist per FM Global Lost Prevention Data Sheet 2.2.13.1.2 – “Roof Deck Securement for Wind Loads” are equal to or last than a FM 105 attachment. Should the roofing contractor find the steel decking does not meet the FM Roof Deck Securement Requirements, the cost for installing sufficient FM approved fasteners FM Global Lost Prevention Data Sheet 2.2.13.1.2.

1.04 SUBMITTALS

A. Submittal Procedures: Procedures for submittals
   1. Product Data: Deck profile characteristics and dimensions, structural properties, and finishes
   2. Shop Drawings: Indicate deck plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Fabricator: Company specializing in performing the work of this section with minimum 5 years documented experience.
2. Erector: Company specializing in performing the work of this section with minimum 5 years documented experience, certified by AISC Quality Certification Program.
3. Qualifications of Installers: Use 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 needed for proper performance of the work in this section. Inn acceptance or rejection of the work, the Owner will make no allowance for the lack of knowledge or skill on the part of the workers.

1.06 SUBMITTALS

A. General: Comply with Submittal Procedures.

1.07 DELIVERY, STORAGE AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products.

B. Deliver materials to the job site in original, unopened bundles. Materials are to be stored off the ground with one end elevated to provide drainage and are to be protected from the elements with weatherproof tarps ventilated to avoid condensation. Cut plastic wrappers to encourage ventilation. Keep materials dry.

C. Keep all materials clearly identified with all identifying marks legible. Keep all damaged material clearly identified as damaged and stored separately to prevent its inadvertent use.

D. Do not allow installation of damaged or otherwise non-complying material.

E. Use all necessary means to protect the materials in this section before, during, and after installation, and to protect the work and materials of all other trades.

F. In the event of damage, immediately make all necessary repairs and replacements subject to the approval of, and at no additional cost to the Owner.

G. Roof surfaces shall be protected from damage at all times.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel decking shall be manufactured from steel with minimum yield strength of 33 ksi, 22 gage, conforming to ASTM A1008/A1008M for uncoated and painted deck and A653/A653M for galvanized deck.

B. New steel decking shall match the existing steel deck profile. Contractor shall field verify existing deck profile.

C. Flat stock steel deck repair material, where required, shall be 18-gage, G-80 galvanized sheet metal.

D. Bearing Plates and Angles: ASTM A 36 steel

E. Rust Inhibitor Primer/Coating:
   1. Advanced Protective Products, Rust Destroyer
   2. Sherwin-Williams, E41 N1, Kromik Metal Primer
   3. Rust-Oleum, #7769, Rusty Metal Primer

F. Touch-Up Primer for Galvanized Surfaces: SSPC 20, Type 1, inorganic

G. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to decking.

H. Closure Strips, Cover Plates, and related Accessories: Fabricated of metal of same type and finish as deck.

I. Screw Fasteners: Self-tapping fasteners for fastening steel decking to structural members.
   1. Product Specifications:
      a. Diameter: #12, 1/4
      b. Length: 1-1/4 inch
      c. Thread Form:12-24, 1/4-28
      d. Head Style: #12: 5/16" HWH; 1/4: 5/16" HWH; 1/4: 3/8" HWH
      e. Finish: Climaseal
   2. Approvals and Listings
      a. Factory Mutual (J.I. 2 X 9A2 AM), ICBO 3056, ICC - ESR 1976
   3. Approved Manufacturer:
      a. OMG Roofing Products - Teks 5 or ICH Traxx/5
      b. Owner Approved Equal

J. Side Lap Fasteners: Self drilling screws for fastening the steel deck side laps and for flat stock metal repair materials.
   1. Product Specifications:
      a. Diameter: #12, 1/4
      b. Thread Form :12-24, 1/4-28
      c. Length: 3/4 inch
      d. Head Style: #12: 5/16" HWH; 1/4: 5/16" HWH; 1/4: 3/8" HWH
      e. Finish: Climaseal
   2. Approvals and Listings
      a. Factory Mutual (J.I. 2 X 9A2 AM), ICBO 3056, ICC - ESR 1976
   3. Approved Manufacturer:
      a. OMG Roofing Products - Stitch Teks 1 or ICH Traxx/1
      b. Owner Approved Equal

2.02 FABRICATION

A. Steel Roof Deck: Minimum 22 gage sheet steel, minimum 33 ksi, 1-1/2 inch high, fluted profile to SDI WR; multiple span; lapped joints. Contractor to verify existing steel decking profile before ordering replacement steel decking. New steel roof deck is to match existing steel deck profile.

B. Fabricate metal decking in accordance with the SDI Design Manual for Composite Decks, Form Decks, Roof Decks, and AISI, to accommodate maximum working stress of 20,000 psi and maximum span deflection of 1/240.

C. For new drains, fabricate roof sump pan of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.01 EXAMINATION

A. Execution Requirements: Verification of existing conditions before starting work

B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.

C. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 STEEL DECK - RUST REPAIR

A. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer’s recommendations as approved by the Owner’s Representative.

B. Surface rust areas shall be thoroughly wire brushed to remove any loose or foreign materials that would adversely affect adhesion or appearance of applied coatings. Remove oil, grease, dirt, rust, and other foreign substances from the steel decking.

C. Materials Preparation: Carefully mix and prepare rust inhibitor materials in accordance with manufacturer's directions.
   1. Maintain containers used in mixing and application of rust inhibitor in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before use.
3. Use only thinners approved by the paint manufacturer and Owner, and only within recommended limits.

D. Rust Inhibitor Application:
1. Apply rust inhibitor to all clean surfaces within a four-hour period of the cleaning, and prior to deterioration or oxidation of the surface, and in accordance with the manufacturer's recommendations.
2. Allow sufficient time between successive coats to permit proper drying. Do not recoat until rust inhibitor has dried to where it feels firm and does not deform or feel sticky under moderate thumb pressure.

E. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the rust inhibitor as recommended by the manufacturer for applying the rust inhibitor to a steel decking.

F. Completed Work: Contractor to remove, refinish, or repaint work not in compliance with specified requirements.

3.03 STEEL DECK REPLACEMENT

A. Steel roof deck shall be replaced in full-length sheet to match existing deck layout, unless otherwise stated elsewhere.

B. Erect metal decking and connect to structure in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Coordinate attachment sequence and procedure with placing of units.

C. On steel support members, provide 1-1/2 inch minimum bearing. On masonry support surfaces, provide 3-inch minimum bearing.

D. Align and level deck on supports.

E. Provide fasteners, and side lap connectors of size, spacing, and location as indicated in accordance with SDI Design Manual for Roof Decks and per manufacturer's written instructions.

F. Space FM Approved deck fasteners a maximum of 12 in. (305 mm) on center (every other rib) at all supports in the field of the roof.

G. Space FM Approved deck fasteners a maximum of 6 in. (152 mm) on center (every rib) at all supports in the roof’s corners and perimeters.

H. Secure the steel deck to supporting members at each deck side lap.

I. For overlap-type side laps, ensure securement penetrates all deck panels at the laps. Do not weld side laps on 20 gage steel decking. (0.0359 in., 0.91 mm) or thinner deck.

J. For a Class 1-90, side laps shall be fastened together, not exceeding 36 inches on center in the field, and 30 inches on center in the perimeters and corners center-to-center between each side lap fastener, or side lap fastener and support.

K. Fasten the deck to the structural members at each side lap, regardless of resultant fastener spacing. For overlap-style side laps, ensure fasteners penetrate all deck panels at the laps. For interlocking-style side laps, install one fastener on each side of the lap. End laps shall be a minimum of 2 inches.

L. Ensure the fasteners do not penetrate any conduit or miscellaneous piping located at bottom of the decking.

3.04 STEEL DECKING REPAIR

A. For openings less than 12 inches x 12 inches in size, G-90 galvanized sheet metal may be used for the repair, overlapping the adjacent decking 18 inches on all sides. Steel metal repair shall be fastened to existing steel deck units with side lap fasteners spaced 6 inches on center.

B. For openings less than 24 inches x 24 inches in size but greater than 12 inches x 12 inches, a partial steel deck panel (matching the existing steel deck profile and gage) shall be used for the repair, overlapping the adjacent decking 18 inches minimum at the end laps. Fasten the steel deck panel to the existing decking with the end and side laps fasteners spaced 6 inches on center. Should structural members be present; fasten the steel deck panel to the steel structural member as specified in FM 1-29 guidelines - 2.2.13.1.2.

C. Install 6 inch wide sheet steel cover plates where deck changes direction. Fasten in place 12 inches on center maximum. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

3.05 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. Upon completion of painting, clean paint spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.06 FIELD QUALITY CONTROL

A. Quality Control: Field-testing and inspection.

B. Inspection:
   1. Inspect metal decking for evidence of rust or damage.
   2. Inspect all securement fasteners over entire roof area for size and spacing.
   3. Inspect all side lap fasteners over entire roof area for type, size, and spacing of side lap fasteners.

END OF SECTION 05 3100

SECTION 06150 – WOOD DECKING AND LUMBER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide labor, materials and equipment necessary to complete the work of this Section, including the following:
   1. Wood decking, lumber and timbers for the following applications:
      a. Decks
      b. Boardwalk
      c. Cladding
      d. Walkways
      e. Conservatories
      f. Site furnishings
      g. Pavilions
      h. Pergolas
      i. Dividers
      j. Porte cochere
      k. Lattice structures
      l. Arbors
      m. Greenhouses
      n. Paneling
      o. Ceilings

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections.
   1. Section 06100 – ROUGH CARPENTRY for other rough carpentry work.
   2. Section 062000 – FINISH CARPENTRY for other finish carpentry work.

C. Reference Standards: Comply with applicable requirements of the following:

   1. ASTM D143-14 – Standard Test Methods for Small Clear Specimens of Timber.
   2. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
   3. ASTM D 4761-13, Section 8.5.3.1 – Standard Test Methods for Mechanical Properties of Lumber and Wood-Based Structural Materials
   4. U.S. Lacey Act – Full Compliance as product is from FSC Managed Forest
   5. FSC
   6. ASTM E648-17 "Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source". The foregoing test procedure is comparable to NFPA No. 253
   7. International Code Council (ICC) Evaluation Service Report (ESR) issued and active, meeting the criteria of Acceptance Criteria AC47: ESR-3756.
   8. ENVIRONMENTAL PRODUCT DECLARATION (EPD) in accordance with ISO 14025, ISO 21930 and EN 15804.

1.02 SUBMITTALS

A. Submittals: Submit under provisions of Division 01.

B. Product Literature: Manufacturer's product literature describing all components. Include installation recommendations and instructions.

C. Verification Samples: For each type of decking and lumber.

D. Certificate of Compliance, Forest Stewardship Council: FSC Controlled Wood, Chain of Custody.

E. USGBC LEED Submittals Only, Certified Wood: Submit chain-of-custody certificates signed by manufacturer certifying that wood products comply with LEED forest certification and chain-of- custody requirements. Include evidence that mill and fabricator is certified for chain-of-custody or that outsourcing agreements are in place approved by an FSC-accredited certification body. Include statement indicating costs for each certified wood product.

F. Certificates of Compliance: Submit documentation of the following.
   1. MSDS (Material Safety Data Sheet) – Submit a Material Safety and Data Sheet for the wood products supplied on the project.
   2. ENVIRONMENTAL PRODUCT DECLARATION (EPD) in accordance with ISO 14025, ISO 21930 and EN 15804.
   3. ICC ESR-3756.

1.03 QUALITY ASSURANCE

A. Manufacturer/Vendor Qualifications: Products covered under this Section shall be supplied by a single manufacturer/vendor unless otherwise specified with a minimum of ten years proven production or supply experience.

B. Installer Qualifications: Installer shall have a minimum of three years proven construction experience and be capable of estimating and building from drawings and details, determining elevations, in addition to proper material handling.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect materials during shipment, storage and construction against damage.

B. All units shall be individually strapped to wood pallets or blocking of a minimum

thickness to allow the egress of lift forks using high strength strapping.

C. Store a minimum of 4 inches off the ground in a dry location and cover with polyethylene to protect from contact with materials which would cause staining or discoloration.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis-of-Design: Kebony™ Clear Radiata #2637 and #2638, nominal 5/4x6, (22x142mm) by Kebony AS, Tel 855.230.5656, info@kebony.us, www.kebony.us
   1. Moisture Content:
      a. Moisture content of 4 to 8 %; all dimensions when net thickness is over 1 inch.
   2. Surface:
      a. S4S (surfaced four sides), E2E (eased two edges). Edges shall be eased to a radius of 3.5mm.
      b. Rough Sawn. Edges shall be square.
      c. Custom profiled. Profiles shall be as per plans and specifications.
      d. Knots/Pitch pockets: May be visible and are a natural occurrence in wood.
      e. Cupping: Max 1 % of width.
   3. Dimensions on Drawings: Nominal and Actual Size shall be listed.
   4. Length:
      a. Lumber shall be supplied at or over specified length for final fit in the field.
      b. Lumber shall be supplied precision trimmed to specified lengths only when specified in writing.
   5. End Coating: No end coating or sealing is required.

B. Mechanical Properties: Meet or exceed the following when tested in accordance with ASTM D143:
   1. Bending Strength (MOR): 5,235 psi, 36.1 MPa
   2. Modulus of Elasticity (MOE): 1,798,468 psi, 12.4 GPa
   3. Compression Parallel to Grain: 13,200 psi. 1553 psi (Note: Average)
   4. Compression Perpendicular to Grain: (Note: Average)
      a. @ 0.02”: 325.5 psi.
      b. @ 0.04”: 1581.5 psi.
      c. @ 0.10”: 2638.5 psi.
   5. Average Air-Dry Density: Approximately 42 lb/ft^2, 670 Kg/m^3
   6. Basic Specific Gravity: Ranges from 0.80-0.91.
   7. Max. Swelling: 4% (dry to wet, tangential)

   Above values are typical, but not engineering design values. Please contact Kebony for such details if application is outside of those detailed in ESR-3756.

C. Fire Rating, Acute Inhalation, Combustion Toxicity Requirements: Meet or exceed the following.

Lumber supplied shall be fire resistant without the use of any fire-resistant treatments to meet ASTM E84-15a,"Standard Method of Test for Surface Burning Characteristics of Building Materials". The foregoing test procedure is comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8-1.

D. Environmental Compliance:
   1. The natural service life of Kebony woods exceed their natural growth cycle, trap and store carbon and can be reclaimed, reused or recycled. Kebony woods do not require for service any petroleum based or inorganic chemical treatments adhesives or coatings. Kebony woods do not require for service any specialized handling storage or disposal procedures and generate zero post-industrial or post-consumer non-biodegradable waste. Kebony woods are also safe for human and animal contact, meet Low VOC emission standards and meet International Building Code and International Residential Code requirements for naturally durable wood.
   2. USGBC LEED Compliance Only: Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
   3. ENVIRONMENTAL PRODUCT DECLARATION (EPD) in accordance with ISO 14025, ISO 21930 and EN 15804.

E. Fastening Systems:
   1. Kebony wood products #2637 and #2638 uniquely offer four methods of fastening, three of which are patented.
      a. **Step-Clip for Kebony**. Patented and licensed exclusively by Kebony from Barrette Outdoor Living. The system consists of:
         - custom profiled wood deck boards (#2637 and #2638)
         - custom extruded polypropylene (PP) strips with predefined clip locations and clip shapes designed to mate with the custom profile of the above boards.
         - 15-degree coiled stainless steel ring-shank nails
      b. **Fastenator Hidden Fastening System**. Patented by Duralife Decking and Railing Systems. The system consists of
         - custom profiled wood deck boards (#2637 and #2638)
         - custom extruded clips with predefined screw locations and clip shapes designed to mate with the custom profile of the above boards.
         - clips include pre-tapped #7 x 2-1/4”
      c. Pro Plug System for Wood
         - custom profiled wood deck boards (#2637 and #2638)
         - Patented Pro Plug Tool for Wood for counterboring and pre-drilling
         - Pre-Cut matching Kebony plugs
      d. Face Fastening

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to starting work inspect the substrate to ensure that it has been properly prepared to accept materials specified in this Section. Commencement of work shall imply acceptance of surfaces and deck conditions.
   1. Review drawings for heavy static items such as planters, hot tubs, sculptures or equipment that will be installed on top of wood decking, lumber and timbers.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved submittals including the following:
   1. Install materials plumb, true to line, cut and fitted.
   2. Scribe and cope as required for accurate fit to adjacent construction.
   3. Use manufacturer’s recommended fasteners.
   4. Fasten tight to supports. Provide shims if there are variations in framing.

3.03 CLEANING AND PROTECTION

A. Protect from damage during construction operations. Promptly repair any damaged surfaces. Remove and replace work which cannot be satisfactorily repaired.

END OF SECTION 06150

SECTION 06 1000 - CARPENTRY WORK (For Roofing)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Roof curbs and cants; concealed wood blocking, with hardware and attachment accessories.

B. Preservative Treated Wood (PTW).

C. Refer to schedule at end of Section.

1.02 REFERENCES

A. American Lumber Standards Committee (ALSC): National Design Specification for Wood Construction.

B. American Wood Preservers Association (AWPA): AWPA Book of Standards.

C. Product Standard of NBS (PS):
   1. PS 1 - Construction and Industrial Plywood
   2. PS 20 - American Softwood Lumber Standard

1.03 QUALITY ASSURANCE

A. Rough Carpentry Lumber: Visible grade stamp of agency certified by National Forest Products Association (NFPA).

B. Preservative Treatment: Confirm to applicable requirements of AWPA.

1.04 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Replacement of damaged or deteriorated perimeter and / or parapet wall wood blocking:
   1. Basis for Measurement: By linear foot
   2. Basis of Payment: Includes labor for the installation of new wood blocking, new wood blocking fasteners and associated accessories; and removal and disposal of existing materials.

1.05 SUBMITTALS

A. Product List: Submit list of proposed Products and manufactures, including all items specified in Part 2 -- Products or otherwise required by the Work.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, finish, accessories, and locations to a minimum scale of 1-½ inch to one foot.

C. Manufacturer's Certifications: Submit certification that preservative wood treatment is in accordance with applicable requirements and that preservative formulation/treater warrants PTW material for intended use.

PART 2 - PRODUCTS

2.01 ROUGH CARPENTRY MATERIALS

A. Timber, General: Hand select material at factory from lumber of species and grade indicated below for compliance with "Appearance" grade requirements of ALSC National Grading Rule; provide certificate of inspection from an accredited Agency for selected material.
   1. Provide seasoned lumber with 19 percent moisture content at time of dressing and shipment, for sizes 2-inches or less in thickness.
   2. Provide lumber with 15 percent moisture content at time of dressing and shipment for, sizes 2-inches or more in thickness.

B. Dimensioned Lumber: Graded in accordance with established grading rules; grade and species as follows:
   1. Concealed Boards: WWPA standard grade, any species, or SPIB No. 3 grade Southern Pine.
   2. Lumber for Miscellaneous Uses: Standard grade unless otherwise indicated.
   3. Plywood: PS 1; select sheathing grade or APA rated 5/8-inch minimum thickness, CD-X, or better in sheathing.

C. Nails, Spikes, and Staples: Galvanized; size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Medium carbon steel, hot dipped galvanized; sized to suit application.

E. Anchors: Toggle bot type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or power activated type for anchorage to steel.

2.02 PRESERVATIVE TREATED WOOD (PTW)

A. Shop Preservative (Pressure Treatment Type): AWPA C2 and C9.

B. Wood for Above-Ground Contact Use: AWPB LP-2.

C. Shop pressure treat and provide identification on preservative treated materials, including all wood blocking, cants, and plywood.

D. Dry all PTW after treatment to the following maximum moisture content:
   1. Plywood:15 percent.
   2. Lumber: 19 percent.

2.03 SOURCE QUALITY CONTROL

A. Factory marked each piece of lumber with type, grade, mill, and grading agency.

B. Nominal sizes are indicated. Provide actual sizes as required by PS 20.

C. Provide dressed lumber, sized four sides.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify that surfaces are ready to receive work and field measurements are as shown on shop drawings.

B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this Work.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.02 INSTALLATION

A. Discard units or material with defects that might impair quality of work and units that are too small to use in fabricating work with minimum joints.

B. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.

C. Securely attach carpentry work to substrate to anchoring and fastening as shown and as required by recognized standards. Use common wire nails, except as otherwise indicated. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners with splitting wood; pre-drill as required.

D. Install components with fasteners suited to materials.
   1. Nailable Surfaces: Galvanized compatible nails, sized as follows:
      a. ¾ and 1-inch materials: 8d nails.
      b. 1-1/2 or 2 inch materials: 16d nails.
   2. Hollow Masonry Walls: Toggle Bolts.
   3. Solid Masonry: Rawl Zamac pin drive.
   4. Steel Members: Bolts or Power actuated Hilti pins.
   5. Maximum Spacing: 12-inches on center, unless noted otherwise.

6. Top of Hollow Masonry Wall: Set 12-inch minimum J-bolts in fully set bed of concrete; minimum 18-inches on center.

E. Remove all bent or deformed nails from finished work and dispose of.

3.03 CLEANING

A. Pick up spilled carpentry products, unused nails, and fasteners daily.

3.04 PROTECTION

A. Protective Walkways - Traffic Area Protection: Install full sheets of ¾-inch exterior grade plywood and minimum ½-inch wood fiber insulation to those areas of new roof surface to be trafficked by personal and wheeled vehicles.

3.05 SITE TREATMENT OF CARPENTRY

A. Treat site-saw cut ends. Allow preservative to cure prior to erecting materials.

3.06 SCHEDULE

A. Rough Carpentry Work:
1. Miscellaneous blocking and canting for single-ply roofing systems and related flashings and sheet metal.
2. Blocking and canting for roof mounted mechanical items.

END OF SECTION 06 1000

SECTION 07 540.2 –EPDM MEMBRANE ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Adhered EPDM sheet roofing
   2. Polyisocyanurate Insulation
   3. Cover board
   4. Walkway pads

Missouri Athletic Training Center:

B. The scope of work includes minimizing the intrusion of dust and debris, created by the process of the installation of the new EPDM Roofing System. The phased installation of the new roof system will be installed in such a manner as to maintain daily watertight integrity.

C. **Scope of Work: Sections 9** : Over the cleaned and prepared wood decking substrate mechanically fasten 5/8” Type X gypsum /Securerock or equal with FM 1-90 fastening pattern (minimum 16 fasteners per 4x8). Installation of manufacturer approved (SA) self-adhered vapor barrier to the primed gypsum substrate. With FM 1-90 FM ribbon pattern installation of two (2) layers of 2.0” polyisocyanurate insulation adhered with 2-part low rise foam. The roof systems are required to have 4’ true sumps without chamfering the drain bowl locations.

   1. Roof section 9-Include roof section stairway platform from roof section 9 onto roof section 12.
   2. Roof section 9-Fabricate a knee wall expansion joint system with wood blocking and sheet metal as per detail 1 & 2 A/502.

D. **Scope of Work: Section 13**: Over the cleaned and prepared wood decking substrate mechanically fasten 5/8” Type X gypsum /Securerock or equal with FM 1-90 fastening pattern (minimum 16 fasteners per 4x8). Installation of manufacturer approved (SA) self-adhered vapor barrier followed by the installation of one **(1)** layer of 1.5” polyisocyanurate insulation adhered with the required 2-part low rise foam followed by the installation of 1/8”-12” tapered insulation. The roof system is required to have 4’ true sumps without chamfering the drain bowl locations.

E. **Scope of Work: Section 14A & 14B**: Over the cleaned and prepared wood decking substrate mechanically fasten 5/8" Type X gypsum /Securerock or equal with FM 1-90 fastening pattern(minimum 16 fasteners per 4x8). Installation of manufacturer approved (SA) self-adhered vapor barrier to the primed gypsum substrate. With FM 1-90 FM ribbon pattern installation of two (2) layers of 2.0" polyisocyanurate insulation adhered with 2-part low rise foam. Installation of new knee wall separating the roof sections as defined by the expansion joint transition. Within the new knee wall, fabricate 3 through wall scuppers to allow drain flow from roof section 14A & 14B. Installation of crickets/saddles will to divert flow through through wall scuppers. Installation of new 24ga. gutter and down spouts as needed.

F. **Scope of Work: Sections 18:** Over the cleaned and prepared wood decking substrate mechanically fasten 5/8" Type X gypsum /Securerock or equal with FM 1-90 fastening pattern (minimum 16 fasteners per 4x8). Installation of manufacturer approved (SA) self-adhered vapor barrier to the primed gypsum substrate. With FM 1-90 FM ribbon pattern installation of two (2) layers of 2.0" polyisocyanurate insulation adhered with 2-part low rise foam. The roof systems are required to have 4' true sumps without chamfering the drain bowl locations. Installation of new gutters and sheet metal fascia to match existing.

G. Installation of 1/2" HD polyisocyanurate cover board in accordance with FM 1-90 ribbon method, installation of ½" plywood on all walls, door access, and ladder egresses, followed by the roofing system manufacturer's 60 mil EPDM membrane, shall be installed in order to meet the project's roofing design guidelines. All flashing membranes, prefabricated metal, and sheet metal will be installed in accordance with the roofing system manufacturer's recommendations. The installation of butyl caulk or butyl tape at all attachment points of the surface mounted counterflashing. Installation of manufacturers suggested yellow warning line at perimeter of roof area on all unprotected edges roughly 10' from perimeter. Paint all gas lines yellow. Remove all wood supports and replace them with synthetic Dura-block products. Contractor's responsibility to include all needed wood nailers to facilitate the installation of roof system in its entirety. The completed EPDM roof system and roofing system manufacturer's supplied accessories shall be installed in such a manner so that the roofing system manufacturer's Twenty (20) Year Full Systems (NDL) Warranty can be issued upon successful completion of the roofing project.

H. Installation of fixed steel ladder from roof section 13 onto roof section 10.

I. Installation of new roof access stairway from roof section 9 onto roof section 12.

1.03 DEFINITIONS

A. ASTM E108, Class "A".

B. UL 790, Class "A".

1.04 REFERENCES

A. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

B. Single-Ply Roofing Institute (SPRI): Application Guidelines and Wind Design Guidelines for Various Single Ply Membranes

C. National Installers Association (NRCA): Current Roofing and Waterproofing Manual

D. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Current SMACNA Technical Manuals.

E. Code of Federal Regulations, (CFR) including:
   1. CFR Title 29, Part 1910 "Occupational Safety and Health Standards."
   2. CFR Title 29, Part 1926 "Safety and Health Regulations for Construction."

F. Underwriters Laboratories (UL):
   1. Roof Materials and Systems Directory. 2012.
   2. UL 790: Tests for Fire Resistance of Roof Covering Materials: 1983.

G. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) FOR EPDM MEMBRANE:
   1. .060" (Black) Non-Reinforced
   2. ASTM D 412
   3. ASTM D 624
   4. ASTM D 573

1.05 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 system manufacturer based on testing and field experience.

C. Roofing System Design: Comply with SPRI "Wind Design Guide for Adhered Single Ply Roofing Systems" for the following ground roughness exposure, classification of building and system design:
   1. Surface Roughness Category: Exposure B
   2. Classification of Building: Category II
   3. Wind uplift Design: 90 mph @ 3 second gust
   4. System 1 Design: Adhered Single Ply Membrane Roofing

D. Underwriters Laboratories Inc. (UL):
   1. UL RMSD – 2009 Roofing Materials and Systems Directory
   2. UL 790 – 2009 Fire Resistance of Roofing Coverings Materials
   3. Exterior Fire Exposure Classification: Class A, ASTM E 108, for application and slopes shown.

1.06 ACTION SUBMITTALS

A. Product Data: Submit latest edition of roofing system manufacturer's roofing and base flashing specifications including list of materials proposed for use, installation procedures, and roofing system manufacturer's Product Safety Data Sheets.

B. Product Safety Data Sheets: Installer shall review all product data safety data sheet chemical names prior to submitting to University of Missouri.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Roof plan showing orientation of concrete deck and orientation of membrane roofing.
   4. Insulation ribbon methods for corner, perimeter, and field-of-roof locations.

D. Samples for Verification: Physical samples are <u>not</u> necessary.
   1. Sheet roofing, of color specified.
   2. Roof insulation.
   3. Cover board.
   4. Metal termination bars.
   5. Battens.
   6. Six batten fasteners of each type, length, and finish.
   7. Walkway pads or rolls.
   8. Safety yellow perimeter tape.

1.07 INFORMATION SUBMITTALS

A. Qualification Data: For qualified Installer and roofing system manufacturer.

B. Roofing system manufacturer Certificates: Signed by roofing system manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of compliance with performance requirements.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by roofing system manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

D. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.

E. Single Ply Roofing Institute (SPRI) - Fasteners Withdrawal Resistance Testing:
   1. The Installer shall conduct fastener pullout tests in accordance with the August 11, 2011, revision of the ANSI/SPRI FX-1 - American National Standard – Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
   2. Prior to starting the project, provide a copy of the Fasteners Withdrawal Resistance Testing to roofing system manufacturer's technical department.

F. Warranty:
   1. Provide sample copy of 20-year (NDL) Full System roofing system manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.
   2. Provide sample of copy 3-year Installer's workmanship warranty stating obligations, remedies, limitations, and exclusions of warranty.

G. Inspection Report: Copy of roofing system roofing system manufacturer's final inspection report of completed roofing installation.

1.08 CLOSE OUT SUBMITTALS

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

1.09 QUALITY ASSURANCE

A. Roofing System Manufacturer Qualifications: A qualified roofing system manufacturer that is UL listed for membrane roofing system identical to that used for this Project.

B. Installer Qualifications:
   1. A qualified firm that is approved, authorized, or licensed by membrane roofing system roofing system manufacturer to install roofing system manufacturer's product and that is eligible to receive roofing system manufacturer's special warranty.
   2. Prior to submitting a roofing proposal, Installer must be approval by Owner's representative.

C. Roofing system manufacturer's membrane shall meet the following characteristics:
   1. Protective membrane surface coating to resist accumulation of air borne contaminants such as dust and dirt.
   2. Membrane Thickness: Membrane roofing system manufacturer is to verify that the membrane thickness is of the membrane thickness specified ASTM D412 nominal thickness of +/- 10 percent will not be acceptable for measurement of membrane thickness.

D. Source Limitations: Obtain components including roof insulation, fasteners, and accessories for membrane roofing system from same roofing system manufacturer as membrane roofing.

E. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified

testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

F. Pre-installation Conference: Before installing roofing system, conduct conference at Project site. Notify participants at least 10 working days before the conference.
   1. Meet with Owner's Representative/General Contractor, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system 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 roofing system 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 roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.
   8. Review temporary protection requirements for roofing system during and after installation.
   9. Review roof observation and repair procedures after roofing installation.

G. At no cost to University of Missouri, roofing system manufacturer's technical representative shall perform:
   1. Manufacturer's Quality Control Inspection: The Manufacturer's Technical Representative shall review the on-going work on the first day of the roofing production and a minimum of one (1) in-progress inspection every 10 working days. The Roof system manufacturer Technical Representative shall:
      a. Communicate with the University of Missouri project manager each inspection, i.e., meet with the University of Missouri designated project manager before entering work area.
      b. Note all defects noted non-compliance with the specifications or the recommendations of the roof system manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the University of Missouri representative and Roof system manufacturer.
      c. Ensure the roofing contractor has received a copy of each In-Progress Inspection Report within two days of the inspection. The roofing contractor is to forward the University of Missouri On-site Representative a copy of the In-Progress Inspection Report.
   2. Final Roof Inspection: Contractor is to arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion of the roofing project.
      a. All defects noted non-compliance with the specifications, or the recommendations of the roof system manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the

University of Missouri and Roof system manufacturer.

b. The roofing contractor is to forward a copy of the Final Inspection Report to the University of Missouri On-site Representative within two days after date inspection(s) is performed.

H. Installer's Responsibility: Any failure by the Owner Representative or roofing system manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the Installer, or reduce, or in any way limit, his responsibility of full performance of work required of the Installer under these specifications.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with roofing system manufacturer's name, product brand name, and type, date of manufacture, and directions for storing and mixing with other components. Deliver materials in sufficient quantity to allow work to proceed without interruption.

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.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Store and protect materials, including roofing insulation from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store all materials in a dry location. Use pallets to support all materials from roof deck. Distribute the load to stay within live load limits of the roof construction. Remove unused materials from the roof at the end of each day's work. Comply with roofing system manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.11 PROJECT CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to roofing system manufacturer's written instructions and warranty requirements.

B. The EPDM adhered membrane shall not be installed under the following conditions without consulting manufacturer for precautionary steps:
1. The roof assembly permits interior air to pressurize the membrane underside.
2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
3. The wall/deck intersection permits air entry into the wall flashing area.

C. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

D. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit the roofing system to be installed according to roofing system manufacturer's written instructions and warranty requirements.

E. Protection:
   1. Provide special protection and avoid traffic on completed areas of membrane installation.
   2. Restore to original condition or replace work or materials damaged during handling of roof materials.
   3. Take precautions as required to protect adjacent work and structures.

F. Emergency Equipment and Materials: Maintain onsite equipment and materials necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather. If inclement weather occurs while a temporary water stop is in place, the Installer shall provide the labor necessary to monitor the situation to maintain a watertight condition.

G. Protection:
   1. Arrange work sequence to avoid use of newly constructed Roofing for storage, walking surface, and equipment movement. Where such access is absolutely required, the Installer shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent Roofing areas.
   2. The Installer shall provide a suitable temporary protective surface for all roofing areas which will receive construction traffic or construction equipment during all phases of the roofing project.
   3. During installation of the membrane roofing systems, should there be any damage created by other construction trades to the new or to existing roofing membrane and/or roofing system, the Installer is to immediately notify the Owner's Representative and membrane roofing system manufacturer. All damages are to be repaired according to the membrane roofing system manufacturer's or Owner's representative's recommendations. The "party" responsible for the roofing damage shall bear the total cost for the repairs or for the replacement of existing or new roofing system.

H. Restrictions:
   1. Comply with Owner's General and Safety Requirements on use of site.
   2. Smoking and Tobacco products are prohibited on all roof areas and on the campus grounds.
   3. Provide and maintain sanitary facilities for employees.
   4. Maintain facility and all utility services in a functional condition.

1.12 WARRANTY

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

B. Roofing System Manufacturer's Warranty: Submit a written warranty, without monetary limitation, with all available options, including flashing endorsement, roofing system manufacturer's roof insulation and roofing system manufacturer's accessories, signed by roofing system roofing system manufacturer's agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
   1. Twenty (20) Year Full System Warranty (no ponding/standing water exclusions accepted). Warranty shall be non-prorated and cover basic wind speeds up to **70 mph**.
   2. "Early Bird" warranties are not to be issued, as they will not be accepted by Owner.
   3. The specified roofing system manufacturer's warranty will be issued only upon final acceptance by the roofing system manufacturer's ttechnical department and the Owner's Representative's final approval.
   4. Request for final payment and issuance of the specified Roofing system manufacturer's warranty will be issued to the Installer's after successful completion and Owner's Representative's final approval and acceptance of the entire roof system installation.

C. Installer's Warranty: Submit roofing Installer's workmanship warranty, on a notarized written warranty form, signed by Installer, covering Work of this Section, including membrane roofing, sheet flashing, cover board, roof insulation, fasteners, adhesives, sealants, and associated sheet metal, for the following warranty period:
   1. Warranty Period: Three (3) years from date of Substantial Completion. Refer to University of Missouri Roofing and Sheet Metal Guarantee form in Division 1 near the beginning of this manual.

PART 2 - PRODUCTS

2.01 ROOFING SYSTEM MANUFACTURER

A. The components of the roof system are to be products of a single roofing system manufacturer or approved by the Roof system manufacturer, whose products meet or exceed the project specifications, have manufactured, and installed the roofing materials and systems of the type specified for a minimum of twenty (20) years, and who maintains a single source responsibility for the total roofing system.

B. Roofing system manufacturers: The components of the roofing system are to be products of a single roofing system manufacturer as required to provide the specified system warranty. Subject to compliance with requirements, provide roofing products from:
   1. Versico incorporated, Akron OH
   2. Carlisle Roof System, Akron OH
   3. Owner approved manufactures.

2.02 EPDM MEMBRANE

A. EPDM Membrane: a uniform, flexible sheet formed from ethylene propylene diene monomer, ASTM D 412, of the following Classification – Type and Grade, Membrane Thickness, UL Classification, and Membrane Exposed Face Color.
   1. Classification: Type II, Grade I.
   2. Membrane Thickness: 60 mils, +/- 2.0 mils.
   3. UL Class: A.
   4. Membrane: Exposed Face Color: Black

2.03 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by roofing system roofing system manufacturer for intended use and compatible with membrane roofing materials.
   1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdictions.

B. Membrane flashing and Flashing Accessories: As recommended by the roofing system manufacturer's printed instructions for sheet flashing of same material, mil thickness and color as sheet membrane.

C. Asphalt Resistance Membrane Flashing: Roof system manufacturer's SA vapor barrier. The asphalt resistance membrane flashing can be adhered directly to asphalt-contaminated surfaces. The asphalt resistant membrane can be installed over the field membrane to act as a protection layer membrane in conditions where oil and grease could develop from roof-top equipment.

D. Insulation Fasteners: Roofing system manufacturer approved corrosion resistant steel #12 "fasteners," screws of the appropriate size and type for roof membrane and insulation attachment. A #12 corrosion-resistant fastener is used with plates to attach insulation boards to steel roof decks. Fasteners for the insulation shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

E. Insulation Securement Plates: Roofing system manufacturer approved corrosion resistant steel, 3-inch round plates, "plates," of the appropriate size and type for the securement of the insulation to approved substrates. Securement plates for the insulation shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

F. Membrane Securement Plates: Roofing system manufacturer approved corrosion resistant steel, 2-inch round plates, "discs," for the securement of the membrane to the steel roof decks. Securement plates for the membrane shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

G. Membrane Securement Screw: Roofing system manufacturer approved corrosion resistant steel, "#15screws" of the appropriate size and type for roof membrane securement. A #15, heavy-duty, corrosion-resistant fastener used with "discs" and "termination bar" to attach Roof system manufacturer's roof membrane to steel roof decks.

Fasteners for the membrane shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

H. Membrane Bonding Adhesive: Roofing system manufacturer's approved contact adhesive, Standard bonding adhesive, used to attach membrane to the horizontal or near-horizontal substrate. Application rates are to be as recommended by the roofing system manufacturer's printed instructions.

I. Membrane Flashing Bonding Adhesive: Roofing system manufacturer's approved contact adhesive, used to attach the flashing membrane to the substrate, either horizontally or vertically. Application rates are to be as recommended by the roofing system manufacturer's printed instructions.

J. Metal Termination Bar: a heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Reglet is produced from 6063-T5, 0.10 inch to 0.12 inch (2.5 mm to 3.0 mm) thick extruded aluminum. "reglet" has a 2-1/4 inch (57 mm) deep profile and is provided in 10 foot (3 m) lengths.

K. Membrane Securement Bar: is a 1-inch-wide aluminum alloy bar used with to clamp the membrane to the roof deck along walls, curbs, and certain vertical to horizontal changes in the roofing system. Termination bar is supplied in bundles of 25 pieces. Each termination bar is 10 feet long.

L. Sealants: Owner approved sealant shall be used to seal penetrations through the membrane system and at miscellaneous sealant applications that are exposed to roof systems components.

M. Safety Warning Membrane: A highly visible product to draw attention to unprotected roof perimeters and potentially hazardous areas. The safety warning membrane is designed for use on a membrane roof. The EPDM safety warning membrane shall be yellow in color, 60 mils in thickness, 4 inches wide, and 100 feet in length.

N. Pre-Fabricated Pipe Flashing: prefabricated vent pipe flashing made from 0.060 inch (60 mil/1.5 mm) thick membrane.

O. Pre-Fabricated Corner Flashing: prefabricated universals corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are adhered/quick applied to membrane base flashings.

P. Aluminum: ASTM B 209-86, alloy and temper - 3003-H14, 0.040 inch thick aluminum sheet, mill finish with formed drip edge.

Q. Mineral Wool-Fiber Fire-Resistant Insulation: Semi-rigid mineral-wool-fiber batt insulation; Type IVA per ASTM C 612; not less than 144 psf (6.9 kPa) compressive strength per ASTM C 165; less than 0.05 percent moisture absorption per ASTM C 1104; complying with ASTM E 136; and with the following surface-burning characteristics per ASTM E 84:
   1. Flame Spread: 0.
   2. Smoke Developed: 0

3. Manufacturers: Subject to compliance with requirements, available products include the following:
   a. Basis of Design: Roxul Safe; Roxul Inc.

R. Other miscellaneous materials shall be of the "best grade" available and to be approved in writing by the roofing system manufacturer for the specific application.

2.04 INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements, selected from roofing system manufacturer's standard sizes and of thickness indicated.

B. Polyisocyanurate board insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM 1289-03, Type 2, Class 1, Grade 2

C. Insulation Requirements:

1. **Roof Areas 9**: 5/8" Gypsum substrate, SA VB, install two (2) layers of 2.0" poly Iso adhered with low rise foam to self-adhered vapor barrier with ½" HD cover board adhered with low rise foam.
2. **Roof Area 13**: 5/8" Gypsum substrate, SA VB, install one (1) layers of 1.5" poly Iso adhered with low rise foam to self-adhered vapor barrier followed by 1/8"-12 tapered insulation with ½" HD cover board adhered with low rise foam.
3. **Roof Area 14A & 14B:** 5/8" Gypsum substrate, SA VB, install two (2) layers of 2.0" poly Iso adhered with low rise foam to self-adhered vapor barrier with ½" HD cover board adhered with low rise foam.
4. **Roof Area 18**: 5/8" Gypsum substrate, SA VB, install two (2) layers of 2.0" poly Iso adhered with low rise foam to self-adhered vapor barrier with ½" HD cover board adhered with low rise foam.

D. Tapered Polyisocyanurate Insulation Shapes: Preformed insulated shapes for saddles, crickets, tapered edge strips, sumps, and other insulation shapes where indicated or where required for sloping to drain. Fabricate to slopes indicated. Saddles, Crickets, Edge Strips, and Other Shapes:
1. Tapered insulation boards fabricated to slope of 1/4-inch per 12 inches (1:48) unless otherwise indicated.
2. Crickets between Roof Drains: Tapered insulation boards fabricated to slope of 1/2-inch per 12 inches (1:24) unless otherwise indicated.
3. Sumps for Roof Drains, measuring 4 feet x 4 feet; size to be modified when drains are located next to parapet wall.
4. Tapered insulation boards fabricated to slope of 1/4-inch per 12 inches (1:48). Provide a minimum insulation thickness at the roof drain or roof scupper of 2.0 inches.
5. Saddle Behind (Upslope) from Curbs Measuring 18 inches and greater: Tapered insulation boards fabricated to slope of 1/2-inch per 12 inches (1:24).
6. Saddle Behind (Upslope) from Round Penetrations Measuring 12 inches in diameter and greater: Tapered insulation boards fabricated to slope of 1/2-inch per 12 inches (1:24).

2.05 COVER BOARD

A. Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing materials.
   1. Type, Thickness and Size: Gypsum core board with a thickness of 5/8" -inch x 4 feet x 8 feet.
   2. UL Class A (UL 790) and ULC S-102
   3. Product: Subject to compliance with requirements, provide product as manufactured by:
      a. "Dens-Deck Prime®" as manufactured by Georgia-Pacific Corporation.

B. High density polyisocyanurate cover board: Closed cell polyisocyanurate foam with coated glass matt facer laminated to both faces, complying with the following additional characteristics:
   1. Thickness: 0.5 inches.
   2. Size: 48 inches by 48 inches, nominal.
   3. R-Value (LTTR):
      a. 0.5 inches, R-Value: 2.5, minimum.
   4. Compressive Strength: 100 psi.
   5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
   6. Recycled Content: 8.3 percent post-industrial, average.

2.06 INSULATION AND COVER BOARD ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation roofing system manufacturer for intended use and compatible with membrane material.

2.07 DUAL COMPONENT POLYURETHANE ADHESIVE

A. General: Provide a dual component polyurethane adhesive that is intended for the attachment of polyisocyanurate insulation to various substrates. The dual component polyurethane adhesive must have approvals from the insulation and roofing system manufacturer for adhering the polyisocyanurate insulation to approved substrates, multiple layers of polyisocyanurate insulation, and cover boards. Consult adhesive roofing system manufacturer on current acceptable substrates to apply dual component polyurethane adhesive to various substrates.

B. Dual component polyurethane adhesive: The low-slope dual component polyurethane adhesive shall have the following minimum properties:
   1. Density ASTM D-1622: Free Rise, 3.2 lb./cf.
   2. Compressive Strength ASTM D-1621: Parallel, 38 psi @ 6% deflection.
   3. Tensile Strength ASTM D-1623: 35 psi
   4. Water Absorption ASTM D-2843: 5.1%
   5. Closed Cell Content ASTM D-6226: 90% min.
   6. R-Value ASTM C-518 3.8/inch (new)
   7. VOC Content ASTM D-2369 <5 g/l (1&2 combined)
   8. Weight/Gallon: Part A Component 10.32 lbs. Part B Component 8.54 lbs.

C. Approved Roofing system manufacturer and Product:

1. OMG Roofing Products, “OlyBond 500® SpotShot.”
2. Roof system manufacturer, “OM Board Adhesive.”
3. Approved equal as approved by Owner or Roof Consultant

2.08 VAPOR RETARDER

A. Self-Adhered (SA) - 32 mil (0.8 mm) self-adhesive vapor barrier that can also serve as temporary roof protection. Self-Adhered is available in rolls 44.9 inches x 133.8 feet (1.14 x 40.8 m).

B. SA Primer - A polymer emulsion water-based primer designed to improve the adhesion of SA vapor retarder on concrete, METAL roof decks, gypsum substrates or plywood walls. Application temperature must be 41°F (5°C) and above. The coverage rate will range from 163 - 400 ft2/gal (4 - 9.8 m²/L) for non-porous surfaces to 82 - 135 ft2/gal (2 - 3.3 m²/L) for porous surfaces. The VOC content is 3 g/L.

2.09 RELATED MATERIALS

A. Timber, General: Hand select material at factory from lumber of species and grade indicated below for compliance with "Appearance" grade requirements of ALSC National Grading Rule; provide certificate of inspection from an accredited Agency for selected material.
   1. Provide seasoned lumber with 19 percent moisture content at time of dressing and shipment, for sizes 2-inches or less in thickness.
   2. Provide lumber with 15 percent moisture content at time of dressing and shipment for, sizes 2-inches or more in thickness.

B. Dimensioned Lumber: Graded in accordance with established grading rules; grade and species as follows:
   1. Concealed Boards: WWPA standard grade, any species, or SPIB No. 3 grade Southern Pine.
   2. Lumber for Miscellaneous Uses: Standard grade unless otherwise indicated.
   3. Plywood: PS 1; select sheathing grade or APA rated 5/8-inch minimum thickness, CD-X, or better in sheathing.

2.10 MISCELLANEOUS FASTENERS AND ANCHORS

A. General: All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum, or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1¼ inch (32 mm) and shall be approve for such use by the fastener roofing system manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm), stainless steel, and to be approved for such use by the fastener roofing system manufacturer.

2.11 EXTERIOR ROOF SECTION PLATFORM

A. Steel steps with walk through platform (**Roof sections 10-13**)
1. Heavy duty bar grating or diamond plate stair treads won't sag or dish (standard).
2. Factory welded handrails of 1 1/2" x 11 Ga. square tubing.
3. 2 rail system with toeguard (standard).
4. 10" structural channel stringers.
5. Structural connections are made with 5/8" dia. Bolts and 3/8" butt plates.
6. Fire proof construction.
7. Meets OSHA requirements. See OSHA standard 1910.25 (Fixed Industrial Stairs).
   a. FS Industries
   b. Global
   c. Cotterman

2.12 EXTERIOR FIXED LADDER

B. Fixed steel ladder with walk through cage (**Roof sections 13 to 10**)
1. Side members are 1/4"x2"x2" steel angle. Climbing rungs are 3/4" corrugated steel round rungs space on 12" centers. Stand-off brackets are 7".
   a. FS Industries
   b. Global
   c. Cotterman

2.13 PROTECTION PADS

A. Protection Pads: "- factory-formed, nonporous, heavy-duty, slip resisting, surface-textured protection pads, as supplied Roof system manufacturer. The color of protection pads shall be black. Protection pads to be used under all wood support blocking, equipment supports, pipe steel supports, and under downspout splash blocking.

2.14 ROOF WALKWAYS

A. Walkway: factory-formed, nonporous, heavy-duty, slip resisting, surface-textured protection pads, approximately 2" thick, as supplied Roof system manufacturer. **Please include within base bid roughly 300LF of walk path.**

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect entire roof area to be roofed for acceptability. Examine substrates, areas, and

conditions for compliance with the following requirements and other conditions affecting installation and performance of the roofing system:

1. Verify that roof openings and penetrations are in place, and curbs are set and braced, and that the roof drains and drain lines are properly clamped into position and are in a 100% functional condition.
2. Verify that primary drain bodies are at proper elevations for construction of sump at slopes indicated.
3. Verify that secondary overflow drain bodies are at proper elevations for construction, without sumps, at level of roof surface.

B. The Installer shall conduct fastener pullout tests in accordance with the August 11, 2011, revision of the ANSI/SPRI FX-1 - American National Standard – Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.

C. Verify that structural use panels, sheathing, and similar wood products are securely anchored to substrates, and that surfaces of panels and sheathing are without irregularities which could interfere with proper membrane and flashing installation.

D. Visually inspect roof deck for the following:
   1. Evidence of impaired deck structural capacity or integrity.
   2. Presence of corrosion.
   3. Presence of foreign materials.
   4. Ridges or uneven conditions in deck.
   5. Holes, voids, or gaps in deck.
   6. Accumulations of moisture.

E. Other conditions that would prevent proper application of roofing or that would prevent membrane roofing manufacturer's approval of substrate, components, or system.

F. Verify that roofing systems can be installed with positive drainage of minimum slopes indicated at all areas of roof, without ponding after 24 hours.

G. Verify that roofing as completed will discharge to internal roof drains without ponding or inadvertent discharge through secondary roof drains.

H. Verify that final installed curb heights for flashing are a minimum of 8-inches (200 mm) measured above finished roof membrane.

I. Verify piping and conduit penetrations of roof are made individually, separated by a minimum of 12 inches (300 mm) from each other and from restraining surfaces or other obstructions.

J. Verify locations of interior electrical conduits, piping, ducts, and similar items in close proximity to underside of steel roof decking, to avoid striking with fasteners.

K. Verify that deck and other substrates are dry, free of debris, excess, and foreign materials.

L. Verify substrates and surfaces to receive flashings are dry, clean, and free of sharp or penetrating projections or other irregularities.

M. Proceeding: Proceed with installation only after unsatisfactory conditions have been corrected.

N. Do not commence work until decking and substrates are in full compliance with roof system manufacturer's requirements, deck and substrate conditions are sound, and positive fall to drainage points are achieved.

O. Commencement: Commencement of work indicates acceptance of conditions and responsibility for all corrections.

3.02 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system roofing system manufacturer's written instructions. Remove all sharp projections.

B. The Installer will be entirely responsible for the complete removal of all dirt, debris, and moisture from the roof's substrate, i.e., steel decking, concrete decking, before the installation of the roofing system. The roof's substrate must be 100% completely dry before applying the spray-in-foam insulation or before the installation of the specified roofing insulation.

C. Cleaning: Clean substrate including metal decking flutes of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

D. Debris, water, moisture, or foreign materials found in flutes of steel roof decking is not permitted; remove and replace roofing installed above flutes found to contain foreign materials.

E. Cleaning, repair, or replacement of damaged items, as a result of roofing related materials entering the facility, shall be solely at the roofing contractor's expense.

F. Broom clean cover board immediately prior to membrane roofing application.

G. Promptly remove debris each day; do not stockpile debris or allow waste to accumulate on steel decking, insulation, or roofing under construction.

H. Containment: Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction at the end of the workday or when rain is forecast. Remove roof-drain plugs when no work is taking place or when rain is forecast.

I. Mask off adjoining surfaces not receiving roofing membrane materials to prevent spillage or overspray affecting other construction.

J. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with the same materials as the substrate.

K. Seal around along perimeters, along equipment curbs, around pipes, around conduits, and any other roof penetrations with vapor barrier.

L. Base Vertical Flashings: Coordinate roof insulation thickness with adjacent base flashing height, to maintain not less than 8-inch (203 mm) flashing height. Adjust base vertical flashing height including substrates and changes in exterior wall materials to maintain minimum height.

M. Proceed with roofing work only when weather conditions permit work to proceed in accordance with manufacturer's requirements and recommendations.

3.03 WOOD NAILER INSTALLATION(CONTRACTOR RESPONSIBLE TO INCLUDE ALL WOOD NAILER WITHIN BASE BID)

A. All Wood Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Wood nailer attachment shall meet the current Factory Mutual Loss Prevention Data Sheet 1-49. Refer to Division 06 10 00 for acceptable fasteners for wood product attachments.

B. **Wood Nailer thickness shall be as required to match the insulation and cover board height (thickness) to allow a smooth transition.**

C. Stainless steel, corrosion resistant, fasteners are required when mechanically attaching any roof system manufacturer product to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal edge detailing, a separation layer must be placed between the metal and ACQ treated wood.

D. New wood nailers and/or plywood sheeting shall meet the performance criteria in Division 06 10 00.

3.04 VAPOR-RETARDER / AIR BARRIER INSTALLATION

A. Deck to be as clean as possible. Ensure the concrete is in good condition. If the concrete deck is wet, allow enough time for the moisture to dry. If the contractor cannot remove the asphalt roof membrane from the concrete deck, please remove any loose or deteriorated material, prime existing substrate and install vapor barrier: **No torches to be used to dry deck of moisture!**

B. Install Self-Adhered over a SA Primer. In concrete applications, allow concrete to cure for

at least 7 days. Do not install when it is raining, snowing, or on wet/humid surfaces. Install in temperatures 32°F (0°C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks, and DensDeck Prime® boards.

C. Begin application at the bottom of the slope. Unroll Self-Adhered onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 in. (75 mm) lengthwise following the reference line and by 6 in. (150 mm) at each end. Stagger end laps by at least 12 in. (300 mm). Tool vapor barrier up all penetrations and or perimeters and seal. Vapor barrier to be installed as if the VB was a temp roof. Do not immediately remove the silicone release sheet.

D. Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold Self- Adhered tight and peel back the release sheet by pulling diagonally.

E. Use a 75 lb. (34 kg) roller to press Self-Adhered down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

3.05 INSULATION BOARD INSTALLATION

A. General Criteria:
   1. Coordinate installing membrane roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
   2. Wet, broken, warped, or bent insulation boards are not acceptable. Any damaged insulation boards are to be replaced with new insulation boards.
   3. The substrate surface must be free of debris, dirt, grease, oil, ice, snow, frost, standing water, and must be 100% completely dry prior to the installation of the specified roofing insulation or during the time of applying the dual component polyurethane adhesive.
   4. Construct sumps at primary roof drains using tapered insulation to slope indicated. Install nailers or blocking as required to secure drain body assembly to roof deck.
      a. Unless otherwise indicated, construct sumps to consistent and uniform slope of 1/2 per 12 inches (1:48) to provide a smooth transition from the roof surface to the drain. Do not introduce steeper or shallower slopes within sump.
      b. Use tapered insulation to form a square sump. Unless indicated otherwise, construct sump measuring 4 foot by 4 foot at primary roof drains.
      c. Adjust primary roof drain assemblies to proper elevation for sump.
      d. Install tapered insulation so edges do not restrict flow of water.
      e. Do not create circular depressions around primary roof drains at bottoms of sumps.
   5. **Do not install sumps at secondary overflow roof drains.**
      a. Adjust secondary roof drain assemblies to proper elevation of final roofing membrane.
      b. Do not create circular depressions around secondary roof drains.
   6. Where conditions require drain modifications to match specified insulation thickness, roofing contractor will be responsible for the cost of readjusting the primary roof drain bowl and associated plumbing to match the “finished” insulation thickness. University

of Missouri will not permit circular depressions, nor the cutting or shaving the insulation in order to slope the insulation to the edge of the drain bowl.

7. University of Missouri will not permit loose boards under foot. Contractor is expected to use adequate weight during the application of the insulation boards. Boards in access of 1/8" deflection will not be permitted.
8. Roofing system manufacturer's technical representative shall be on the jobsite during the first initial day of installation of the roofing system.

B. Installation of additional "flat stock" and tapered polyisocyanurate insulation:
   1. The "flat stock" and / or tapered polyisocyanurate insulation panels shall be laid transverse to the proceeding layer of insulation, with joints staggered at least 1/3 of overall length from those of the proceeding layer of the "flat stock" insulation.
   2. The "flat stock" and / or tapered polyisocyanurate insulation boards shall be adhered to top layer of "flat stock" insulation with the dual component polyurethane adhesive. The dual component polyurethane adhesive shall be dispensed ¾ inch wide and 12 inches on center bands in the field of the roof. In the corners and perimeters of the roof area where the tapered crickets or saddles are to be installed, the number of ribbons per unit width or area over the field rate by:
      a. 70% in the perimeter - resulting in a maximum on center spacing equal to 60% of the field spacing (field ribbons at 12" on center, the perimeter spacing shall be 7" on center).
      b. 160% in the corner - resulting in a maximum on center spacing equal to 40% of the field spacing (field ribbons at 12" on center, the corner spacing shall be 4.8" on center.).
   3. After allowing dual component polyurethane adhesive to rise ¾ inch to 1 inch, lay insulation board in to position and walk into place. After walking into place, the insulation board shall be pressed firmly into the adhesive layer using an approved weighted roller by frequent rolling in two or more directions. Contractor shall also "weight down" the insulation board to ensure proper adhesive to the top layer of insulation.
   4. University of Missouri will not accept any un-adhered or loose insulation boards. After installation of the insulation board, if the insulation board is not properly adhered to the proceeding layer, the Installer will be held responsible for replacing the unacceptable installed insulation board. All cost related, i.e., replacement of specified insulation, cover board, membrane, etc., to the replacement of the unacceptable installed insulation board will be at no cost to the Owner.

3.06 COVER BOARD INSTALLATION

A. General Criteria:
   1. Fasten the specified cover board according to requirements of the roofing system manufacturer's written instructions.
   2. Wet, broken, warped, or bent insulation boards are not acceptable. Any damaged cover boards are to be replaced with new cover boards.
   3. Consult roofing system manufacturer on current acceptable substrates and rates for applying low-rise urethane adhesives. The surface of the substrate shall be inspected prior to installation of the cover board.
   4. The substrate surface must be free of debris, dirt, grease, oil, ice, snow, frost,

standing water, and must be 100% completely dry prior to the installation of the specified cover board or during the time of applying the dual component polyurethane adhesive and the spray- in-place foam.

5. Roofing system manufacturer's technical representative must be on the jobsite during the first initial day of installation of the roofing system.
6. Install a single layer of cover board over the specified polyisocyanurate insulation.
7. The cover board sheeting shall be laid transverse to the top layer of the insulation board, with joints staggered at least 1/3 of overall length from those of the insulation layer.
8. The cover board shall be neatly cut to fit within 1/4 inch (6 mm) of nailers, penetrations, and projections.
9. Fill all gaps exceeding 1/4 inch (6 mm) with spray-in-place foam insulation.
10. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
11. Do not install more cover board than can be covered with the specified roofing system by the end of the day, or onset of inclement weather.

B. Attachment of Cover Board:
   1. Apply the dual component polyurethane adhesive at the manufacturer's written instructions for adhering the specified cover board to the specified polyisocyanurate insulation.
   2. The dual component polyurethane adhesive shall be dispensed in 12 inches on center bands in the field of the roof. In the corners and perimeters of the roof area, the number of ribbons per unit width or area over the field rate by:
      a. **70% in the perimeter - resulting in a maximum on center spacing equal to 60% of the field spacing (field ribbons at 12" on center, the perimeter spacing shall be 7" on center).**
      b. **160% in the corner - resulting in a maximum on center spacing equal to 40% of the field spacing (field ribbons at 12" on center, the corner spacing shall be 4.8" on center).**
   3. After allowing low rise urethane foam to rise ¾ inch to 1 inch, lay cover board in to position and walk into place. After walking into place, the cover board shall be pressed firmly into the adhesive layer using an approved weighted roller by frequent rolling in two or more directions. Contractor shall also use "weights" to ensure the cover board is completely adhered to the top layer of the polyisocyanurate insulation. There shall not be any elevation change or raise of the corners or sides of the cover board as compared to the sides of the adjacent cover board sides. The cover board shall lay flat, or level as compared to the edges of the adjacent cover board.
   4. **After installation of the cover board, should the cover board have more than 1/8 inch deviation or rise to the adjacent cover board, the Installer will held responsible for replacing the unacceptable installed cover board. All cost related, i.e. replacement of specified insulation, cover board, membrane, etc., to the replacement of the unacceptable installed cover board will be at no cost to the Owner. The replacement of the unacceptable cover boards shall be completed prior to the installation of the membrane.**

3.07 EPDM MEMBRANE INSTALLATION

A. General: Install in strict accordance with roofing system manufacturer's latest published requirements, instructions, specifications, details, and approved shop drawings.

B. Install EPDM membrane per roofing system manufacturer’s requirements to obtain roofing system manufacturer Twenty (20)-year Full System (NDL) warranty.

C. Install in strict accordance with roofing system manufacturer's latest published instructions.

D. Roofing system manufacturer’s technical representative must be on the jobsite during the first initial day of installation of the roofing system.

E. Coordinate with Owner representative to shut down air-intake equipment in the vicinity of the Work. Roofing Contractor shall cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors located in the mechanical ductwork.

F. The EPDM membrane is to be adhered with roofing system manufacturer’s approved adhesive. Membrane overlaps shall be shingled with the flow of water where possible. Tacking of the EPDM membrane side laps for purposes of temporary restraint during installation is not permitted.

G. Layout: Layout roofing membrane to minimize number of seams. Avoid seams through roof primary roof drain sumps or through secondary roof drain locations.
1. Position membrane straight and square to building.

3.08 ADHERED EPDM ROOFING MEMBRANE INSTALLATION

A. Install EPDM sheet over area to receive roofing according to roofing system manufacturer’s written instructions. Adhere membrane on all roof areas using largest sheet practical for job conditions. Avoid wrinkling or stretching the membrane. Unroll sheet and allow relaxing for a minimum of 30 minutes.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer’s technical personnel.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically fasten roofing membrane securely at terminations, penetrations, angle changes and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing membrane, tape side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges to verify seam strength.
   2. Apply lap sealant to seal all edges of flashing membrane and T-Patches.
   3. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.

H. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

I. **USE CAUTION TO ENSURE ADHESIVE FUMES ARE NOT DRAWN INTO THE BUILDING.**

J. Mechanically fasten membrane securely at all vertical to horizontal transitions, at points of terminations, and at the perimeter of roof to meet Manufacturer's Technical Department's requirements for properly securing the specified roofing system.

K. Spread sealant bed over deck drain flange at deck drains and securely seal roofing membrane in place with drain clamping ring.

L. Securement Around Perimeter and Rooftop Penetrations
   1. Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, roofing system manufacturer's fasteners and termination bar or discs shall be installed. Fasteners, disc, and termination bar shall be installed according to the roofing system manufacturer's instructions. Fasteners shall be installed using the fastener roofing system manufacturer's recommended fastening tools with depth locators.
   2. EPDM membrane flashings shall extend a minimum of 3 inches past the securement bar or plates and shall be adhered onto the EPDM membrane.

M. Field-seam according to Section 3.07, "Seam Installation."

N. Excessive Repairs: Excessive repairs to membrane, or to membrane seams are not permitted. Remove and replace membrane in entire area affected, and as directed by University of Missouri representative.

Note:

1. **The Installer shall employ all means necessary to assure that the installation of all field and flashing membranes are free of loose (un-adhered) areas and wrinkles. The Owner's Representative(s) reserves the right to require that all preventable loose and /or wrinkled field membrane and membrane flashings to be repaired to the satisfaction of the Owner's Representative. In the event that the Installer determines that loose and /or wrinkled membrane or membrane flashing is unavoidable in a specific area(s), the onsite Owner's Representative must be notified immediately for a determination of acceptability.**
2. **Contractor is to ensure during the time of installing the membrane field and**

membrane flashing sheet, there are no entrapment of debris under the membrane.

3.09 MEMBRANE FLASHING INSTALLATION

A. General: All membrane flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the roofing system manufacturer. Approval shall only be for specific locations on specific dates. Membrane flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.

B. Manufacturers required adhesive to be used to adhere the EPDM membrane flashing to acceptable wall and equipment curb substrates. No bitumen shall be in contact with the EPDM membrane. If bitumen exists **install Cav Grip primer or equal over existing bitumen**.

C. Manufacturers Adhesive for Membrane Flashings:
   1. Over the properly installed and prepared flashing substrate, the adhesive shall be applied according to instructions found on the Product Data Sheet. The adhesive shall be applied in smooth, even coats with no gaps, globs, or similar inconsistencies. Only an area that can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
   2. No adhesive shall be applied in seam areas that are to be adhered. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by techniques.
   3. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut, and corners applied. Where applicable, roofing system manufacturer's pre-fabricated corners shall be used.
   4. The membrane flashing shall be completely adhered to the substrate with no unadhered areas.

D. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and roofing system manufacturer's technical department.

E. Vertical Surfaces Taller than 24 Inches (760 mm): Where vertical distance of flashing membrane exceeds 24 inches in height, in addition to terminations at base flashings, mechanically fasten fully adhered flashing membrane with additional termination bar installed horizontally at not greater than 30 inches (760 mm) on center vertically to top of flashing membrane.
   1. Install membrane cover strip of standard sheet at least 8 inch (0.23 m) in width of same material, type, reinforcement.
   2. Install baton bar and cover strip using mechanical fasteners as roofing progresses. Do not proceed with roofing without full attachment of termination bars and installation of coversheet for area under construction.

F. Flashing Termination: Terminate all vertical flashing membrane surfaces horizontally and vertically with mechanically fastened termination bars and sheet metal

flashings/counterflashings. Mechanically fasten flashing membrane securely using mechanical fasteners specifically designed and sized for fastening specified membrane flashing and termination bars into substrate.

1. Fasten baton bar/termination bar with fasteners not greater than 6 inches (152 mm) on center for length of bar, with fasteners within 3 inches (76 mm) of ends, or closer as required by manufacturer. Fasten into nailer or other substantial backing located behind point of base or curb termination.
2. Uniformly fasten, seat, and compress termination bar into top of fully adhered flashing membrane.
3. Install sealants continuously across surface of termination, including terminations covered with sheet metal flashing and counterflashing.
4. Install termination bars using mechanical fasteners as roofing progresses. Do not proceed with roofing without full attachment of termination bars for area under construction.
5. At termination of vertical and wall sheet flashings not under copings, install termination bar at vertical and wall membrane flashings with metal surface mounted one- or two- piece counterflashing assemblies, as is required for condition. Install as indicated in Drawings, or if not shown in Drawings or otherwise indicated, as required to produce continuous closure of membrane with termination bar and metal flashing, regardless of abutting materials overlap.
6. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for requirements for counterflashings and other metal fabrications.

G. Primary Roof Drains: Install membrane into sump and extend into line of depressed sump at roof drain. Install membrane free of wrinkles or surface irregularities. Shingle seams around and outside sump in direction of water flow and drainage; backwater laps and seams are not permitted in or around sumps or drains.
   1. Cut membrane to fit roof drain piping inlet; do not allow membrane to restrict opening size.
   2. Spread sealant over roof drain deck flange and securely seal roofing membrane in place with clamping ring. Seal between membrane and drain base with water cut off mastic in accordance with manufacturer's recommendations.
      a. Apply sealant in strict compliance with manufacturer's requirements.
   3. Install membrane to comply with other requirements indicated for roofing membrane.
   4. Remove and replace any steel fasteners and washers in clamping ring. Install clamping ring using stainless steel fasteners and washers.
   5. Securely tighten clamping rings to provide constant pressure on water cut off mastic.
   6. Install new metal strainers to complete primary roof drains.

H. Secondary Overflow Roof Drains: Install membrane to extend into line of roof drain at roof surface. Install membrane free of wrinkles or surface irregularities. Shingle seams around and outside drain in direction of water flow and drainage; backwater laps and seams are not permitted in roof membrane around or under drains.
   1. Cut membrane to fit roof drain piping inlet; do not allow membrane to restrict opening size.
   2. Do not set secondary roof drain body below roof surface. **Do not construct roof sumps at secondary overflow roof drains.**

3. Spread sealant over roof drain deck flange and securely seal roofing membrane in place with clamping ring. Seal between membrane and drain base with sealant in accordance with manufacturer's recommendations.
   a. Apply sealant in strict compliance with manufacturer's requirements.
4. Install membrane to comply with other requirements indicated for roofing membrane.
5. Remove and replace any steel fasteners and washers in clamping ring. Install clamping ring using stainless steel fasteners and washers.
6. Securely tighten clamping rings to provide constant pressure on sealant.
7. Install new metal strainers to complete secondary roof drains.

I. High- or Elevated- Temperature Vent Flashings: Install prefabricated or field-formed membrane flashings to comply with manufacturer's written requirements and recommendations and as indicated. Field form flashings from sheet flashing membrane designed for and suited to condition.
   1. Install stainless steel metal base fabricated metal flashing sleeves prior to installing flashings.
   2. Install fire-resistant mineral-wool-fiber insulation between metal flashing sleeve and high- or elevated- temperature outside vent surfaces.
   3. Select proper diameter prefabricated flashing to properly fit penetration and roof conditions.
   4. Secure deck membrane around metal base sleeve penetration to comply with manufacturer's requirements. Secure close to penetration so prefabricated flashing will cover attachments. Secure top of membrane flashing to top of sleeve penetration.
   5. Secure deck membrane around sleeve penetration to comply with manufacturer's requirements. Secure close to penetration so prefabricated flashing will cover attachments.
   6. Install flashings to produce a minimum of 8-inch (200 mm) flashing height.
   7. Lap base of flashings atop roof membrane at least 4 inches (100 mm). Hot-air seams at roofing membrane lap.
   8. Place prefabricated flashing in place tight to horizontal deck membrane; ensure flange lays flat to deck membrane.
   9. base of prefabricated flashing continuously to deck membrane.
   10. Where required by manufacturer, heat upper part of prefabricated flashing to temperature required by manufacturer; avoid overheating.
   11. Clamp top of flashing at vent with stainless steel clamping ring.
   12. Install stainless steel metal umbrella cap flashing, holding close to membrane base flashing.

J. Only an area, which can be completely covered in the same day's operations, shall be flashed.

K. Daily test lap edges with probe to verify seam continuity of all membrane flashings.

L. Complete all membrane flashing and metal details on a daily basis. No temporary flashings shall be allowed with the prior written approval of the Owner's Representative and roofing system manufacturer. If any water is allowed to enter under the completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Installer's expense.

M. **USE CAUTION TO ENSURE ADHESIVE FUMES ARE NOT DRAWN INTO THE BUILDING.**

N. Installer is to ensure there are no wrinkles and "fish-mouths" in the membrane flashing and in the overlap seams.

O. Excessive Repairs: Excessive repairs to seams or flashings are not permitted. Remove and replace membrane, and if required the roofing components, in entire area affected as directed by University of Missouri representative.

3.10 PERIMETER AND METAL BASE FLASHINGS

A. General: All flashings shall be installed concurrently with the roofing membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the roofing system manufacturer. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Installer's expense.

B. Sheet metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

C. All Kynar coated perimeter metal edging shall be fabricated and installed per current SMACNA requirements.

D. Installation of 2 piece Metal Era coping as referred to in drawings.

E. Secure the Kynar coated metal over the field membrane and the "Multi-Purpose Sealing Tape." Fastened the sheet metal with approved stainless steel nails or other acceptable fastener. Fasteners shall be fastened 4 inches on center and staggered 4 inches on center.

F. An 8 inch minimum wide strip of the 60 mil membrane flashing shall be adhered to the 4 inch wide flange of the sheet metal and to the field membrane. Check all coverstrip with a rounded screwdriver. Re-work any inconsistencies.

3.11 WALKWAY INSTALLATION

A. Installer is to install walkway in the areas as indicated on roof plans. Installer is responsible for verification of the total linear footage of the required walkway installation. The minimum length of the walkway, installed at any one location, shall be four (4') feet.

B. Install the walkway to roofing system manufacturer's written instructions.
   1. Clean all dirt and debris from the deck membrane in areas where the walkway will be installed.
   2. Important: Check all deck membrane s with a rounded screwdriver prior to installation of walkway. Re-adhere any inconsistencies before walkway installation.
   3. Install walkway in the indicated roof areas.
   4. Installer should adhere the walkway to the field membrane.

3.12 PROTECTION PAD INSTALLATION

A. General: Install protection pad under exposed wood blocking and under equipment supports.

B. The installation of the protection pad:
   1. Clean all dirt and debris from the deck membrane in areas where the protection pad will be installed.
   2. Important: In areas where protection pads are to be installed, Installer is to probe all field membrane seams laps with a rounded screwdriver prior to installation of the protection pad. Re-adhere any inconsistencies before protection pad installation.
   3. Cut the protection pad 4 inches (4") wider than the dimensions of the wood blocking or equipment and piping support.
   4. Adhere the entire perimeters of the protection pad to the field membrane sheet.
   5. Probe all protection pad seams with a rounded screwdriver. Re-adhere any inconsistencies found in the protection pad seams.
   6. Center the wood blocking or equipment or pipe support over the protection pad.

3.13 HIGHLY VIISBLE MEMBRANE INSTALLATION

A. General Requirements: Provide and install a highly visible membrane product; designed to draw attention to unprotected roof perimeters and potentially hazardous areas that do not comply with University of Missouri safety guidelines.

B. Installation of yellow, 4 inch wide, cover strip:
   1. Installer and University of Missouri Representative shall verify unprotected roof perimeters and potentially hazardous areas on the referenced project's roof area(s).
   2. The yellow cover strip shall be installed not less than 6 feet 6 inches (2 meters) from unprotected roof perimeters and potentially hazardous areas.
   3. Before installing the yellow membrane 4-inch-wide cover strip, the Installer shall have Roof system manufacturer Technical Representative to verify permanence of all deck membrane with a rounded screwdriver. Repair any inconsistencies of the membrane seams before yellow membrane installation.
   4. The roofing membrane shall be properly cleaned prior to install the "yellow membrane 4-inch-wide cover strip." Failure to properly clean the membrane will result in less than satisfactory adhesion of the yellow membrane.
   5. Peel and stick the yellow cover strip to installed and inspected roofing membrane.
   6. Installer shall take care to avoid trapping air under the yellow membrane.
   7. After adhering the yellow cover strip, the Installer shall verify permanence of all yellow cover strip. Repair any inconsistencies of the yellow cover strip installation.

3.14 TEMPORARY ROOFING TERMINATIONS AND PROTECTION

A. Prior to starting roofing project, the Installer shall inspect the facility existing roof area(s) associated with the contract roofing project for any defects which could cause water or moisture vapor entries into the building during the roofing application. Any defects or concerns shall be addressed in writing to the Owner's representative prior to starting the roofing project. Proceeding with the roofing project indicates the Installer's acceptance of the existing facility conditions.

B. For existing roof areas where access is absolutely required for the installation of the new roofing system on another roof area, the Installer shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent roof areas. A suitable temporary protective surface shall be provided for all roof areas which receive traffic during construction of the new roofing system. During the roofing project, any damage which occurs to the new or existing roofing membrane and/or system shall be removed and replaced at the Installer's expense.

C. The Installer shall provide the labor and materials required to maintain a watertight and impermeable condition at all times on the roof areas as referenced in the project's contract documents. All membrane and metal flashings shall be installed concurrently with the field membrane installation to maintain a 100% watertight and to prevent any air/water vapor infiltration into the completed roofing system each day.

D. When an interruption or a postponement in the roofing work occurs during the installation of the roofing system, the Installer shall install temporary watertight and hermetic terminations across the installed Roof system manufacturer roofing system. The Roof system manufacturer roofing system shall be 100% impermeable to prevent water and air/water vapor infiltration into or under the new roofing system. When work resumes, any contaminated membrane shall be removed from the work area and disposed off site. None of these materials shall be reused in the new work.

E. During inclement weather or during a postponement in the roofing work occurs while a temporary water stops or terminations are in place, the Installer shall provide the labor and materials to monitor and ensure the temporary water stops and terminations are 100% watertight and impermeable condition.

F. If any weather-related moisture or the result of moisture caused by the condensation of water vapor are allowed to enter the newly completed Roof system manufacturer Roofing System, the affected roof area(s) shall be removed and replaced at the Installer's expense.

3.15 FIELD QUALITY CONTROL

A. Quality Control of Seams:
   1. The Installer shall designate a Quality Control Supervisor to daily check all seams for continuity by using a rounded screwdriver.
   2. On-site evaluation of completed seams shall be made by the Installer at locations as directed by the Owner's Representative or roofing system manufacturer's technical

representative.

3. All membrane seams, both field and flashings, shall be adhered and probed on a daily basis. NO EXCEPTIONS.

B. Roofing system manufacturer's technical representative: Installer shall arrange to have the system manufacturer's technical representative on site for the first day of installation of the roofing system. The Technical Representative shall note:
   1. Conduct a site inspection on the first day of production.
   2. Communicate with the University of Missouri project manager each inspection, i.e., meet with the University of Missouri designated project manager before entering the work area.
   3. Note all defects noted non-compliance with the specifications or the recommendations of the roof system manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the University of Missouri representative and Roof system manufacturer.
   4. Ensure the roofing contractor has received a copy of each In-Progress Inspection Report within two days of the inspection. The roofing contractor is to forward the University of Missouri On-site Representative a copy of the In-Progress Inspection Report.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion of the roofing project.
   1. All defects noted non-compliance with the roofing specifications and details, or the recommendations of roofing system manufacturer representative should be itemized in a punch list. These items must be corrected immediately by the Installer to the satisfaction of the Owner's Representative and roofing system manufacturer technical representative.
   2. Ensure the roofing contractor has received a copy of the Final Inspection Report within two days of the inspection. The roofing contractor is to forward the University of Missouri On-site Representative a copy of the Final Inspection Report.

3.16 PROTECTING AND CLEANING

A. Protect sheet membrane roofing from, not limited to the following items: dirt, grease, rust stains, roofing asphalt, scuff marks, abrasions, adhesive spills, sealant spills, membrane cuts, and any physical damages to the installed Roof system manufacturer roofing system during the construction period.

B. Upon completion of the Work, dispose of, away from the Site, all debris, trash, containers, fasteners, roofing remnants and scraps.

C. **The completed "Roof" shall be washed with water and the University of Missouri approved cleaner to remove all dirt, stains, adhesive and sealant spills, and any residue from roof membrane.**

3.17 ACCEPTANCE

A. Prior to demobilization from the site, the roofing system manufacturer's project manager, University of Missouri's representative(s), roofing system manufacturer's designated field technical representative and Installer's project manager, production crew superintendent, and project's roofing foreman shall review the completed work.

B. Installer and University of Missouri representative shall inspect the completed roofing system for any uneven cover boards, loose or improperly attached insulation or cover boards, ponding of water, un-adhered membrane and membrane flashing, membrane damage, dirt, rust stains, roofing asphalt, grease, scuff marks, cuts, abrasions, adhesive spills, and sealant spills.

C. All defects noted noncompliance with the project's bid documents will be itemized in a punch list. Any non-compliance item shall be removed and/or repaired immediately by the Installer to the satisfaction of the University of Missouri representative, and to roofing system manufacturer.

D. The noted deficiencies shall be repaired or replaced to a condition free of damage and deterioration at the time of Substantial Completion Acceptance by University of Missouri's representative, and / or to accordance of the University of Missouri project contract documents.

E. All warranties as required for the project of this specification shall be submitted for approval prior to final payment by the University of Missouri.

END OF SECTION 07 5401

SECTION 07540.3 –EPDM MEMBRANE ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
   1. Adhered EPDM sheet roofing
   2. Polyisocyanurate Insulation
   3. Cover board
   4. Walkway pads

Energy Management:

B. **Scope of Work**: The scope of work includes the minimizing of the intrusion of dust and debris, created by the process of the installation of the new EPDM Roofing System. The phased installation of the new roof system will be installed in such a manner as to maintain a watertight integrity on a daily basis.

C. **Roof 1**: Remove roof system down to the concrete substrate; prime concrete deck substrate and install manufactures approved (SA) self-adhered vapor barrier; Installation of the following with FM 1-90 FM ribbon pattern installation of (2) two layers of 1.5” polyisocyanurate insulation adhered with two-part low-rise foam over the self-adhered vapor barrier. The roof systems are required to have 4’ true sumps without chamfering the drain bowl locations. Installation of ½” plywood on all walls followed by the installation of plywood at all roof accesses and ladder egresses.

D. **Roof 2**: Over the cleaned and prepared wood decking substrate mechanically fasten 5/8” Type X gypsum /Securerock or equal with FM 1-90 fastening pattern (minimum 16 fasteners per 4x8). Installation of manufacturer approved (SA) self-adhered vapor barrier to the primed gypsum substrate. With FM 1-90 FM ribbon pattern installation of two (2) layers of 1.5” polyisocyanurate insulation adhered with 2-part low rise foam. The roof systems are required to have 4’ true sumps without chamfering the drain bowl or through wall sump locations. Installation of ½” plywood on all walls followed by the installation of plywood at all roof accesses and ladder egresses.

E. Installation of 1/2” HD polyisocyanurate cover board with two-part low-rise foam with FM 1-90 FM ribbon pattern over redundant layers of insulation staggered a minimum of 18”. Installation of the roofing system manufacturers fully adhered 60 mil EPDM membrane in order to meet the project’s roofing design guidelines. All flashing

membranes, prefabricated metal, and sheet metal will be installed in accordance with roofing system manufacturer's recommendations. The installation of butyl caulk or tape at all attachment points of the surface mounted counterflashing. Installation of extensive walk paths in a way to match the existing walk paths. Installation of a yellow warning line 10' from unprotected edge. Paint all gas lines yellow. Remove all wood supports and replace them with synthetic Dura-block products. Contractor's responsibility to include all needed wood nailers to facilitate the installation of roof system in its entirety. The completed EPDM roof system and roofing system manufacturer's supplied accessories shall be installed in such a manner so that the roofing system manufacturer's Twenty- (20) year Full Systems (NDL) Warranty can be issued upon successful completion of the roofing project. Contractor to verify all drain lines are functioning at the end of the project.

F. Installation of new roof access stairway from roof section 1 onto roof section 2.

1.03 DEFINITIONS

A. ASTM E108, Class "A".

B. UL 790, Class "A".

1.04 REFERENCES

A. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

B. Single-Ply Roofing Institute (SPRI): Application Guidelines and Wind Design Guidelines for Various Single Ply Membranes

C. National Installers Association (NRCA): Current Roofing and Waterproofing Manual

D. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Current SMACNA Technical Manuals.

E. Code of Federal Regulations, (CFR) including:
   1. CFR Title 29, Part 1910 "Occupational Safety and Health Standards."
   2. CFR Title 29, Part 1926 "Safety and Health Regulations for Construction."

F. Underwriters Laboratories (UL):
   1. Roof Materials and Systems Directory. 2012.
   2. UL 790: Tests for Fire Resistance of Roof Covering Materials: 1983.

G. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) FOR EPDM MEMBRANE:
   1. .060" (Black) Non Reinforced
   2. ASTM D 412
   3. ASTM D 624

4. ASTM D 573

1.05 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 system manufacturer based on testing and field experience.

C. Roofing System Design: Comply with SPRI "Wind Design Guide for Adhered Single Ply Roofing Systems" for the following ground roughness exposure, classification of building and system design:
   1. Surface Roughness Category: Exposure B
   2. Classification of Building: Category II
   3. Wind uplift Design: 90 mph @ 3second gust
   4. System 1 Design: Adhered Single Ply Membrane Roofing

D. Underwriters Laboratories Inc. (UL):
   1. UL RMSD – 2009 Roofing Materials and Systems Directory
   2. UL 790 – 2009 Fire Resistance of Roofing Coverings Materials
   3. Exterior Fire Exposure Classification: Class A, ASTM E 108, for application and slopes shown

1.06 ACTION SUBMITTALS

A. Product Data: Submit latest edition of roofing system manufacturer's roofing and base flashing specifications including list of materials proposed for use, installation procedures, and roofing system manufacturer's Product Safety Data Sheets.

B. Product Safety Data Sheets: Installer shall review all product data safety data sheet chemical names prior to submitting to University of Missouri.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Roof plan showing orientation of concrete deck and orientation of membrane roofing.
   4. Insulation ribbon methods for corner, perimeter, and field-of-roof locations.

D. Samples for Verification: Physical samples are not necessary.
   1. Sheet roofing, of color specified.
   2. Roof insulation.

3. Cover board.
4. Metal termination bars.
5. Battens.
6. Six batten fasteners of each type, length, and finish.
7. Walkway pads or rolls.
8. Safety yellow perimeter tape.

1.07 INFORMATION SUBMITTALS

A. Qualification Data: For qualified Installer and roofing system manufacturer.

B. Roofing system manufacturer Certificates: Signed by roofing system manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of compliance with performance requirements.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by roofing system manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

D. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.

E. Single Ply Roofing Institute (SPRI) - Fasteners Withdrawal Resistance Testing:
   1. The Installer shall conduct fastener pullout tests in accordance with the August 11, 2011 revision of the ANSI/SPRI FX-1 - American National Standard – Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
   2. Prior to starting the project, provide a copy of the Fasteners Withdrawal Resistance Testing to roofing system manufacturer’s technical department.

G. Warranty:
   1. Provide sample copy of 20-year (NDL) Full System roofing system manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.
   2. Provide sample of copy 5-year Installer’s workmanship warranty stating obligations, remedies, limitations, and exclusions of warranty.

H. Inspection Report: Copy of roofing system roofing system manufacturer's final inspection report of completed roofing installation.

1.08 CLOSE OUT SUBMITTALS

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

1.09 QUALITY ASSURANCE

A. Roofing System Manufacturer Qualifications: A qualified roofing system manufacturer

that is UL listed for membrane roofing system identical to that used for this Project.

B. Installer Qualifications:
   1. A qualified firm that is approved, authorized, or licensed by membrane roofing system roofing system manufacturer to install roofing system manufacturer's product and that is eligible to receive roofing system manufacturer's special warranty.
   2. Prior to submitting a roofing proposal, Installer must be approval by Owner's representative.

C. Roofing system manufacturer's membrane shall meet the following characteristics:
   1. Protective membrane surface coating to resist accumulation of air borne contaminants such as dust and dirt.
   2. Membrane Thickness: Membrane roofing system manufacturer is to verify that the membrane thickness is of the membrane thickness specified ASTM D412 nominal thickness of +/- 10 percent will not be acceptable for measurement of membrane thickness.

D. Source Limitations: Obtain components including roof insulation, fasteners, and accessories for membrane roofing system from same roofing system manufacturer as membrane roofing.

E. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

F. Pre-installation Conference: Before installing roofing system, conduct conference at Project site. Notify participants at least 10 working days before conference.
   1. Meet with Owner's Representative/General Contractor, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system 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 roofing system 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 roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

G. At no cost to University of Missouri, roofing system manufacturer's technical representative shall perform:
   1. Manufacturer's Quality Control Inspection: The Manufacturer's Technical Representative shall review the on-going work on the first day of the roofing production and a minimum of one (1) in-progress inspection every 10 working days. The Roof system manufacturer Technical Representative shall:
      a. Communicate with the University of Missouri project manager each inspection, i.e. meet with the University of Missouri designated project manager before entering work area.
      b. Note all defects noted non-compliance with the specifications or the recommendations of the roof system manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the University of Missouri representative and Roof system manufacturer.
      c. Ensure the roofing contractor has received a copy of each In-Progress Inspection Report within two days of the inspection. The roofing contractor is to forward the University of Missouri On-site Representative a copy of the In-Progress Inspection Report.
   2. Final Roof Inspection: Contractor is to arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion of the roofing project.
      a. All defects noted non-compliance with the specifications or the recommendations of the roof system manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the University of Missouri and Roof system manufacturer.
      b. The roofing contractor is to forward a copy of Final Inspection Report to the University of Missouri On-site Representative within two days after date inspection(s) is performed.

H. Installer's Responsibility: Any failure by the Owner Representative or roofing system manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the Installer, or reduce, or in any way limit, his responsibility of full performance of work required of the Installer under these specifications.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with roofing system manufacturer's name, product brand name, and type, date of manufacture, and directions for storing and mixing with other components. Deliver materials in sufficient quantity to allow work to proceed without interruption.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within temperature range required by roofing system manufacturer.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Store and protect materials, including roofing insulation from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store all materials in a dry location. Use pallets to support all materials from roof deck. Distribute the load to stay within live load limits of the roof construction. Remove unused materials from the roof at the end of each day's work. Comply with roofing system manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.11 PROJECT CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to roofing system manufacturer's written instructions and warranty requirements.

B. The EPDM adhered membrane shall not be installed under the following conditions without consulting manufacturer for precautionary steps:
   1. The roof assembly permits interior air to pressurize the membrane underside.
   2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
   3. The wall/deck intersection permits air entry into the wall flashing area.

C. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

D. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to roofing system manufacturer's written instructions and warranty requirements.

E. Protection:
   1. Provide special protection and avoid traffic on completed areas of membrane installation.
   2. Restore to original condition or replace work or materials damaged during handling of roof materials.
   3. Take precautions as required to protect adjacent work and structures.

F. Emergency Equipment and Materials: Maintain onsite equipment and materials necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather. If inclement weather occurs while a temporary water stop is in place, the Installer shall provide the labor necessary to monitor the situation to maintain a watertight condition.

G. Protection:
   1. Arrange work sequence to avoid use of newly-constructed Roofing for storage, walking surface, and equipment movement. Where such access is absolutely required, the Installer shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent Roofing areas.
   2. The Installer shall provide a suitable temporary protective surface for all roofing areas which will receive construction traffic or construction of equipment during all phases of the roofing project.
   3. During the course of installation of the membrane roofing systems, should there be any damage created by other construction trades to the new or to existing roofing membrane and/or roofing system, the Installer is to immediately notify the Owner's Representative and membrane roofing system manufacturer. All damages are to be repaired according to the membrane roofing system manufacturer's or Owner's representative's recommendations. The "party" responsible for the roofing damages shall bear the total cost for the repairs or for the replacement of existing or new roofing system.

H. Restrictions:
   1. Comply with Owner's General and Safety Requirements on use of site.
   2. Smoking and Tobacco products are prohibited on all roof areas and on the campus grounds.
   3. Provide and maintain sanitary facilities for employees.
   4. Maintain facility and all utility services in a functional condition.

1.12 WARRANTY

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

B. Roofing System Manufacturer's Warranty: Submit a written warranty, without monetary limitation, with all available options, including flashing endorsement, roofing system manufacturer's roof insulation and roofing system manufacturer's accessories, signed by roofing system roofing system manufacturer's agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
   1. Twenty (20) Year Full System Warranty (no ponding/standing water exclusions accepted). Warranty shall be non-prorated and cover basic wind speeds up to **70 mph**.
   2. "Early Bird" warranties are not to be issued, as they will not be accepted by Owner.
   3. The specified roofing system manufacturer's warranty will be issued only upon final acceptance by the roofing system manufacturer's ttechnical department and the Owner's Representative's final approval.
   4. Request for final payment and issuance of the specified Roofing system manufacturer's warranty will be issued to the Installer's after successful completion

and Owner's Representative's final approval and acceptance of the entire roof system installation.

C. Installer's Warranty: Submit roofing Installer's workmanship warranty, on a notarized written warranty form, signed by Installer, covering Work of this Section, including membrane roofing, sheet flashing, cover board, roof insulation, fasteners, adhesives, sealants, and associated sheet metal, for the following warranty period:
   1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ROOFING SYSTEM MANUFACTURER

A. The components of the roof system are to be products of a single roofing system manufacturer or approved by the Roof system manufacturer, whose products meet or exceed the project specifications, have manufactured and installed the roofing materials and systems of the type specified for a minimum of twenty (20) years, and who maintains a single source responsibility for the total roofing system.

B. Roofing system manufacturers: The components of the roofing system are to be products of a single roofing system manufacturer as required to provide the specified system warranty. Subject to compliance with requirements, provide roofing products from:
   1. Versico incorporated, Akron OH
   2. Carlisle Roof System, Akron OH
   3. Firestone Roof system, Carmel IN.
   4. Owner approved manufacturers.

2.02 EPDM MEMBRANE

A. EPDM Membrane: a uniform, flexible sheet formed from ethylene propylene diene monomer, ASTM D 412, of the following Classification – Type and Grade, Membrane Thickness, UL Classification, and Membrane Exposed Face Color.
   1. Classification: Type II, Grade I.
   2. Membrane Thickness: 60 mils, +/- 2.0 mils.
   3. UL Class: A.
   4. Membrane: Exposed Face Color: Black

2.03 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by roofing system roofing system manufacturer for intended use and compatible with membrane roofing materials.
   1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdictions.

B. Membrane flashing and Flashing Accessories: As recommended by the roofing system manufacturer's printed instructions for sheet flashing of same material, mil thickness and color as sheet membrane.

C. Asphalt Resistance Membrane Flashing: Roof system manufacturer's SA vapor barrier. The asphalt resistance membrane flashing can be adhered directly to asphalt-contaminated surfaces. The asphalt resistant membrane can be installed over the field membrane to act as a protection layer membrane in conditions where oil and grease could develop from roof-top equipment.

D. Insulation Fasteners: Roofing system manufacturer approved corrosion resistant steel #12 "fasteners," screws of the appropriate size and type for roof membrane and insulation attachment. A #12 corrosion-resistant fastener is used with plates to attach insulation boards to steel roof decks. Fasteners for the insulation shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

E. Insulation Securement Plates: Roofing system manufacturer approved corrosion resistant steel, 3 inch round plates, "plates," of the appropriate size and type for the securement of the insulation to approved substrates. Securement plates for the insulation shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

F. Membrane Securement Plates: Roofing system manufacturer approved corrosion resistant steel, 2 inch round plates, "discs," for the securement of the membrane to the steel roof decks. Securement plates for the membrane shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

G. Membrane Securement Screw: Roofing system manufacturer approved corrosion resistant steel, "#15screws" of the appropriate size and type for roof membrane securement. A #15, heavy-duty, corrosion-resistant fastener used with "discs" and "termination bar" to attach Roof system manufacturer's roof membrane to steel roof decks. Fasteners for the membrane shall be supplied and installed as recommended by the roofing system manufacturer's printed instructions.

H. Membrane Bonding Adhesive: Roofing system manufacturer's approved contact adhesive, Standard bonding adhesive, used to attach membrane to the horizontal or near-horizontal substrate. Application rates are to be as recommended by roofing system manufacturer's printed instructions.

I. Membrane Flashing Bonding Adhesive: Roofing system manufacturer's approved contact adhesive, used to attach the flashing membrane to the substrate, either horizontally or vertically. Application rates are to be as recommended by roofing system manufacturer's printed instructions.

J. Metal Termination Bar: a heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Reglet is produced from 6063-T5, 0.10 inch to 0.12 inch (2.5 mm to 3.0 mm) thick extruded aluminum. "reglet" has a 2-1/4 inch (57 mm) deep

profile, and is provided in 10 foot (3 m) lengths.

K. Membrane Securement Bar: is a 1 inch wide aluminum alloy bar used with to clamp the membrane to the roof deck along walls, curbs, and certain vertical to horizontal changes in the roofing system. Termination bar is supplied in bundles of 25 pieces. Each termination bar is 10 feet long.

L. Sealants: Owner approved sealant shall be used to seal penetrations through the membrane system and at miscellaneous sealant applications that are exposed to roof systems components.

M. Safety Warning Membrane: A highly visible product to draw attention to an unprotected roof perimeters and potential hazardous area. The safety warning membrane is designed for use on a membrane roof. The EPDM safety warning membrane shall be a yellow in color, 60 mils in thickness, 4 inches wide, and 100 feet in length.

N. Pre-Fabricated Pipe Flashing: prefabricated vent pipe flashing made from 0.060 inch (60 mil/1.5 mm) thick membrane.

O. Pre-Fabricated Corner Flashing: prefabricated universals corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are adhered/quick applied to membrane base flashings.

P. Aluminum: ASTM B 209-86, alloy and temper - 3003-H14, 0.040 inch thick aluminum sheet, mill finish with formed drip edge.

Q. Mineral Wool-Fiber Fire-Resistant Insulation: Semi-rigid mineral-wool-fiber batt insulation; Type IVA per ASTM C 612; not less than 144 psf (6.9 kPa) compressive strength per ASTM C 165; less than 0.05 percent moisture absorption per ASTM C 1104; complying with ASTM E 136; and with the following surface-burning characteristics per ASTM E 84:
   1. Flame Spread: 0.
   2. Smoke Developed: 0

   3. Manufacturers: Subject to compliance with requirements, available products include the following:
      a. Basis of Design: Roxul Safe; Roxul Inc.

R. Other miscellaneous materials shall be of the “best grade” available and to be approved in writing by the roofing system manufacturer for the specific application.

2.04 INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements, selected from roofing system manufacturer’s standard sizes and of thickness indicated.

B. High density polyisocyanurate cover board: Closed cell polyisocyanurate foam with

coated glass matt facer laminated to both faces, complying with the following additional characteristics:

1. Thickness: 0.5 inches.
2. Size: 48 inches by 48 inches, nominal.
3. R-Value (LTTR):
   a. 0.5 inches, R-Value: 2.5, minimum.
4. Compressive Strength: 120 psi.
5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
6. Recycled Content: 8.3 percent post-industrial, average.

C. Polyisocyanurate Board Insulation: ASTM C1289-13, Type II, Class 1 – Faced with grey paper facers on both major surfaces of the core foam, Grade 2—20 psi (138 kPa) min. compressive strength

D. Insulation Requirements:
   1. **Roof Section 1:** (2) two layers of 1.5" poly Iso low rise foamed to vapor barrier followed by ½" HD cover board adhered with low rise foam.
   2. **Roof section 2**: 5/8" Gypsum substrate installed onto wood deck followed by self-adhered vapor barrier, (2) two layers of 1.5" poly Iso low rise foamed to vapor barrier followed by ½" HD cover board adhered with low rise foam.

E. Tapered Polyisocyanurate Insulation Shapes: Preformed insulated shapes for saddles, crickets, tapered edge strips, sumps, and other insulation shapes where indicated or where required for sloping to drain. Fabricate to slopes indicated. Saddles, Crickets, Edge Strips, and Other Shapes:
   1. Tapered insulation boards fabricated to slope of 1/4-inch per 12 inches (1:48) unless otherwise indicated.
   2. Crickets between Roof Drains: Tapered insulation boards fabricated to slope of 1/2-inch per 12 inches (1:24) unless otherwise indicated.
   3. Sumps for Roof Drains, measuring 4 feet x 4 feet; size to be modified when drains are located next to parapet wall: 4. Tapered insulation boards fabricated to slope of 1/4-inch per 12 inches (1:48). Provide a minimum insulation thickness at the roof drain or roof scupper of 2.0 inches.
   4. Saddle Behind (Upslope) from Curbs Measuring 18 inches and greater: Tapered insulation boards fabricated to slope of 1/2-inch per 12 inches (1:24).
   5. Saddle Behind (Upslope) from Round Penetrations Measuring 12 inches in diameter and greater: Tapered insulation boards fabricated to slope of 1/2-inch per 12 inches (1:24).

F. Approved Roofing system manufacturer and Product:
   1. Roof system manufacturer;

2.05 COVER BOARD

A. High density polyisocyanurate cover board: Closed cell polyisocyanurate foam with coated glass matt facer laminated to both faces, complying with the following additional characteristics:

1. Thickness: 0.5 inches.
2. Size: 48 inches by 48 inches, nominal.
3. R-Value (LTTR):
   a. 0.5 inches, R-Value: 2.5, minimum.
4. Compressive Strength: 100 psi.
5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
6. Recycled Content: 8.3 percent post-industrial, average.

2.06 INSULATION AND COVER BOARD ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation roofing system manufacturer for intended use and compatible with membrane material.

2.07 DUAL COMPONENT POLYURETHANE ADHESIVE

A. General: Provide a dual component polyurethane adhesive that is intended for the attachment of polyisocyanurate insulation to various substrates. The dual component polyurethane adhesive has to have approvals from the insulation and roofing system manufacturer for adhering the polyisocyanurate insulation to approved substrates, multiple layers of polyisocyanurate insulation, and cover boards. Consult adhesive roofing system manufacturer on current acceptable substrates to apply dual component polyurethane adhesive to various substrates.

B. Dual component polyurethane adhesive: The low-slope dual component polyurethane adhesive shall have the following minimum properties:
   1. Density ASTM D-1622: Free Rise, 3.2 lb./cf.
   2. Compressive Strength ASTM D-1621: Parallel, 38 psi @ 6% deflection.
   3. Tensile Strength ASTM D-1623: 35 psi
   4. Water Absorption ASTM D-2843: 5.1%
   5. Closed Cell Content ASTM D-6226: 90% min.
   6. R-Value ASTM C-518 3.8/inch (new)
   7. VOC Content ASTM D-2369 <5 g/l (1&2 combined)
   8. Weight/Gallon: Part A Component 10.32 lbs. Part B Component 8.54 lbs.

C. Approved Roofing system manufacturer and Product:
   1. OMG Roofing Products, “OlyBond 500® SpotShot.”
   2. Roof system manufacturer, “OM Board Adhesive.”

2.08 VAPOR RETARDER ON CONCRETE DECKS & GYPSUM.

A. SA - 32 mil (0.8 mm) self-adhesive vapor barrier that can also serve as temporary roof protection. Self-Adhered is available in rolls 44.9 inches x 133.8 feet (1.14 x 40.8 m).

B. SA Primer - A polymer emulsion water-based primer designed to improve the adhesion of SA vapor retarder on concrete roof decks, gypsum substrates or plywood walls. Application temperature must be 41°F (5°C) and above. The coverage rate will range from 163 - 400 ft2/gal (4 - 9.8 m²/L) for non-porous surfaces to 82 - 135 ft2/gal (2 - 3.3 m²/L) for porous surfaces. The VOC content is 3 g/L.

2.09 RELATED MATERIALS

A. Timber, General: Hand select material at factory from lumber of species and grade indicated below for compliance with "Appearance" grade requirements of ALSC National Grading Rule; provide certificate of inspection from an accredited Agency for selected material.
   1. Provide seasoned lumber with 19 percent moisture content at time of dressing and shipment, for sizes 2-inches or less in thickness.
   2. Provide lumber with 15 percent moisture content at time of dressing and shipment for, sizes 2-inches or more in thickness.

B. Dimensioned Lumber: Graded in accordance with established grading rules; grade and species as follows:
   1. Concealed Boards: WWPA standard grade, any species, or SPIB No. 3 grade Southern Pine.
   2. Lumber for Miscellaneous Uses: Standard grade unless otherwise indicated.
   3. Plywood: PS 1; select sheathing grade or APA rated 5/8-inch minimum thickness, CD-X, or better in sheathing.

2.10 MISCELLANEOUS FASTENERS AND ANCHORS

A. General: All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum, or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1¼ inch (32 mm) and shall be approve for such use by the fastener roofing system manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm), stainless steel, and to be approved for such use by the fastener roofing system manufacturer.

2.11 PROTECTION PADS

A. Protection Pads: “- factory-formed, nonporous, heavy-duty, slip resisting, surface-textured protection pads, as supplied Roof system manufacturer. Color of protection pads shall be black. Protection pads to be used under all support blocking, equipment supports, pipe steel supports, and under downspout splash blocking.

2.12 ROOF WALKWAYS

A. Walkway: factory-formed, nonporous, heavy-duty, slip resisting, surface-textured

protection pads, approximately 2” thick, as supplied Roof system manufacturer. **(Match existing walkway outline in base bid.)**

2.13 DRAINS

A. Zurn Standard - Black Iron/Cast Iron bowl and components.

2.14 EXTERIOR ROOF SECTION PLATFORM

A. Steel steps with walk through platform (**Roof sections 1 & 2**)
1. Heavy duty bar grating or diamond plate stair treads won’t sag or dish (standard).
2. Factory welded handrails of 1 1/2" x 11 Ga. square tubing.
3. 2 rail system with toe guard (standard).
4. 10" structural channel stringers.
5. Structural connections are made with 5/8" dia. Bolts and 3/8" butt plates.
6. Fireproof construction.
7. Meets OSHA requirements. See OSHA standard 1910.25 (Fixed Industrial Stairs).
   a. FS Industries
   b. Global
   c. Cotterman

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect entire roof area to be roofed for acceptability. Examine substrates, areas, and conditions for compliance with the following requirements and other conditions affecting installation and performance of the roofing system:
1. Verify that roof openings and penetrations are in place, and curbs are set and braced, and that the roof drains and drain lines are properly clamped into position and are in a 100% functional condition.
2. Verify that primary drain bodies are at proper elevations for construction of sump at slopes indicated.
3. Verify that secondary overflow drain bodies are at proper elevations for construction, without sumps, at level of roof surface.

B. The Installer shall conduct fastener pullout tests in accordance with the August 11, 2011 revision of the ANSI/SPRI FX-1 - American National Standard – Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.

C. Verify that structural use panels, sheathing, and similar wood products are securely anchored to substrates, and that surfaces of panels and sheathing are without irregularities which could interfere with proper membrane and flashing installation.

D. Visually inspect cast-in-place reinforced concrete roof deck for the following:
   1. Evidence of impaired deck structural capacity or integrity.
   2. Exposed concrete reinforcing.
   3. Presence of corrosion.
   4. Spalling or loss of concrete cover.
   5. Presence of foreign materials.
   6. Efflorescence.
   7. Ridges or uneven conditions in concrete deck.
   8. Holes, voids, or gaps in concrete deck.
   9. Accumulations of moisture.

E. Other conditions that would prevent proper application of roofing or that would prevent membrane roofing manufacturer's approval of substrate, components, or system.

F. Verify that roofing systems can be installed with positive drainage of minimum slopes indicated at all areas of roof, without ponding after 24 hours.

G. Verify that roofing as completed will discharge to internal roof drains without ponding or inadvertent discharge through secondary roof drains.

H. Verify that final installed curb heights for flashing are a minimum of 8-inches (200 mm) measured above finished roof membrane.

I. Verify piping and conduit penetrations of roof are made individually, separated by a minimum of 12 inches (300 mm) from each other and from restraining surfaces or other obstructions.

J. Verify locations of interior electrical conduits, piping, ducts, and similar items in close proximity to underside of steel roof decking, to avoid striking with fasteners.

K. Verify that deck and other substrates are dry, free of debris, excess, and foreign materials.

L. Verify substrates and surfaces to receive flashings are dry, clean, and free of sharp or penetrating projections or other irregularities.

M. Proceeding: Proceed with installation only after unsatisfactory conditions have been corrected.

N. Do not commence work until decking and substrates are in full compliance with roof system manufacturer's requirements, deck and substrate conditions are sound, and positive fall to drainage points are achieved.

O. Commencement: Commencement of work indicates acceptance of conditions and responsibility for all corrections.

3.02 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system roofing system manufacturer's written instructions. Remove all sharp projections.

B. The Installer will be entirely responsible for the complete removal of all dirt, debris, moisture from the roof's substrate, i.e. steel decking, concrete decking, before the installation of the roofing system. The roof's substrate must be 100% completely dry before applying the spray-in-foam insulation or before the installation of the specified roofing insulation.

C. Cleaning: Clean substrate including metal decking flutes of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

D. Debris, water, moisture, or foreign materials found in flutes of steel roof decking is not permitted; remove and replace roofing installed above flutes found to contain foreign materials.

E. Cleaning, repair or replacement of damaged items, as a result of roofing related materials entering the facility, shall be solely at the roofing contractor's expense.

F. Broom clean cover board immediately prior to membrane roofing application.

G. Promptly remove debris each day; do not stockpile debris or allow waste to accumulate on steel decking, insulation, or roofing under construction.

H. Containment: Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction at the end of the workday or when rain is forecast. Remove roof-drain plugs when no work is taking place or when rain is forecast.

I. Mask off adjoining surfaces not receiving roofing membrane materials to prevent spillage or over spray affecting other construction.

J. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with same materials as the substrate.

K. Seal around along perimeters, along equipment curbs, around pipes, around conduits, and any other roof penetrations with vapor barrier.

L. Base Vertical Flashings: Coordinate roof insulation thickness with adjacent base flashing height, to maintain not less than 8-inch (203 mm) flashing height. Adjust base vertical flashing height including substrates and changes in exterior wall materials to maintain minimum height.

M. Proceed with roofing work only when weather conditions permit work to proceed in accordance with manufacturer's requirements and recommendations.

3.03 WOOD NAILER INSTALLATION

A. All Wood Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Wood nailer attachment shall meet the current Factory Mutual Loss Prevention Data Sheet 1-49. Refer to Section 06100 for acceptable fasteners for wood product attachments.

B. Wood Nailer thickness shall be as required to match the insulation and cover board height (thickness) to allow a smooth transition.

C. Stainless steel, corrosion resistant, fasteners are required when mechanically attaching any roof system manufacturer product to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal edge detailing, a separation layer must be placed between the metal and ACQ treated wood.

D. New wood nailers and/or plywood sheeting shall meet the performance criteria in Section 06100.

3.04 VAPOR-RETARDER / AIR BARRIER INSTALLATION

A. Deck to be as clean as possible. Insure the concrete is in good condition. If concrete deck is wet allow sufficient amount of time for the moisture to dry. If the contractor cannot remove the asphalt roof membrane from the concrete deck, please remove any loose or deteriorated material, prime existing substrate and install vapor barrier: **No torches to be used to dry deck of moisture!**

B. Install Self-Adhered over a SA Primer. In concrete applications allow concrete to cure for at least 7 days. Do not install when it is raining, snowing, or on wet/humid surfaces. Install in temperatures 32°F (0°C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks, and DensDeck Prime® boards.

C. Begin application at the bottom of the slope. Unroll Self-Adhered onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 in. (75 mm) lengthwise following the reference line and by 6 in. (150 mm) at each end. Stagger end laps by at least 12 in. (300 mm). Tool vapor barrier up all penetrations and or perimeters and seal. Vapor barrier to be installed as if the VB was a temp roof. Do not immediately remove the silicone release sheet.

D. Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold Self- Adhered tight and peel back the release sheet by pulling diagonally.

E. Use a 75 lb. (34 kg) roller to press Self-Adhered down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

3.05 INSULATION BOARD INSTALLATION

A. General Criteria:
   1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
   2. Wet, broken, warped, or bent insulation boards are not acceptable. Any damaged insulation boards are to be replaced with new insulation boards.
   3. The substrate surface must be free of debris, dirt, grease, oil, ice, snow, frost, standing water, and must be 100% completely dry prior to the installation of the specified roofing insulation or during the time of applying the dual component polyurethane adhesive.
   4. Construct sumps at primary roof drains using tapered insulation to slope indicated. Install nailers or blocking as required to secure drain body assembly to roof deck.
      a. Unless otherwise indicated, construct sumps to consistent and uniform slope of 1/2 per 12 inches (1:48) to provide a smooth transition from the roof surface to the drain. Do not introduce steeper or shallower slopes within sump.
      b. Use tapered insulation to form a square sump. Unless indicated otherwise, construct sump measuring 4 foot by 4 foot at primary roof drains.
      c. Adjust primary roof drain assemblies to proper elevation for sump.
      d. Install tapered insulation so edges do not restrict flow of water.
      e. Do not create circular depressions around primary roof drains at bottoms of sumps.
   5. **Do not install sumps at secondary overflow roof drains.**
      a. Adjust secondary roof drain assemblies to proper elevation of final roofing membrane.
      b. Do not create circular depressions around secondary roof drains.
   6. Where conditions required drain modifications to match specified insulation thickness, roofing contractor will be responsible for the cost of readjusting the primary roof drain bowl and associated plumbing to match the “finished” insulation thickness. University of Missouri will not permit the circular depressions, nor the cutting or shaving the insulation in order to slope the insulation to the edge of the drain bowl.
   7. University of Missouri will not permit loose boards under foot. Contractor is expected to use adequate weight during the application of the insulation boards. Boards in access of 1/8” deflection will not be permitted.
   8. Roofing system manufacturer’s technical representative shall be on the jobsite during the first initial day of installation of the roofing system.

B. Attachment of the Polyisocyanurate Insulation:
   1. Install one layer of SA vapor barrier to the top flange of the substrate prior to installing the first layer of polyisocyanurate board insulation.
   2. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.6 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 16 inches in each direction.
   3. The first layer of the insulation edges shall be supported on the top rib of the steel deck. The insulation board shall be lay transverse to the direction of the steel decking ribs. Insulation boards edges shall be as close as practical to the center of the rib, with a minimum of 1½-(1.5) inches bearing on the rib. Stagger end joints of boards a minimum of 1/3 of overall length.
   4. Over the top of the first layer of insulation, the second layer of insulation board shall be lay transverse to the direction of the first layer of insulation. Stagger end joints of boards a minimum of 1/3 of overall length.
   5. The second layer of the specified polyisocyanurate insulation shall be fastened to the steel decking per an approved fastening pattern. The specified insulation board shall be fastened to the steel decking with manufacturer approved metal insulation plates and #12 fasteners. The polyisocyanurate insulation fastener density shall install a minimum of 1 fastener every 2 square feet for the field of the roof; increasing the numbers of fasteners and insulation plates for the perimeter by 50% and increasing the number of fasteners and insulation plates by 100% in the corners of the roof.
   6. The “metal fasteners” are to have a minimum 3/4-inch and a maximum 1- inch penetration through the steel decking. All fasteners should be fastened only through the top rib of the steel decking**. No insulation or securement fasteners are to penetrate the bottom flute of the steel decking. Roofing Contractor shall use fastener tools with a depth locator and torque-limiting attachment to ensure proper securement of the fasteners.**
   7. Install eight (8’) feet x eight (8’) feet tapered insulation at each primary roof drain or supper. The tapered insulation shall be mitered at the corners to provide a smooth and tapered transition into the roof drains and scuppers.
   8. Roofing Contractor shall ensure the “flat stock” and tapered insulation has been installed to where there will not be any ponding of water anywhere on the roofing system (roof area) after 24 hours of rainfall. Any ponding of water after 24 hours will not be acceptable to the Owner and shall be corrected by the Roofing Contractor at no charge to the Owner.

C. Installation of additional “flat stock” and tapered polyisocyanurate insulation:
   1. The “flat stock” and / or tapered polyisocyanurate insulation panels shall be laid transverse to the proceeding layer of insulation, with joints staggered at least 1/3 of overall length from those of the proceeding layer of the “flat stock” insulation.
   2. The “flat stock” and / or tapered polyisocyanurate insulation boards shall be adhered to top layer of “flat stock” insulation with the dual component polyurethane adhesive. The dual component polyurethane adhesive shall be dispensed ¾ inch

wide and 12 inches on center bands in the field of the roof. In the corners and perimeters of the roof area where the tapered crickets or saddles are to be installed, the number of ribbons per unit width or area over the field rate by:

a. 70% in the perimeter - resulting in a maximum on center spacing equal to 60% of the field spacing (field ribbons at 12" on center, the perimeter spacing shall be 7" on center).
b. 160% in the corner - resulting in a maximum on center spacing equal to 40% of the field spacing (field ribbons at 12" on center, the corner spacing shall be 4.8" on center.).

3. After allowing dual component polyurethane adhesive to rise ¾ inch to 1 inch, lay insulation board in to position and walk into place. After walking into place, the insulation board shall be pressed firmly into the adhesive layer with using an approved weighted roller by frequent rolling in two or more directions. Contractor shall also "weight down" the insulation board to ensure proper adhesive to the top layer of insulation.
4. University of Missouri will not accept any un-adhered or loose insulation boards. After installation of the insulation board, if the insulation board is not properly adhered to the proceeding layer, the Installer will be held responsible for replacing the unacceptable installed insulation board. All cost related, i.e. replacement of specified insulation, cover board, membrane, etc., to the replacement of the unacceptable installed insulation board will be at no cost to the Owner.

3.06 COVER BOARD INSTALLATION

A. General Criteria:
1. Fasten the specified cover board according to requirements of the roofing system manufacturer's written instructions.
2. Wet, broken, warped, or bent insulation boards are not acceptable. Any damaged cover boards are to be replaced with new cover boards.
3. Consult roofing system manufacturer on current acceptable substrates and rates for applying the low-rise urethane adhesives. The surface of substrate shall be inspected prior to installation of the cover board.
4. The substrate surface must be free of debris, dirt, grease, oil, ice, snow, frost, standing water, and must be 100% completely dry prior to the installation of the specified cover board or during the time of applying the dual component polyurethane adhesive and the spray- in-place foam.
5. Roofing system manufacturer's technical representative must be on the jobsite during the first initial day of installation of the roofing system.
6. Install a single layer of cover board over the specified polyisocyanurate insulation.
7. The cover board sheeting shall be laid transverse to the top layer of the insulation board, with joints staggered at least 1/3 of overall length from those of the insulation layer.
8. The cover board shall be neatly cut to fit within 1/4 inch (6 mm) of nailers, penetrations, and projections.
9. Fill all gaps exceeding 1/4 inch (6 mm) with spray-in-place foam insulation.
10. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.

11. Do not install more cover board than can be covered with the specified roofing system by the end of the day, or onset of inclement weather.

B. Attachment of Cover Board:
   1. Apply the dual component polyurethane adhesive at the manufacturer's written instructions for adhering the specified cover board to the specified polyisocyanurate insulation.
   2. The dual component polyurethane adhesive shall be dispensed in 12 inches on center bands in the field of the roof. In the corners and perimeters of the roof area, the number of ribbons per unit width or area over the field rate by:
      a. 70% in the perimeter - resulting in a maximum on center spacing equal to 60% of the field spacing (field ribbons at 12" on center, the perimeter spacing shall be 7" on center).
      b. 160% in the corner - resulting in a maximum on center spacing equal to 40% of the field spacing (field ribbons at 12" on center, the corner spacing shall be 4.8" on center.).
   3. After allowing low rise urethane foam to rise ¾ inch to 1 inch, lay cover board in to position and walk into place. After walking into place, the cover board shall be pressed firmly into the adhesive layer with using an approved weighted roller by frequent rolling in two or more directions. Contractor shall also use "weights" to ensure the cover board is completely adhered to the top layer of the polyisocyanurate insulation. There shall not be any elevation change or raise of the corners or sides of the cover board as compared to the sides of the adjacent cover board sides. The cover board shall lay flat or level as compared to the edges of the adjacent cover board.
   4. **After installation of the cover board, should the cover board have more than 1/8 inch deviation or rise to the adjacent cover board, the Installer will held responsible for replacing the unacceptable installed cover board. All cost related, i.e. replacement of specified insulation, cover board, membrane, etc., to the replacement of the unacceptable installed cover board will be at no cost to the Owner. The replacement of the unacceptable cover boards shall be completed prior to the installation of the membrane.**

3.07 EPDM MEMBRANE INSTALLATION

A. General: Install in strict accordance with roofing system manufacturer's latest published requirements, instructions, specifications, details, and approved shop drawings.

B. Install EPDM membrane per roofing system manufacturer's requirements in order to obtain roofing system manufacturer Twenty (20)-year Full System (NDL) warranty.

C. Install in strict accordance with roofing system manufacturer's latest published instructions.

D. Roofing system manufacturer's technical representative must be on the jobsite during the first initial day of installation of the roofing system.

E. Coordinate with Owner representative to shut down air-intake equipment in the vicinity of the Work. Roofing Contractor shall cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors located in the mechanical ductwork.

F. The EPDM membrane is to be adhered with roofing system manufacturer's approved adhesive. Membrane overlaps shall be shingled with the flow of water where possible. Tack ing of the EPDM membrane side laps for purposes of temporary restraint during installation is not permitted.

G. Layout: Layout roofing membrane to minimize number of seams. Avoid seams through roof primary roof drain sumps or through secondary roof drain locations.
1. Position membrane straight and square to building.

3.08 ADHERED EPDM ROOFING MEMBRANE INSTALLATION

A. Install EPDM sheet over area to receive roofing according to roofing system manufacturer's written instructions. Adhere membrane on all roof areas using largest sheet practical for job conditions. Avoid wrinkling or stretching the membrane. Unroll sheet and allow relaxing for a minimum of 30 minutes.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically fasten roofing membrane securely at terminations, penetrations, angle changes and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing membrane, tape side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
1. Test lap edges to verify seam strength.
2. Apply lap sealant to seal all edges of flashing membrane and T-Patches.
3. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.

H. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

I. **USE CAUTION TO INSURE ADHESIVE FUMES ARE NOT DRAWN INTO THE BUILDING.**

J. Mechanically fasten membrane securely at all vertical to horizontal transitions, at points of terminations, and at the perimeter of roof in order to meet Manufacturer's Technical Department's requirements for properly securing the specified roofing system.

K. Spread sealant bed over deck drain flange at deck drains and securely seal roofing membrane in place with drain clamping ring.

L. Securement Around Perimeter and Rooftop Penetrations
   1. Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, roofing system manufacturer's fasteners and termination bar or discs shall be installed. Fasteners, disc, and termination bar shall be installed accord to the roofing system manufacturer's instructions. Fasteners shall be installed using the fastener roofing system manufacturer's recommended fastening tools with depth locators.
   2. EPDM membrane flashings shall extend a minimum of 3 inches past the securement bar or plates and shall be adhered onto the EPDM membrane.

M. Field-seam according to Section 3.07, "Seam Installation."

N. Excessive Repairs: Excessive repairs to membrane, or to membrane seams are not permitted. Remove and replace membrane in entire area affected, and as directed by University of Missouri representative.
   Note:
   1. **The Installer shall employ all means necessary to assure that the installation of all field and flashing membranes are free of loose (un-adhered) areas and wrinkles. The Owner's Representative(s) reserves the right to require that all preventable loose and /or wrinkled field membrane and membrane flashings to be repaired to the satisfaction of the Owner's Representative. In the event that the Installer determines that loose and /or wrinkled membrane or membrane flashing is unavoidable in a specific area(s), the onsite Owner's Representative must be notified immediately for a determination of acceptability.**
   2. **Contractor is to ensure during the time of installing the membrane field and membrane flashing sheet, there are no entrapment of debris under the membrane.**

3.09 MEMBRANE FLASHING INSTALLATION

A. General: All membrane flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the roofing system manufacturer. Approval shall only be for specific locations on specific dates. Membrane flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.

B. Manufacturers required adhesive to be used to adhere the EPDM membrane flashing to acceptable wall and equipment curb substrates. No bitumen shall be in contact with the EPDM membrane. If bitumen exists **install Cav Grip primer or equal over existing bitumen**.

C. Manufacturers Adhesive for Membrane Flashings:
   1. Over the properly installed and prepared flashing substrate, the adhesive shall be applied according to instructions found on the Product Data Sheet. The adhesive shall be applied in smooth, even coats with no gaps, globs, or similar inconsistencies. Only an area that can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
   2. No adhesive shall be applied in seam areas that are to be adhered. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by techniques.
   3. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and corners applied. Where applicable, roofing system manufacturer's pre-fabricated corners shall be used.
   4. The membrane flashing shall be completely adhered to the substrate with no unadhered areas.

D. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and roofing system manufacturer's technical department.

E. Vertical Surfaces Taller than 24 Inches (760 mm): Where vertical distance of flashing membrane exceeds 24 inches in height, in addition to terminations at base flashings, mechanically fasten fully adhered flashing membrane with additional termination bar installed horizontally at not greater than 30 inches (760 mm) on center vertically to top of flashing membrane.
   1. Install membrane cover strip of standard sheet at last 8 inch (0.23 m) in width of same material, type, reinforcement.
   2. Install baton bar and cover strip using mechanical fasteners as roofing progresses. Do not proceed with roofing without full attachment of termination bars and installation of coversheet for area under construction.

F. Flashing Termination: Terminate all vertical flashing membrane surfaces horizontally and vertically with mechanically fastened termination bars and sheet metal flashings/counterflashings. Mechanically fasten flashing membrane securely using mechanical fasteners specifically designed and sized for fastening specified membrane flashing and termination bars into substrate.
   1. Fasten baton bar/termination bar with fasteners not greater than 6 inches (152 mm) on center for length of bar, with fasteners within 3 inches (76 mm) of ends, or closer as required by manufacturer. Fasten into nailer or other substantial backing located behind point of base or curb termination
   2. Uniformly fasten, seat, and compress termination bar into top of fully adhered

flashing membrane.

3. Install sealants continuously across surface of termination, including terminations covered with sheet metal flashing and counterflashing.
4. Install termination bars using mechanical fasteners as roofing progresses. Do not proceed with roofing without full attachment of termination bars for area under construction.
5. At termination of vertical and wall sheet flashings not under copings, install termination bar at vertical and wall membrane flashings with metal surface mounted one- or two- piece counterflashing assemblies, as is required for condition. Install as indicated in Drawings, or if not shown in Drawings or otherwise indicated, as required to produce continuous closure of membrane with termination bar and metal flashing, regardless of abutting materials overlap.
6. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for requirements for counterflashings and other metal fabrications.

G. Primary Roof Drains: Install membrane into sump and extend into line of depressed sump at roof drain. Install membrane free of wrinkles or surface irregularities. Shingle seams around and outside sump in direction of water flow and drainage; backwater laps and seams are not permitted in or around sumps or drains.
   1. Cut membrane to fit roof drain piping inlet; do not allow membrane to restrict opening size.
   2. Spread sealant over roof drain deck flange and securely seal roofing membrane in place with clamping ring. Seal between membrane and drain base with water cut off mastic in accordance with manufacturer's recommendations.
      a. Apply sealant in strict compliance with manufacturer's requirements.
   3. Install membrane to comply with other requirements indicated for roofing membrane.
   4. Remove and replace any steel fasteners and washers in clamping ring. Install clamping ring using stainless steel fasteners and washers.
   5. Securely tighten clamping rings to provide constant pressure on water cut off mastic.
   6. Install new metal strainers to complete primary roof drains.

H. Secondary Overflow Roof Drains: Install membrane to extend into line of roof drain at roof surface. Install membrane free of wrinkles or surface irregularities. Shingle seams around and outside drain in direction of water flow and drainage; backwater laps and seams are not permitted in roof membrane around or under drains.
   1. Cut membrane to fit roof drain piping inlet; do not allow membrane to restrict opening size.
   2. Do not set secondary roof drain body below roof surface. **Do not construct roof sumps at secondary overflow roof drains.**
   3. Spread sealant over roof drain deck flange and securely seal roofing membrane in place with clamping ring. Seal between membrane and drain base with sealant in accordance with manufacturer's recommendations.
      a. Apply sealant in strict compliance with manufacturer's requirements.
   4. Install membrane to comply with other requirements indicated for roofing membrane.

5. Remove and replace any steel fasteners and washers in clamping ring. Install clamping ring using stainless steel fasteners and washers.
6. Securely tighten clamping rings to provide constant pressure on sealant.
7. Install new metal strainers to complete secondary roof drains.

I. High- or Elevated- Temperature Vent Flashings: Install prefabricated or field-formed membrane flashings to comply with manufacturer's written requirements and recommendations and as indicated. Field form flashings from sheet flashing membrane designed for and suited to condition.
1. Install stainless steel metal base fabricated metal flashing sleeves prior to installing flashings.
2. Install fire-resistant mineral-wool-fiber insulation between metal flashing sleeve and high- or elevated- temperature outside vent surfaces.
3. Select proper diameter prefabricated flashing to properly fit penetration and roof conditions.
4. Secure deck membrane around metal base sleeve penetration to comply with manufacturer's requirements. Secure close to penetration so prefabricated flashing will cover attachments. Secure top of membrane flashing to top of sleeve penetration.
5. Secure deck membrane around sleeve penetration to comply with manufacturer's requirements. Secure close to penetration so prefabricated flashing will cover attachments.
6. Install flashings to produce a minimum of 8-inch (200 mm) flashing height.
7. Lap base of flashings atop roof membrane at least 4 inches (100 mm). Hot-air seams at roofing membrane lap.
8. Place prefabricated flashing in place tight to horizontal deck membrane; ensure flange lays flat to deck membrane.
9. base of prefabricated flashing continuously to deck membrane.
10. Where required by manufacturer, heat upper part of prefabricated flashing to temperature required by manufacturer; avoid overheating.
11. Clamp top of flashing at vent with stainless steel clamping ring.
12. Install stainless steel metal umbrella cap flashing, holding close to membrane base flashing.

J. Only an area, which can be completely covered in the same day's operations, shall be flashed.

K. Daily test lap edges with probe to verify seam continuity of all membrane flashings.

L. Complete all membrane flashing and metal details on a daily basis. No temporary flashings shall be allowed with the prior written approval of the Owner’s Representative and roofing system manufacturer. If any water is allowed to enter under the completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Installer's expense.

M. **USE CAUTION TO ENSURE ADHESIVE FUMES ARE NOT DRAWN INTO THE BUILDING.**

N. Installer is to ensure there are no wrinkles and “fish-mouths” in the membrane flashing and in the overlap seams.

O. Excessive Repairs: Excessive repairs to seams or flashings are not permitted. Remove and replace membrane, and if required the roofing components, in entire area affected as directed by University of Missouri representative.

3.10 PARAPET AND METAL BASE FLASHINGS

A. General: All flashings shall be installed concurrently with the roofing membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner’s Representative and the roofing system manufacturer. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Installer’s expense.

B. Sheet metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

C. All Stainless Steel perimeter metal coping and counterflshing shall be fabricated and install per current SMACNA requirements.

D. Secure the Stainless Steel metal over the field membrane and the “Multi-Purpose Sealing Tape.” Fastened the sheet metal with approved stainless steel nails or other acceptable fastener. Fasteners shall be fastened 4 inches on center and staggered 4 inches on center.

E. An 8 inch minimum wide strip of the 60 mil membrane flashing shall be adhered to the 4 inch wide flange of the sheet metal and to the field membrane. Check all coverstrip with a rounded screwdriver. Re-work any inconsistencies.

3.11 WALKWAY INSTALLATION

A. Installer is to install walkway in the areas as indicated on roof plans. Installer is responsible for verification of the total linear footage of the required walkway installation. The minimum length of the walkway, installed at any one location, shall be four (4’) feet.

B. Install the walkway to roofing system manufacturer’s written instructions.
   1. Clean all dirt and debris from the deck membrane in areas where the walkway will be installed.
   2. Important: Check all deck membrane s with a rounded screwdriver prior to installation of walkway. Re-adhere any inconsistencies before walkway installation.
   3. Install walkway in the indicated roof areas.
   4. Installer should adhere the walkway to the field membrane.

3.12 PROTECTION PAD INSTALLATION

A. General: Install protection pad under exposed wood blocking and under equipment supports.

B. The installation of the protection pad:
   1. Clean all dirt and debris from the deck membrane in areas where the protection pad will be installed.
   2. Important: In areas where protection pads are to be installed, Installer is to probe all field membrane seams laps with a rounded screwdriver prior to installation of the protection pad. Re-adhere any inconsistencies before protection pad installation.
   3. Cut the protection pad 4 inches (4") wider than the dimensions of the wood blocking or equipment and piping support.
   4. Adhere the entire perimeters of the protection pad to the field membrane sheet.
   5. Probe all protection pad seam s with a rounded screwdriver. Re-adhere any inconsistencies found in the protection pad seams.
   6. Center the wood blocking or equipment or pipe support over the protection pad.

3.13 HIGHLY VISBLE MEMBRANE INSTALLATION

A. General Requirements: Provide and install a highly visible membrane product; designed to draw attention to an unprotected roof perimeters and potential hazardous area that do not comply with University of Missouri safety guidelines.

B. Installation of yellow, 4 inch wide, cover strip:
   1. Installer and University of Missouri Representative shall verify unprotected roof perimeters and potential hazardous areas on the referenced project's roof area(s).
   2. The yellow cover strip shall be installed not less than 6 feet 6 inches (2 meters) from unprotected roof perimeters and potential hazardous areas.
   3. Before installing the yellow membrane 4 inch wide cover strip, the Installer shall have Roof system manufacturer Technical Representative to verify permanence of all deck membrane with a rounded screwdriver. Repair any inconsistencies of the membrane seams before yellow membrane installation.
   4. The roofing membrane shall be properly cleaned prior to install the "yellow membrane 4 inch wide cover strip." Failure to properly clean the membrane will result in less than satisfactory adhesion of the yellow membrane.
   5. Peel and stick the yellow cover strip to installed and inspected roofing membrane.
   6. Installer shall take care to avoid trapping air under the yellow membrane.
   7. After adhering the yellow cover strip, the Installer shall verify permanence of all yellow cover strip. Repair any inconsistencies of the yellow cover strip installation.

3.14 TEMPORARY ROOFING TERMINATIONS AND PROTECTION

A. Prior to starting roofing project, the Installer shall inspect the facility existing roof area(s) associated with the contract roofing project for any defects which could cause water or moisture vapor entries into the building during the roofing application. Any defects or concerns shall be address in writing to the Owner's representative prior to starting the roofing project. Proceeding with the roofing project indicates the Installer's acceptance of the existing facility conditions.

B. For existing roof areas where access is absolutely required for the installation of the new roofing system on another roof area, the Installer shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent roof areas. A suitable temporary protective surface shall be provided for all roof areas which receive traffic during construction of the new roofing system. During the roofing project, any damage which occurs to the new or existing roofing membrane and/or system shall be removed and replaced at the Installer's expense.

C. The Installer shall provide the labor and materials required to maintain a watertight and impermeable condition at all times on the roof areas as referenced in the project's contract documents. All membrane and metal flashings shall be installed concurrently with the field membrane installation in order to maintain a 100% watertight and to prevent any air/water vapor infiltration into the completed roofing system each day.

D. When an interruption or a postponement in the roofing work occurs during the installation of the roofing system, the Installer shall install temporary watertight and hermetic terminations across the installed Roof system manufacturer roofing system. The Roof system manufacturer roofing system shall be 100% impermeable in order to prevent water and air/water vapor infiltration into or under the new roofing system. When work resumes, any contaminated membrane shall be removed from the work area and disposed off site. None of these materials shall be reused in the new work.

E. During inclement weather or during a postponement in the roofing work occurs while a temporary water stops or terminations are in place, the Installer shall provide the labor and materials to monitor and ensure the temporary water stops and terminations are 100% watertight and impermeable condition.

F. If any weather related moisture or the result of moisture caused by the condensation of water vapor are allowed to enter into the newly-completed Roof system manufacturer Roofing System, the affected roof area(s) shall be removed and replaced at the Installer's expense.

3.15 FIELD QUALITY CONTROL

A. Quality Control of Seams:
   1. The Installer shall designate a Quality Control Supervisor to daily check all seams for continuity by using a rounded screwdriver.

2. On-site evaluation of completed seams shall be made by the Installer at locations as directed by the Owner's Representative or roofing system manufacturer's technical representative.
3. All membrane seams, both field and flashings, shall be adhered and probed on a daily basis. NO EXCEPTIONS.

B. Roofing system manufacturer's technical representative: Installer shall arrange to have the system manufacturer's technical representative on site of the first day of installation of the roofing system. The Technical Representative shall note:
1. Conduct a site inspection on the first day of production.
2. Communicate with the University of Missouri project manager each inspection, i.e. meet with the University of Missouri designated project manager before entering work area.
3. Note all defects noted non-compliance with the specifications or the recommendations of the roof system manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the University of Missouri representative and Roof system manufacturer.
4. Ensure the roofing contractor has received a copy of each In-Progress Inspection Report within two days of the inspection. The roofing contractor is to forward the University of Missouri On-site Representative a copy of the In-Progress Inspection Report.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion of the roofing project.
1. All defects noted non-compliance with the roofing specifications and details or the recommendations of roofing system manufacturer representative should be itemized in a punch list. These items must be corrected immediately by the Installer to the satisfaction of the Owner's Representative and roofing system manufacturer technical representative.
2. Ensure the roofing contractor has received a copy of Final Inspection Report within two days of the inspection. The roofing contractor is to forward the University of Missouri On-site Representative a copy of the Final Inspection Report.

3.16 PROTECTING AND CLEANING

A. Protect sheet membrane roofing from, not limited to the following items; dirt, grease, rust stains, roofing asphalt, scuff marks, abrasions, adhesive spills, sealant spills, membrane cuts, and any physical damages to the installed Roof system manufacturer roofing system during the construction period.

B. Upon completion of the Work, dispose of, away from the Site, all debris, trash, containers, fasteners, roofing remnants and scraps.

C. **The completed "Roof" shall be washed with water and University of Missouri approved cleaner to remove all dirt, stains, adhesive and sealant spills, and any residue from roof membrane.**

3.17 ACCEPTANCE

A. Prior to demobilization from the site, the roofing system manufacturer's project manager, University of Missouri's representative(s), roofing system manufacturer's designated field technical representative and Installer's project manager, production crew superintendent, and project's roofing foreman shall review the completed work.

B. Installer and University of Missouri representative shall inspect the completed roofing system for any uneven cover boards, loose or improperly attached insulation or cover boards, ponding of water, un-adhered membrane and membrane flashing, membrane damage, dirt, rust stains, roofing asphalt, grease, scuff marks, cuts, abrasions, adhesive spills, and sealant spills.

C. All defects noted noncompliance with the project's bid documents will be itemized in a punch list. Any non-compliance item shall be removed and/or repaired immediately by the Installer to the satisfaction of the University of Missouri representative, and to roofing system manufacturer.

D. The noted deficiencies shall be repaired or replaced to a condition free of damage and deterioration at the time of Substantial Completion Acceptance by University of Missouri's representative, and / or to accordance of the University of Missouri project contract documents.

E. All warranties as required for the project of this specification shall be submitted for approval prior to final payment by University of Missouri.

END OF SECTION 07540.3

SECTION 07 5900 – PREPARATION OF RE-ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fastener Pullout Testing: Provide fastener pullout testing in each roof area for each type of roof deck in accordance with SPRI – Standard Pullout Test Procedure.

B. The removal of the existing roofing system down to the existing roof's substrate, i.e., concrete, gypsum or steel decking.

C. The coordination with the electrical / mechanical contractor for the removal of any unused equipment / penetrations or deck accessories prior to initial roof replacement.

D. The coordination with the electrical / mechanical contractor for raising any rooftop appurtenances, i.e., refrigeration piping supports, where it is required to achieve minimum recommended heights and clearances for the new roofing system.

E. Replacement of any deteriorated steel decking.

F. Application of a rust inhibitor coating to rusting steel decking.

G. The coordination with the electrical contractor for the lightning protection system.

H. Temporary roofing tie-ins and water stops.

I. Quality Control

1.02 DEFINITIONS

A. Division 1 – General Requirements

B. Section 06 1000 – Carpentry Work

C. Section 07 5400 – Thermoplastic Membrane Roofing System

D. Section 07 6000 – Flashing and Sheet Metal: Requirements for sheet metal components

1.03 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Replacement of damaged or deteriorated steel decking:
   1. Basis for Measurement: By square foot
   2. Basis of Payment: Replace Metal Deck: Replace any deck which is damaged or has scaling corrosion with new, mechanically attached steel decking of the same type,

thickness, and cross section to match existing if damaged or corroded area covers an area larger than 2 square feet.

B. The cleaning and coating of the steel decking having rust or corrosion:
   1. Basis for Measurement: By square foot
   2. Basis of Payment: Prime Metal Deck: Power clean the metal decking with rotating steel brush roller or approved means of removing rust from the steel decking. Apply to the metal decking an approved rust inhibiting primer. Allow to primer to dry prior to proceeding with roofing installation.

1.04 REFERENCES

A. Single Ply Roofing Institute (SPRI): Standard Pullout Test Procedure.

1.05 SUBMITTALS

A. Submit under provisions Submittals.

B. Product List: Submit list of proposed Products and manufacturers, including all items specified in Part 2 – Products or otherwise required by the Work.

C. Product Data: Provide date for each required product indicating characteristics, performance criteria, mixing and preparation requirements, limitations, and Material Safety Data Sheets (MSDS).

D. Fastener Pullout Testing: Provide fastener pullout testing in each roof area for each type of roof deck in accordance with SPRI – Standard Pullout Test Procedure.

E. Demolition and Removal Procedures and Schedule: Outline all work tasks and schedule them, showing clearly when each area is to be performed. Coordinate with Owner and other contractors to avoid impact to Owner's occupancy.

F. Project Record Documents: Indicate extent of work installed, actual locations of appurtenances and items that will be hidden from view at completion of work.

G. Debris Removal Certification: Provide certified documentation indicating all project related debris has been disposal in an approved and legal landfill.

1.06 PRE-INSTALLATION CONFERENCE

A. Convene 10 days prior to commencing work of this Section.

1.07 COORDINATION AND PROTECTION

A. Provide, erect, and maintain temporary barriers and security devices.

B. Roofing contractor is to verify all field measurements for the referenced roof areas.

C. Do not close or obstruct roadways or sidewalks without permits.

D. Conduct demolition to minimize interference with adjacent roofing and siding, roof mounted equipment, and roof deck and structure to remain.

E. When building exceeds one-story or fifteen feet in height, or when debris must be discharged adjacent to windows, pedestrian, or vehicular traffic, or where the conditions dictate extra precautions, provide enclosed trash chute from rooftop to trash containers.

F. Conduct operations with minimum interference to public or private thoroughfares. Always maintain required egress (exit way) and access.

G. Provide protective measures, including all OSHA and Owner safety requirements, in and around the work area, and in all and around the building prior to beginning the project.

H. At any time, no open flames, torches, or any type of equipment which creates an “open flame” are allowed on Owner’s properties.

I. Roofing contractor shall not refuel any roofing equipment or electrical generators on the roof. All refueling of roofing equipment and generators shall be accomplished on the ground and a minimum of 25 feet from the side of any materials and the side of each building. Provide appropriate fire extinguishers in the designated refueling area. At the end of the workday, all motorized (gasoline, propane, natural gas-, or diesel-powered engines) are to be removed from the roof at the end of the workday.

J. All-terrain vehicles, i.e., “four-wheelers,” or any motorized rideable roofing equipment will not be allowed for facilitating any segment of the Owner roofing project. This includes any type of ATVs, rideable roofing carts, and lawn tractors.

K. Schedule and coordinate all mechanical and electrical service interruptions with Owner’s Representative and designated on-site personnel.

L. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work.
   1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Owner Representative.

M. Restrictions:
   1. Comply with Owner’s General Requirements on use of site.

2. Firearms, Smoking, and Tobacco products are prohibited on all roof areas and on the campus grounds.
3. No food products are allowed on the Owner facility grounds and on the roof at any time.
4. Water is the only liquid allowed on the roof at any time. Provide approved individual and disposable water drinking cups for employees. After use, the disposable drinking cups are to be disposed in approved trash container. Do not dispose drinking cup debris in the roofing debris trash container. Drinking cups debris is to be removed from the facility each day.
5. Maintain facility and all utility services in a functional condition.
6. Provide and maintain sanitary facilities for employees. Provide sanitary soaps for employees.

PART 2 PRODUCTS

2.01 DECK AND SUPPORT MATERIALS

A. Steel Deck: Install new metal decking / panel(s) in areas of deteriorated decking.

B. All New Steel Decks: Align top plane to the existing decking.

C. Curbs and Support Members: Wood or metal curbs and support items as indicated and required for existing conditions.

D. Miscellaneous Metals: Conform to existing Products and installations.

2.02 TESTS

A. Roofing Contractor shall comply with Single Ply Roofing Institute (SPRI) “Standard Pullout Test Procedure” for providing fastener pullout testing as indicated in the provision of Section 07540. Testing shall be performed by using certified equipment and personnel.

PART 3 EXECUTIONS

3.01 EXAMINATION AND PREPARATION

A. Contractor shall have a full understand of the Work and the existing conditions of the Project to complete the Work as outlined in the bid documents. Any discrepancies found between the Drawings and Specifications and Project site conditions, or any errors or omissions in the Drawings or Specifications, the Contractor shall report in written, a minimum of five (5) days before bid submission date, to the Owner Representative describing the discrepancies in the drawings and /or specifications, problems with the substrate slopes, physical latent conditions or any condition that may affect the installation of the Work. Neglect or failure to report any errors, physical latent conditions, or discrepancies in the Drawings and Specifications after submitting the Roofing Contractor’s proposal will be the burden and financial responsibility of the Roofing Contractor to correct

any problems, conflicts, or lack of definition of Work to meet the Contract Agreement between Owner and the Roofing Contractor.

B. Roofing Contractor will be responsible for scheduling a certified testing company for conducting fastener pullout testing. Fastener pullout testing shall be performed by using certified equipment and personnel. Fastener pullout testing shall comply with Single Ply Roofing Institute (SPRI) "Standard Pullout Test Procedure." Copy of the fastener pullout test results shall be submitted to Owner's Representative and to the roofing manufacturer's technical department for recommendations for the type of fastener to be used and for the appropriate fastening pattern for the membrane and insulation fasteners and securement plates or adhesive.

C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces that might be misconstrued as having been damaged by roof replacement operations. Submit to the Owner Representative before starting any Work at the Owner Facility.

D. Contractor must communicate the proposed starting date for reroofing the referenced roof areas to Owner. Contractor must allow Owner time to have the inside protection system installed. In the areas where interior protection is required, the interior protection system must be in place prior to starting the roofing in "that" roof area.

E. Contractors shall remove existing securement fasteners from the existing roofing system by mechanically backing out the securement fasteners from the steel decking. Breaking or snapping off the fasteners will not be permitted.

F. Prevent movement or settlement of adjacent structures and paving. Provide bracing and shoring.

G. Emergency Equipment and Materials: Maintain on site equipment and materials necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather. If inclement weather occurs while a temporary water stop is in place, the contractor shall provide the labor and materials necessary to monitor the conditions to maintain a 100% watertight condition.

H. Arrange work sequence to avoid use of newly constructed Roofing for storage, walking surface, and equipment movement. Where such access is absolutely required, the contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A suitable temporary protective surface shall be provided for all Roofing areas which receive traffic during construction. Any damage which occurs to the Roofing membrane and/or system is to be brought to the attention of the Owner's Representative and membrane manufacturer. All damage is to be repaired or replaced according to the membrane manufacturer's recommendations. The party responsible for damage shall bear the cost of repairs.

I. Protect existing landscaping materials, appurtenances, structures, paving, roofing and siding, roof mounted equipment, roof deck (new and existing) and structures that are not to be demolished.

J. Examine existing mechanical and electrical items to determine conditions and operability.

K. The roofing contractor is to verify the drainage piping is properly connected, free flowing, and sealed to the new roof drain bowls. Additionally, roofing contractor is to verify all roof drains components are in serviceable and functional condition and are clear of debris. Roofing contractor is to replace all existing drain covers with new metal drain strainer covers. The new drain covers are to be painted “Owner Blue,” (Pantone 280).

L. Prior to the starting any Work, any inoperable items or unsafe conditions found in the referenced work area(s), the roofing contractor must immediately notify Owner Representative verbal and in writing of the inoperable item(s) or of the unsafe conditions.

M. Beginning any Work indicates acceptance of existing conditions, including operability of plumbing, mechanical and electrical items / equipment located in the referenced work area(s).

3.02 EXECUTION

A. Coordinate all aspects of demolition work with Owner’s Representative and with all other Trades.

B. Roofing Contractor is to provide safety protective measures inside, outside, and around the building by following all OSHA and Owner safety requirements. If inside protection measures are being provided by Owner’s employees or by a contracted interior protection company, the roofing contractor shall coordinate all roofing activities which may affect the activities of installing or removal of the interior protection system.

C. Prior to demolition work, verify all roof drains, soil pipes, flutes, roof equipment, steel decking and associated members, piping, electrical conduit, and other roof top equipment are secured to the building structure. Coordinate removal and securement of all unsecured roof penetrations and equipment with the electrical / mechanical contractor prior to the start of the roofing demolition.

D. Broom clean, using power assisted apparatus, all loose gravel on designated areas.

E. Owner will occupy portions of building immediately below roof replacement area. Conduct roof replacement so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
   1. Coordinate with Owner to shut down all air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or could activate smoke detection equipment in the ductwork or equipment.
   2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated prior to proceeding with work over the impaired deck area.

F. Remove and dispose of all designated, obsolete-roof penetrations and mechanical equipment as identified by the Owner's Representative in an orderly and careful manner. Contractor shall verify and coordinate all roof penetrations and mechanical removal with the Owner's Representative. Contractor shall coordinate with Owner's Representative and perform all necessary service disconnects.

G. All piping and electrical supports shall be adjusted to accommodate the new height or thickness of the specified roofing system. All lifting and lowering work required for the refrigeration piping supports shall be completed by an Owner approved, licensed mechanical contractor. All roofing work associated with the refrigeration piping supports shall be closely coordinated by the roofing contractor with the mechanical contractor.

H. Remove and replace any deteriorated metal decking. Any metal deck replacement will match existing metal decking type and gauge. Any steel deck replacement will be based upon per unit cost established in the contractor's bid form and document replacements.

I. Remove and dispose of all existing wood blocking, used for piping and equipment supports.

J. Remove and dispose of existing roof related sheet metal, i.e., metal coping, perimeter metal edging, and metal counterflashing, unless a particular component is identified on the project drawings for reuse of the existing sheet metal.

K. Evenly cut edges of existing materials that are to be expanded, replaced, or modified. Completely remove materials from areas to be replaced or repaired each day.

L. Cease operations and notify Owner immediately if adjacent structures or materials appear to be endangered. Do not resume operations until corrective measures have been taken.

M. Remove materials to be re-installed or retained in a manner to prevent damage. Store and protect.

N. Remove roofing, insulation, flashing, and damaged nailers and deck.

O. Perimeter wood blocking shall be left in place for re-use for attachment of the perimeter metal edging or metal coping. Contractor shall provide a unit cost for the replacement of the perimeter wood blocking should owner's representative finds the perimeter wood blocking to be damaged or deteriorated. Any perimeter wood blocking replacement will be based upon per unit cost established in the project's bid form and document replacements.

P. Contractor shall provide, where required to match the new insulation and Dens Deck thickness, additional wood blocking at the perimeter metal edge or expansions joints. All Existing and New Wood Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newton / lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. All

wood nailer attachments shall meet the current Factory Mutual Loss Prevention Data Sheet 1-49. Refer to Section 06 1000 for acceptable fasteners for wood product attachments.

Q. Except when instructed otherwise, immediately remove demolished material from site as work progresses. There shall not be any stockpiling of roof removal materials on any roof section. All roof removal materials shall be removed from the roof each day. All roofing debris is to be disposed of in a state approved landfill. At the end of the reroofing project, documentation of each trash bin disposal shall be submitted to the Owner's Representative for verification of proper disposal.

R. Remove and properly dispose of contaminated, vermin infested, or dangerous materials encountered.

S. Do not burn or bury materials on site.

T. Clean up debris daily, both on the roof and around the facility grounds. Leave the site in clean condition each day.

3.03 STEEL DECK AND SUPPORT REPLACEMENT AND REPAIR

A. In areas of deteriorated steel decking, the roofing contractor shall install new steel deck and accessories.

B. Any steel deck replacement will be based upon per unit cost established in the contractor's bid form and per the required documentation for replacements.

C. Remove deteriorated decking by cutting in straight lines. Coordinate cuts with structural support to ensure proper installation of replacement materials.

D. Where necessary, grind away existing welds and protrusions. Provide smooth and even surface for new deck on existing structural framing.

E. Install new steel decking with all edges properly supported on structural members or adjacent decking. Secure with approved fasteners, spaced per local building code requirements.

3.04 MODIFICATIONS TO EXISTING MECHANICAL AND ELECTRICAL ITEMS

A. When required to achieve recommended clearances, minimum curb heights, or other modifications, disconnect, modify, and reconnect mechanical and electrical services, contractor shall coordinate all work with the and licensed electrical / mechanical contractor.

B. Do not disrupt any services unless specifically approved by the Owner's Representative and on-site personnel.

C. Restore services and verify proper operational conditions to the satisfaction of Owner's Representative.

3.05 MODIFICATIONS TO EXISTING ROOF DRAINS AND PLUMBING

A. Examine areas to receive new roofing system; prior to starting reroofing project. Roofing contractor shall note the existing height of the existing roof drain bowls in regard to the new roofing insulation thickness.

B. Where required to achieve a roof drain bowl height to match the total insulation thickness, the roofing contractor shall be responsible for raising or lowering the drain bowl and / or associated piping to achieve a smooth transition from the flat stock / tapered insulation to the roof's drain bowl. Any modifications, disconnect, modify, and reconnecting the roof drain / plumbing services, contractor shall coordinate all work with Owner approved licensed mechanical contractor.

C. Do not disrupt any services unless specifically approved by the Owner Representative.

D. Restore services and verify proper operational conditions to the satisfaction of Owner Representative.

3.06 TEMPORARY ROOFING TERMINATIONS AND PROTECTION

A. Prior to starting roofing project, the roofing contractor shall inspect the facility existing roof area(s) associated with the contract roofing project for any defects which could cause water or moisture vapor entries into the building during the roofing application. Any defects or concerns shall be addressed in writing to the Owner representative prior to starting the roofing project. Proceeding with the roofing project indicates the roofing contractor's acceptance of the existing facility conditions.

B. For existing roof areas where access is absolutely required for the installation of the new roofing system on another roof area, the roofing contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent roof areas. A suitable temporary protective surface shall be provided for all roof areas which receive traffic during construction of the new roofing system. During the roofing project, any damage which occurs to the new or existing roofing membrane and/or system shall be removed and replaced at the contractor's expense.

C. The roofing contractor shall provide the labor and materials required to maintain a watertight and impermeable condition at all times on the roof areas as referenced in the project's contract documents. All membrane and metal flashings shall be installed concurrently with the field membrane installation to maintain a 100% watertight condition as the work progresses each day. For freezer applications, all equipment and piping flashings, perimeter flashings, i.e., metal edge and coping, must be 100% completed and must be 100% airtight to prevent any air/water vapor infiltration into the completed roofing system each day.

D. When an interruption or a postponement in the roofing work occurs in the installation of the roofing system, the roofing contractor shall install temporary watertight and hermetic terminations across the installed roofing system. The roofing system shall be 100% impermeable to prevent water and air/water vapor infiltration into or under the new roofing system. When work resumes, any contaminated membrane shall be removed from the work area and disposed off site. None of these materials shall be reused in the new work.

E. During inclement weather or during a postponement in the roofing work occurs while a temporary water stops or terminations are in place, the contractor shall provide the labor and materials to monitor and ensure the temporary water stops and terminations are 100% watertight and impermeable condition.

F. If any weather-related moisture or the result of moisture caused by the condensation of water vapor are allowed to enter the newly completed Roofing System, the affected roof area(s) shall be removed and replaced at the contractor's expense.

3.07 QUALITY CONTROL – PERFORMANCE OF INSTALLATION

A. Roofing Contractor to assign a qualified, full, non-working Quality Control Supervisor to be on Project site at all times during installation of Work. This supervisor is to have good communication skills and be able to communicate with the Owner Representative and with Contractor's Employees.

B. Roofing Contractor to assign a qualified, full, non-working Quality Control Supervisor to inspect all installed Work, particularly roofing tie-ins, at the end of each working day, and as otherwise required ensuring watertightness. Inspection to be verified by signature on the Contractor's Quality Assurance Form signifying installation is in accordance with specified requirements for "that" day of installation.

3.08 CLEANING

A. Contractor will be responsible for all cleaning of occupied or work areas when soiled or polluted by Work or operations of the roofing project.

END OF SECTION 07 5900

SECTION 07 6000 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Flashings and counterflashings, gutters and downspouts, metal coping, metal edge and fabricated sheet metal items.
   2. Splash pads
   3. Sheet metal accessories

B. Related Documents: The Contract Documents apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.02 RELTATED SECTIONS

A. Section 06 1000 - Carpentry (for Roofing): Wood blocking, nailers, and grounds.

B. Section 07 5400 - Membrane Roofing.

C. Section 07 5900 - Preparation for Re-Roofing Removal procedures for existing materials.

D. Section 07 9000 - Joint Sealers (for Roofing).

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   2. A653 - Steel Sheet, Zinc Coated, (galvanized) by the Hot-Dip process, Structural (Physical) Quality Property.
   3. A924 - Steel Sheet, Zinc Coated, (galvanized) by the Hot-Dip process.

B. Federal Specifications (FS):
   1. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
   2. Q-F-506 - Flux, Soldering, Paste and liquid.
   3. QQ0L-201F - Lead Sheet.
   4. QQ-S-571 - Solder, Tin Alloy

C. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

D. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Architectural Sheet Metal Manual.

1.04 SYSTEM DESCRIPTION

A. The work of this Section is to physically protect membrane roofing, base flashings, and expansion joints from damage that would permit leakage to the building interior.

1.05 SUBMITTALS

A. Submittal Procedures: Procedures for submittals.
   1. Product Data: Provide data on prefabricated components.
   2. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
   3. Samples: Provide full sized sample of metal flashing illustrating typical seam, external corner, internal corner, material, and finish.
   4. Submit color chart or physical samples for selection of prefinished metal color by the Owner.
   5. Assurance/Control Submittals:
      a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
      b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.06 QUALITY ASSURANCE

A. Standards: Comply with latest edition of standards specified in this section and as referenced below:
   1. ANSI/SPRI ES -1
   2. Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractors
   3. The NRCA Roofing and Waterproofing Manual, Latest Edition - National Roofing Contractors Association
   4. Published installation from manufacturers of selected products.
   5. Annual Book of ASTM Standard, Latest Edition - ASTM International

B. Qualifications:
   1. Fabricator: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
   2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience. Use 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 needed for proper performance of the work in this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials during storage and installation that may cause discoloration, staining, or damage.

1.08 WARRANTY

A. All new materials and workmanship provided under this section of the specifications shall be guaranteed in writing by the Contractor to maintain all sheet metal flashing in a watertight condition without cost to the Owner for a period of three (3) years after date of substantial completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Perma Tight Gold Coping-Metal Era.
B. Aluminum Sheet: ASTM B209, 3004 alloy, 0.040 inch thick.

C. Lead: FS QQ-L-201F, 4-lb/sq ft and 2-1/2-lb/sq ft.

D. Copper: ASTM B 370, cold rolled temper, commercially pure alloy 110; minimum 16 ounces per foot.

E. Where sheet metal is required and material or gauge is indicated on the drawings, provide the highest quality and gauge commensurate with the referenced standards.

F. Contractor shall use gauges or thickness listed in the referenced standards for specific girths.

G. Continuous clip shall be fabricated with material one gauge heavier than connecting.

2.02 COMPONENTS

A. Counter and Slip Flashings, Base and Cover Plates, End Caps, Joint Fasteners, and Gravel Stop: Profiled as indicated and to suit existing conditions.

B. Downspouts: Rectangular profile; fabricated from Pre-Finished Galvanized Steel.

C. Counter and Slip Flashings, Base and Cover Plates, End Caps, Joint Fasteners, and Gravel Stops, Scupper Sleeves and Boxes: Profiled as indicated and to suit existing conditions.

D. End Caps, Downspout Outlets, Gutter and Downspout Support Brackets and Straps, Joint Fasteners, Gutters, Downspout Strainers, Downspout Header, and Scupper Boxes: Profiled to suit gutters and downspouts.

2.03 FASTENERS

A. Manufacturers:
   1. Construction Fasteners, Inc.

2. Hilti
3. OMG
4. Powers
5. Simplex

B. Fasteners and Anchorage Devices: Comply with SMACNA requirements, unless otherwise indicated.
   1. Appropriate for purpose intended, approved by Factory Mutual where required.
   2. Rust-resistant and compatible with materials to be joined.
      a. Ferrous Metals: Stainless steel, finish of exposed fasteners same as flashing metal.
      b. Rivets: Stainless steel (rivet and mandrel), Series 44.
   3. Length: As required for thickness of material to penetrate substrate ½-inch minimum.
   4. Exposed Fasteners: Provide metal-jacketed neoprene washers, jacket color to match pre-finished sheet metal.

C. Mechanical Fasteners for Sheet Metal to Substrate Anchorage:
   1. Masonry: One-step, screw-type drive anchor (nailing); heat-treated, stress relieved, stainless steel pin; zinc jacketed; sized for intended application; minimum 1-1/4-inch length x ¼-inch diameter; Hammer-Screw® manufactured by Powers Fasteners, Inc.
   2. Wood Blocking: Hexagonal head screws, stainless steel, with neoprene rubber washers with jacket color to match pre-finished sheet metal.
   3. Concrete: Same as masonry or other power actuated fasteners, suitable for application.

D. Roofing Nails: Hot-dipped galvanized or non-ferrous type, with annular rings, size as required to suit application, minimum 11-gauge with 3/8-inch diameter head.

E. Mechanical Fasteners for Sheet Metal to Metal Fabrications (Support Framing) Anchorage: Appropriate for purpose intended, size as required to suit application and achieve positive anchorage to substrate material.

2.04 ACCESSORIES

A. Solder: FS QQ-S-571, 50/50 type.

B. Flux: FS O-F-506.

C. Metal Primer: Zinc-rich, or Zinc Chromate, compatible with metal and substrate material.

D. Reglets/Receivers: Surface mounted or recessed pre-finished steel, face and ends covered with plastic tape.

E. Downspout Supports: Brackets; Pre-Finished Stainless-Steel.

F. Sealant: As specified in Section 07 9000. Urethane.
   1. Metal Contact: Type I.
   2. Pitch Pan Filler: Type II.

G. Vent Pipe, Piping, and Electrical Conduit Flashings: Preformed membrane pipe flashings, minimum height above roof: 8 inches.

H. Roof Drain Flashings: Membrane flashing extended minimum 36-inches beyond drain bowl in all directions.

I. Aluminum Tape: Pressure sensitive aluminum tape, approved by membrane manufacturer.

2.05 FABRICATION

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
   1. 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.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Form all sheet metal sections and components (except corners) in longest practical length up to 10-feet maximum, true to shape, accurate in size, square, and free from distortion or defects detrimental to appearance or performance.

C. Fabricate continuous cleats and starter strips of same material as sheet, interlocking with sheet.

D. Form pieces in longest possible lengths.

E. Hem exposed edges on underside ½-inch, miter, and seam corners.

F. Form all sheet metal material to provide watertight joints. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
   1. Unprotected Horizontal Surface (expansion joint covers, etc.) Standing seam or drive cleat joints.
   2. Vertical Surfaces (copings, cap flashings, etc.): Flat lock or cover and backer plate seams.

G. Fabricate corners on all sheet metal components (copings, cap flashings, etc.) to form one piece with minimum 18-inch and maximum 36-inch-long legs.

H. Prefabricate all sheet metal accessory components (pitch pans, utility sleeves, umbrellas, etc.) as much as practical.

I. Gutter and Downspouts: Form in sections from minimum Stainless-Steel 24-gage sheet metal with all required special pieces and accessories. Owner's Representative shall select gutter and downspout color from manufacturer's standard color. Gutter and downspouts shall be formed to the profiles and sizes according to SMACNA requirements.

J. Fabricate downspout accessories, solder watertight.

K. Miter all sheet metals corners and solder, weld, tape, or fasten and seal all joints watertight:
   1. Cover joints with 2-inch-wide aluminum tape and heat weld 4-inch-wide Membrane over aluminum tape.
   2. Pre-finished Galvanized Steel: Apply minimum ¼-inch bead of sealant between connecting metal flanges and drill and fasten with rivets at 2-inches on center.
   3. Unfinished Galvanized Steel: Solder joints watertight.
      a. After soldering, remove flux. Wipe and wash solder joints clean.
   4. Install sealant so it will not be visible on the outside of joints.

L. Fabricate elements complete with required connection pieces.

M. Fabricate all components with allowance for expansion at joints. Provide enlarged or oval holes at all piercing fasteners.

N. Fabricate all components, i.e., coping cap, with horizontal (flat) surfaces with built-in slope for drainage toward roof unless indicated otherwise.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
   1. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
   2. Verify roofing termination and base flashings are in place, sealed, and secure.

B. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating Work. Contractor shall be responsible for all dimensions for all sheet metal applications and installations.

B. Apply manufacturer's approved protective backing paint, to a minimum dry film thickness of 15-mil, on surfaces in contact with dissimilar materials.

3.03 INSTALLATION - VARIOUS SHEET METAL COMPOTENTS

A. Install starter and edge strips, and cleats before starting installation.

B. Install reglets and / or receivers on vertical surfaces to receive counterflashings.
   1. Sawcut new reglets where required.
      a. Install receiver component and anchor with lead wedges at 12-inches on center.
      b. Provide bayonet style lap joints, minimum 4-inch overlap.
      c. Fill voids between wedges with backer rod.
      d. Seal receiver to vertical face of wall.
   2. Install surface mounted reglets true to lines and levels.
      a. Fasten to substrate with neoprene head screws at 12-inhes on center maximum.
      b. Seal top of reglets with sealant.

C. Insert flashings into reglets or receivers to form a tight fit. Apply ¼-inch bead of sealant and lap sheet metal minimum 4-inches.
   1. Reglets: Secure in place with plastic wedges at maximum 6-inches on center.
   2. Receivers: Secure in place with neoprene head screws at maximum 12-inches on center.
   3. Seal flashings into reglets with sealant.

D. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Owner's Representative.

E. Metal coping shall be secured to the parapet with a continuous metal cleat. The 22 gauge metal cleat shall be secured with appropriate concrete fastener, spaced 12 inches on center, to both sides of the parapet wall.

F. Fit flashings tight in place. Make corners square surfaces true and straight in planes and lines accurate to profiles.

G. Provide minimum 6-inch-wide backer and corner plates at copings. Fit to ensure complete and permanent watertight seal of joints.
   1. Apply ¼-inch bead of sealant between each layer of metal at each edge.
   2. Corner and Backer Plates: Secure with the Backer Plates by using appropriate fasteners and securing to the parapet wall.
   3. Cover Plates: Hook front or exposed face of cover plate over drip edge; and enclosing or clamping interior seam to the metal coping drip edge.
   4. Do not use mastic between sheet metal components.

H. Where indicated in project drawings, provide premanufactured perimeter metal edging. Fabricate the metal edge to match existing metal edge configuration. The perimeter metal joints are to have ¼ inch spacing; to have a 2-inch-wide aluminum tape apply over the joint.

I. Provide stainless steel metal scuppers for all roof scuppers. Contractor to verify scupper dimension prior to fabrication of the metal scuppers.

J. Lock and seal all sheet metal joints watertight.

K. Install pre-fabricated vent pipe flashing.

L. Install membrane flashings at all roof drains.

M. Provide Stainless Steel Rain Hoods and Umbrellas at all hot stacks, hot pipe penetrations, and at insulated pipe penetrations.

N. **Pitch pans are not desired**. Construct pitch pans from metal. Install only where specifically indicated or approved by Owner's Representative. Provide flanged umbrellas at all pitch pans.
   1. Fill with non-shrink grout to 1-inch from top of flange.
   2. Top with 2-part Pitch Pan Filler.

O. Protect all membrane penetrations as indicated and as recommended in SMACNA and NRCA manuals.

3.04 SCHEDULE - MATERIALS

A. Exposed to View Components:
   1. Through Wall Scuppers
   2. Scupper Face Plate: Polished Stainless-steel.
   3. Metal Coping and associated components: Stainless-Steel.
   4. Perimeter Metal Edge: Stainless-Steel.
   5. Wrap downspout straps and other heavy gauge materials with Stainless-Steel.

B. Concealed Components, (Counterflashings, Etc.): 24gage Stainless-Steel.

C. Drip Pans Accessories: Stainless steel

D. Rain Hoods and Umbrellas: Stainless steel.

3.05 SCHEDULE - MINIMUM STEEL THICKNESS

A. Stainless Steel: ASTM A 167, Type 302/304, soft temper, 24-gauge minimum, No. 2B finish

B. Perimeter Metal Fascia: ASTM A 653, Grade A, G90, 24-gauge minimum core steel.

C. Rain Hoods and Umbrellas: Stainless Steel 24-gauge.

D. Hook Cleats: 22-gauge.

3.06 TESTING AND ADJUSTING

A. Test all modified, relocated, and new systems and equipment.

B. Correct all deficiencies identified, including replacement of parts and components when required.

C. Adjust all Products and equipment to ensure proper operation and function.

3.07 CLEANING

A. Clean work.

B. Clean Owner-occupied areas when soiled by Work or operations of this Division.

END OF SECTION 07 6000

SECTION 07 7000 - NON-PENETRATING, ROOFTOP PIPE AND DUCT SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rooftop pipe supports for small pipes or conduits.

B. Rooftop duct work supports for small ducts.

1.02 RELATED SECTIONS

A. Division 7 – Membrane Roofing

1.03 SYSTEM DESCRIPTION

A. System design to support rooftop pipes and or duct work with an engineered prefabricated support designed for installation without roof penetrations or other features to damage the single ply roof system.

1.04 SUBMITTALS

A. Provide specification and data sheet.

B. Shop Drawings: Show installation layout including sizes and spacing.

C. Verification Samples: Actual samples of each size of support.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in manufacturer's original packaging, marked with manufacturer's name, product model names and catalog numbers, identification numbers and other related information.

B. Store materials under cover until needed.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturer:
   1. Micro Industries, Inc., 844 South 430 West, Suite 100, Heber City, UT. 800-768-6978.
   2. MAPA Products, 103 W CJ Wise Parkway, Naples, Texas. 877-897-2371
   3. Owner Approved Equal

2.02 MATERIALS

A. Pipe Support shall have the following characteristics:
   1. Capable of supporting gas piping and electrical conduit up to a diameter size of 4 inches.

B. Duct Support shall have the following characteristics:
   1. Capable of supporting square or round duct work.

C. Pipe Support Acceptable Products:
   1. Micro Industries, Inc. Model No. 3-RAH-7
   2. MAPA product number – MS-3RA7.

D. Duct Support Acceptable Products:
   1. Micro Industries, Inc. Model No. 10-DS

PART 3 EXECUTION

3.01 PREPARATION

A. The contractor will confirm the correct size supports have been chosen for the size of pipe and or duct work to support.

3.02 INSTALLATION

A. Install the pipe and or duct supports in accordance with manufacturer's recommendations.

B. Pipe Supports shall be installed at all locations where existing piping or electrical conduit runs across the roof area that are presently mounted on wood blocking.

C. Contact roof system manufacturer as to requirements of separator sheet between pipe and or duct support and the installed roof system. Dead wood blocking shall be installed within the roofing system when weight of the supports exceeds recommend weight loads of the specified polyisocyanurate insulation.

D. Consult roofing manufacturer on proper installation and requirements for "dead" wood sleepers.

E. Pipe Support placement recommendations.
   1. The following are to be used as minimum recommendations. For specific requirements, the installer should consult a structural engineer.
   2. For pipe diameters of 1 ½" to 5"– space supports at a maximum distance of 8' apart.
   3. For pipe diameters less than 1 ½" – space supports at a maximum distance of 10' apart.
   4. Along with the above noted spacing recommendations, one additional support should be placed at every union and source and along with one at side of junctions.

F. Duct Support placement recommendations.
   1. The following are to be used as minimum recommendations. For specific requirements, the installer should consult a structural engineer.
   2. Manufacturer's recommended spacing is not to exceed 8' centers depending upon the load. Do not exceed load weight and make certain each duct support is adjusted in height to even load on all duct supports. Support spacing is not to exceed the maximum spacing required in the duct specifications where applicable.

END OF SECTION 07 7000

SECTION 07 7200 - ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured curbs, equipment rails, and pedestals.

B. Roof hatches.

C. Attic Ventilator.

D. Retrofit Roof Drain

1.02 RELATED REQUIREMENTS

A. Section 07 3500 - EPDM Roofing.

B. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.

1.03 REFERENCE STANDARDS

A. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.04 SUBMITTALS

A. See Section 1.E - Special Conditions, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

PART 2 PRODUCTS

2.01 MANUFACTURED CURBS

A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
   1. AES Manufacturing Inc.: www.aescurb.com.
   2. The Pate Company: www.patecurbs.com.
   3. RPS Accessories: www.rpscurbs.com.
   4. Substitutions: See Section 1.E - Special Conditions.

B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.

1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A 653/A 653M, SS Grade 33 ; G60 coating designation; 18 gage, 0.048 inch thick.
2. Manufactured curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
3. Provide the layouts and configurations shown on the drawings.

C. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
3. Height Above Finished Roof Surface: 6 inches, minimum.
4. Height Above Roof Deck: 14 inches, minimum.

D. Equipment Rails: Two-sided curbs in straight lengths, with top horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of rails.
2. Height Above Finished Roof Surface: 8 inches, minimum.
3. Height Above Roof Deck: 10 inches, minimum.

E. Pipe, Duct, and Conduit Mounting Pedestals: Vertical posts, minimum 8 inches square unless otherwise indicated.
1. Provide sliding channel welded along top edge with adjustable height steel bracket, manufactured to fit item supported.
2. Height Above Finished Roof Surface: 6 inches, minimum.
3. Height Above Roof Deck: 10 inches, minimum.

2.02 ROOF HATCHES

A. Manufacturers - Roof Hatches:
1. **Bilco Co.: www.bilco.com**(Prefered)
2. Dur-Red Products: www.dur-red.com.
3. Milcor Inc: www.milcorinc.com.
4. Substitutions: See Section 1.E - Special Conditions.

B. Roof Hatches: Factory-assembled stainless steel frame and cover, complete with operating and release hardware.
1. Style: Provide flat metal covers unless otherwise indicated.
2. Mounting: Provide frames and curbs suitable for mounting on flat roof deck.
3. Size(s): As indicated on drawings; single-leaf style unless indicated as double-leaf.
4. For Ladder Access: Single leaf; 30 by 54 inches.

C. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
1. Material: Galvanized steel, 14 gage, 0.0747 inch thick.
2. Finish: Stainless steel.
3. Insulation: 1 inch rigid glass fiber, located on outside face of curb.
4. Curb Height: 12 inches from finished surface of roof, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.
1. Capable of supporting 40 psf live load.

2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch thick, liner 22 gage, 0.03 inch thick.
3. Finish: Stainless Steel
4. Insulation: 1 inch rigid glass fiber.
5. Gasket: Neoprene, continuous around cover perimeter.

E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
2. Hinges: Heavy duty pintle type.
3. Hold open arm with vinyl-coated handle for manual release.
4. Latch: Upon closing, engage latch automatically and reset manual release.
5. Manual Release: Pull handle on interior.
6. Locking: Padlock hasp on interior.

F. Roof Hatch Safety Railing System: Tubular steel rails attached to sides of roof hatch curb with tube rails on 2 sides and safety mechanism on exit side.
1. Railing System as manufactured by Safety Rail Source.
a. RHSR-SS 30" x 54"

G. Step Industrial Access Stairway Ladder
1. Perforated stairway code compliant.
2. 24” width
3. Height to platform range- 72”-83” or what is needed.
4. Base size-77D in
5. Basis of design- 8 step industrial access stairway ladder-WISS108246

2.03 ATTIC VENTILATORS

A. Attic Ventilators: Factory assembled, spun aluminum, natural gravity type relief unit.
1. Model GRSR as manufactured by Greenheck.
2. Built-in flashing flange for mounting on manufactured curb.
a. Coordinate curb size with attic ventilator. Approximately 24" x24"

2.04 SNOW GUARDS

A. Snow Guards:
1. Berger BB100 Pro
2. Alpine Snow Bird Pad style snow guard-PD40R
3. Owner approved based on alternate manufacturer process for approval.

B. Snow Guards: Individual projecting metal shapes, set between roofing shingles/tiles, and mechanically fastened to roof deck.
1. Projecting Metal Shapes: Bronze castings, triangular spike design.
2. Finish: Owner selected. (must be approved!)
3. Placement: 3 rows at approximately 12" vertical and at intervals of 2 feet along length of roof increased over entry points.
4. Placement: As per manufacturer requirements

2.05 RETROFIT ROOF DRAINS

A. Factory fabricated drain intended to be installed from the roof surface and form a watertight connection to the existing plumbing and roofing system.
   1. ProSeal Retrofit Roof Drain as manufactured by Marathon Roofing Products; www.marathondrains.com.
   2. Drain Body: consisting of the drain flange and drain stem
      a. Manufactured from copper or spun aluminum.
      b. 12" minimum diameter flange.
      c. 12" long minimum drain stem.
   3. Strainer Dome:
      a. Same material as drain body.
      b. 6" minimum height.
   4. Clamping Ring:
      a. Same material as drain body.
      b. Gravel stop with drainage slots.
      c. Positive attachment to drain body.
   5. Seal: Mechanical compression seal between drain stem and existing plumbing.
   6. Size: Size determined by existing conditions and existing pipe sizes. 3" minimum.

2.06 WELDED ALUMINUM PRE-FAB STAIRWAYS

1. Heavy Duty aluminum I bar grating stair tread
2. Factory welded handrails of 1 ½” x .125 aluminum (60630T52) square tubing.
3. 10” x 2.6” aluminum (6061-T6511) structural channel stringers
4. Meets OSHA requirements standards 1910.25 (Fixed Industrial Stairs)
5. Standard 36” wide treads-widths to be determined.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect/Engineer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 7200

SECTION 07 9000 - JOINT SEALERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Preparing sealant substrate surfaces.
2. Sealant and backing.

B. Related Sections:
1. The Contract Documents apply to the Work of this Section.
2. Section 07 5401 - EPDM Membrane Roofing: Application and locations for sealants used in conjunction with roofing.
3. Section 07 6000 - Flashing and Sheet Metal: Sealants used in conjunction with metal flashing for roofing.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM C920 - Specification for Elastomeric Joint Sealants.
2. ASTM D1056 - Flexible Cellular Material- Sponge or Expanded Rubber.
3. ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open Cell Foam).

B. Federal Specifications (FS):
1. TT-S-00227- Sealing Compound, Rubber Base, Polyurethane, Two Component.
2. TT-S-002330 - Sealing Compounds, Synthetic - Rubber Base, Single Component.
3. TT-S-00230C - Sealing Compound, Silicone, Single Component.
4. FS TT-S-1657 - Sealing Compound, Single Component Butyl Rubber Based Solvent Release Type (for Buildings and other Types of Construction).

1.03 SYSTEM DESCRIPTION

A. System performance to achieve moisture and airtight joint seals.

1.04 SUBMITALS

A. See General Conditions and Special Conditions for Submittals: Procedures for submittals.
1. Product Data: Product chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
2. Product List: Submit list of proposed Products and manufacturers, including all items specified in Part 2 - Products or otherwise required by the Work.
3. Assurance/Control Submittals:
   a. Certificates: Manufacturer certificate that components and Products meet or exceed specified requirements.

b. Qualification Documentation: Sealant installer documentation of experience indicating compliance with specification qualification requirements.

4. Samples: Submit the full range of colors available for each selected product.
5. Manufacturer's Installation Instructions: Induced substrate preparation requirements, special precautions, and installation temperature range.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 3 years documented experience.

B. Perform work in accordance with SWRI (Sealant, Waterproofing and Restoration Institute) requirements for materials and installation.

C. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver Products in manufacturer's original unopened containers or packages with labels intact, identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions, where applicable.

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

1.07 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements: Install sealant during manufacturer's recommended temperature ranges and weather conditions for application and cure. Consult manufacturer when sealant cannot be applied during recommended conditions.

1.08 WARRANTY

A. Warranty:
1. Submit written warranty signed by sealant manufacturer agreeing to replace sealants and accessories which fail because of loss of cohesion or adhesion, or which do not cure.
2. Warranty Period: Three (3) years.

PART 2 PRODUCTS

2.01 BUILDING SEALANTS (See Sealant Schedule at the end of this Section for specific use of sealants.)

A. Sealant Type A:
1. For exterior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:

a. Control and expansion joints in cast-in-place concrete.
b. Joints between architectural precast concrete units.
c. Control and expansion joints in unit masonry.
d. Butt joints between metal panels.
e. Joints between marble and/or granite.
f. Joints between different materials listed above.
g. Perimeter joints between materials listed above and frames of doors, windows, louvers, and similar openings.
h. Control and expansion joints in overhead surfaces.

2. Provide single-component, low-modulus, neutral cure, non-sag sealant; comply with ASTM C920, Type S or M, Grade NS, Class 25.~~(Class 50 ?)~~, Class 100/50
3. Acceptable sealant:
   a. Silicones Single Component
      1) Dow Corning 791
      2) Fire resistant

B. Sealant Type B:
1. For exterior joints in vertical and horizontal surfaces between metal window frames and pre-cast concrete tilt-up panel surfaces and between windows and metal window frames
2. Acceptable products:
   a. Dow Corning 795 Sealant

C. Urethanes:
1. One-Part Urethane (Type I Sealant): Self-Leveling, ASTM C920, Type S, Grade P, Class 25.
   a. Urexpan NR-201, by Pecora Corporation.
2. One-Part Urethane (Type II Sealant): Non-Sag, ASTM C920, Type S, Grade NS, Class 25.
   a. Chem-Calk 900, by Bostik.

D. Modified acrylic/polyurethanes for pitch pans:
1. A two-component, solvent- and styrene-free, modified-acrylic anchoring adhesive.

E. Preformed Compressible & Non-Compressible Fillers:
1. Backer Rod - Closed cell polyethylene foam:
   a. HBR Backer Rod, by Nomaco.
   b. #92 Greenrod, by Nomaco.
   c. Sonofoam Closed-Cell Backer Rod, Sonneborn Building Products, ChemRex Inc.
2. Backer Rod - Open cell polyurethane foam:
   a. Denver Foam, by Backer Rod Mfg. Inc.
   b. Foam Pack II, by Nomaco.
3. Neoprene compression seals:
   a. WE, WF, and WG Series, by Watson Bowman & Acme Corp.
   b. Will-Seal 150 Precompressed Expanding Foam Sealants, by Will-Seal, a Division of Illbruck.
4. Butyl Rod: Kirkhill Rubber Co. (714) 529-4901.

F. Bond Breaker Tape: Polyethylene tape of plastic as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate of joint filler must be avoided for proper performance of sealant.

2.02 COLORS

A. Generally, use sealant colors matching color of material joint is located in.

B. Where a joint occurs between two materials of differing colors and Contractor cannot determine which material to match, contact Owner's Representative for selection.

2.03 ACCESSORIES

A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.

B. Primer: Non-staining type as recommended by sealant manufacturer.

C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

D. Masking tape and similar accessories to protect surfaces from damage.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
   1. Verify that joint widths are in conformance with sealant manufacturer allowable limits.
   2. Verify that contaminants capable of interfering with adhesion have been cleaned from joint and joint properly prepared.

B. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 PREPARATION

A. Remove all existing sealant from joints between coping stones and from all joints below the stone copings.

B. The sealant tray for all surface mounted counterflashing details shall be primed as per Manufacturer's requirements for the applicable sealant.

C. Prepare and size joints in accordance with manufacturer's instructions. Clean substrates of dirt, laitance, dust, or mortar using solvent, abrasion, or sandblasting as recommended by manufacturer. Remove loose materials and foreign matter, which might impair adhesion of sealant.

D. Verify that joint backing and release tapes are compatible with sealant. Verify sealant is suitable for substrate. Verify that sealant is paintable if painted finish is indicated.

E. Protect materials surrounding the work of this Section from damage or disfiguration.

3.03 INSTALLATION

A. Install sealant in accordance with manufacturer's published instructions. Perform work in accordance with ASTM C804 for solvent release sealants.

B. Prime or seal joint surfaces where recommended by sealant manufacturer. Do not allow primer or sealer to spill or migrate onto adjoining surfaces.

C. Install backer rod and bond breaker tape as indicated project drawings and where required by manufacturer.

D. Install preformed compressible and non-compressible fillers in accordance with manufacturer's published instructions.

E. Install sealants to depths recommended by sealant manufacturer in uniform, continuous ribbons free of air pockets, foreign embedded matter, ridges, and sags, "wetting" joint bond surfaces equally on both sides.

F. Tool joints concave unless shown otherwise. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form slight cove so that joint will not trap moisture and foreign matter. Dry tool joints. Do not use soap, water, or solvent on tool joints.

3.04 CURING

A. Cure sealants in compliance with manufacturer's published instructions.

3.05 CLEANING

A. Remove excess and spillage of sealants promptly as the work progresses, using materials and methods as recommended by sealant and substrate manufacturers. Clean adjoining surfaces to eliminate evidence of spillage without damage to adjoining surfaces or finishes.

3.06 PROTECTION

A. Do not permit traffic over uncured sealant.

3.07 SEALANT SCHEDULE

A. Exterior Joints:
   1. Perimeters of exterior openings where frames and other penetrations meet exterior facade of building: precast concrete, brick, CMU, polymer reinforced concrete.
      a. Sealant No. 2.01 B2
   2. Expansion and control joints in exterior surfaces of cast-in-place concrete walls, precast architectural wall panels.
      a. Sealant No. 2.01 B2
   3. Expansion and control joints in exterior surfaces of unit masonry walls and polymer reinforced concrete, including at metal panels.
      a. Sealant No. 2.01 A3
      b. Sealant No. 2.01 B2
   4. Coping joints, coping-to-facade joints, cornice and wash, or horizontal surface joints not subject to foot or vehicular traffic. Sealant No. 2.01 A2
      a. Sealant No. 2.01 A3
   5. Exterior joints in horizontal wearing and non-wearing surfaces.
      a. Sealant No. 2.01 A3
      b. Sealant No. 2.01 C2
   6. Painted metal lap or flashing joints.
      a. Sealant 2.01 C2

B. Flashing and Sheet Metal:
   1. Sealant No. 2.01 A3

C. Pitch Pan Filler:
   1. Sealant No. 2.01 D1

END OF SECTION 07 9000

SECTION 26 4113 LIGHTNING PROTECTION FOR STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Strike (air) terminals and interconnecting conductors.

B. Grounding and bonding for lightning protection.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Electrical system grounds.

B. Surge Protection for Wiring Systems: Specified in individual system requirements.

1.03 REFERENCE STANDARDS

A. NFPA 780 - Standard for the Installation of Lightning Protection Systems.

B. UL 96 - Lightning Protection Components.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination with Roofing Work: Ensure adequate attachment of strike terminals and conductors without damage to roofing.

B. Preinstallation Meeting: Convene a meeting at least at least two weeks prior to commencement of any work affected by lightning protection system requirements to discuss prerequisites and coordination required by other installers; require attendance by representatives of installers whose work will be affected.

1.05 SUBMITTALS

A. Contractor to perform calculations and shop drawings as necessary to illustrate that the reinstallation of lightning protection components meets 2011 NEC, NFPA 780, and UL96A guidance and shall submit professionally engineered, sealed certifications as well as drawings and calculations.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Capable of providing the specified certification of the installed system.

B. Field Quality Control Testing Agency Qualifications: Firm capable of and experienced in grounding and bonding testing with documented experience and minimum of three project references.

PART 2 PRODUCTS

2.01 LIGHTNING PROTECTION SYSTEM

A. Lightning Protection System: Provide complete system complying with NFPA 780, including air terminals, bonding, interconnecting conductors and grounding electrodes.
   1. Contractor to determine the feasibility for reuse of any/all system components (which is desired) to achieve compliance with NFPA 780 and UL96 standards.
   2. Determine ground resistance by field measurement.
   3. Provide copper, bronze, or stainless steel components, as applicable; no aluminum.

2.02 COMPONENTS

A. All Components: Complying with applicable requirements of UL 96.

B. Strike (Air) Terminals: Copper, solid, with adhesive bases for single-ply roof installations.

C. Grounding Rods: Solid copper.

D. Ground Plate: Copper.

E. Conductors: Copper cable.

F. Connectors and Splicers: Bronze.

PART 3 EXECUTION

3.01 EXAMINATION

A. Coordinate work with installation of roofing and exterior and interior finishes.

3.02 INSTALLATION

A. Install in accordance with referenced system standards and as required for specified certification.

B. Connect conductors using mechanical connectors or exothermic welding process; protect adjacent construction elements and finishes from damage.

3.03 FIELD QUALITY CONTROL

A. Perform visual inspection as specified in NFPA 780 as if this were a periodic follow-up inspection.

B. Perform continuity testing as specified in NFPA 780 as if this were testing for periodic maintenance.

C. Obtain the services of the specified certification agency to provide inspection and certification of the lightning protection system, including performance of any other testing required by that agency.

END OF SECTION 26 4113