Procurement Department
2 Space Drive • Taylors, SC 29687-6072 • (864) 355-1279 •
The School District of Greenville County

Addendum No. 2

Date: April 12, 2023

Re: MT Anderson Support Center – Roof, HVAC and Office Renovations

IFB No.: 323-17-4-28

The following information becomes part and parcel of Invitation for Bid (IFB) #323-17-4-28 effective this date. Firms must acknowledge receipt of this addendum in their solicitation response.

The following items shall take precedence over the drawings and specifications for the above named project and shall become a part of the contract documents. Where any item called for in the specifications, or indicated on the drawings, is not supplemented hereby, the original requirements shall remain in effect. Where any original item is amended, voided or superseded hereby, the provisions of such item not specifically amended, voided or superseded shall remain in effect.

ATTACHMENTS

1. Attached Specification - "221400 - Facility Storm Drainage," dated 3/27/23
2. Attached Specification - "030150 - Concrete Deck Repair," dated 3/27/23
3. Attached Specification - "035216 - Lightweight Insulating Concrete," dated 3/27/23
4. Attached Specification - "070150 - Preparation for Re-Roofing," dated 3/27/23
5. Attached Specification - "072216 - Roof Board Insulation," dated 3/27/23
6. Attached Specification - "072600 - Vapor Retarder," dated 3/27/23
7. Attached Specification - "075419 - Polyvinyl Chloride Roofing," dated 3/27/23
8. Attached Specification - "076200 - Flashing and Sheet Metal," dated 3/27/23
9. Diagram – Existing Roof Communications Equipment

GENERAL

1. Bidders are hereby advised that information from bid documents which are not received from the sources listed in the Invitation for Bids is not legitimate and the bidder accepts full responsibility for any differences. GMC has not authorized the scanning of the documents. Bidders should be aware that the plans are copyrighted and any unlawful use is subject to legal action. Bidders are further advised that the purchase and/or use of partial bid documents is not recommended and bidder will be responsible for any discrepancies which might have been avoided had a full set of documents been reviewed.

2. Listing of multiple products or manufacturers within specifications or approval of products or manufacturers via substitution request does not waive or preclude any and all performance, warranty or specific requirements listed within the specification unless specifically noted in the Addendum. Only manufacturers and products meeting the specification requirements and listed in the specifications or included in the Addendum shall be approved for the project.

Inquiries/ District Responses

Before the solicitation inquiry deadline of April 12, 2023, the District received inquiries regarding this solicitation. The District's response to the questions follows in **bold** font.

1. Question: I would like to respectfully request your consideration of G410 60mil adhered Feltback Thermoplastic Polyvinyl-Chloride (PVC) Roofing System with a 20 year warranty, as a Substitution on MT Anderson Greenville. Sika Sarnafil manufactures thermoplastic PVC membranes that are energy-efficient and meet Energy Star and LEED criteria for low slope and steep slope applications. I have included G410 Product Data Sheet , as it pertains to the project specifications. Our G410 60mil adhered feltback membrane is Energy Star Rated and meets All THE ASTM requirements.
   District Response: Sika products as described are now shown in the attached revised specifications listed above.

2. Question: Will there an onsite field office that the General Contractor can work out of daily?
   District Response: Depends on the size needed. We have a conference room that holds 12(Conference D) or a training room that holds about 30 (TR 103). Both are close to break and restrooms.

3. Question: There is a small satellite on at triangular stand. The stand is movable. Is this satellite still being used?
   District Response: The satellite dish is not used and was setup for Direct TV. See attached diagram for existing roof communications equipment.

4. Question: Will the Contractor and subcontractors need to be escorted by staff or security to the roof access door and the second floor during working hours?
   District Response: No, as we won't have students in the building. The contractor will be responsible for their staff accountability should there be an emergency. We can also assign a building radio to the contractor so that they can communicate with building services and the front-desk staff.

5. Question: Will an office space within the facility be provided for the General Contractor to hold meetings and set up a temporary office for the Project Management team?
   District Response: See Answer to Question #2.

6. Question: Is it acceptable for roof access to be set up from the exterior of the building utilizing ladders or stair towers? If so, will the employees still be required to go through the check-in process at the main office before accessing the roof from the building exterior?
   District Response: If ladders are used to access the roof from the exterior they need to be removed at the end of the day. If stair towers are used shall be a semi- permanent the contractor will be responsible for eliminating access to the roof at the end of the day. The rear of building is protected with very tall fence. The GC could setup and lock the gate at the end of the day. Sides or front would need to be taken down as no fence to secure. No check-in at front desk is required. Contractor is require to provide background checks on all employees prior to start of project per "*Important: Student and Staff Safety*" on Pages 8 and 9 of the Invitation for Bid Document.

7. Question: Is any live wiring present in any existing conduit present above deck under the roof membrane in the existing roofing system.
   District Response: Following site inspections it is determined there is no live wiring in any conduit present above deck in the plane of the roof system. Any conduit discovered during demolition is abandoned.

8. Question: It has been noted previously that the existing roof system is saturated in many parts and will likely allow water in the building as part of the tear-off process. The interior wrap system has been eliminated as part of the rebid. Who is the responsible party for concerns related to water intrusion into the building?
   District Response: Contractor is responsible for providing protections. See Addenda 1 response to question 8.

9. Question: Per Taper Notes on Drawing BE1.04, both tapered systems (tapered ISO) are to be ONLY 1/8" primary slope, not the mix of 1/8" and ¼" as was the case of the original bid? However, Drawing BE1.05 shows that the tapered LWIC system is a mix of 1/8" tapered slope and ¼" tapered slope on Roof A and all ¼" slope for Roof B? Is this correct or are both tapered systems to have the same slope layout?
   District Response: The rigidity of tapered iso prevents both systems from having the same layout. Other slope designs may be approved during the submittal process as long as they meet the original design intent. Drawings are correct.

10. Question: Roof System 1 is to include a ¼" Gyp Cover Board?
    District Response: Detail A/BE5.01 shows ½" coverboard.

11. Question: Roof System 2 does not have a cover board, the fleeceback will be adhered directly to the new LWIC tapered system?
    District Response: No, coverboard is required by the construction documents. Contractor is responsible for meeting manufacturer's warranty requirements.

12. Question: May we use hot asphalt to adhere the vapor retarder system in lieu of the noted peel and stick?
District Response: **No, hot asphalt is likely to enter the buildings interior.**

13. Question: What is the anticipated start date range for this project and has the project duration changed from the original bid timeline?
District Response: **The Contractor has 168 calendar days after the issuance date of the purchase order to complete the project. This date has not changed from the original bid timeframe.**

14. Question: The existing roof system has a max thickness (to the concrete deck) of 17"?
District Response: **The contractor is responsible for verifying existing conditions.**

The Inquiry Deadline for IFB 323-17-4-28 ended on April 12, 2023 at 10:00 AM EDT.

End of Section

All other terms and conditions remain unchanged and in force. Thank you for your interest in the District.

Jeffrey S. Knotts
Jeffrey S. Knotts
Director of Procurement

Cc: Ms. Terresa Champion
Attachment (9)

SECTION 221400 – FACILITY STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 035216 – Lightweight Insulating Concrete

C. Section 072216 – Roof Board Insulation

D. Section 072600 – Vapor Retarder

E. Section 075419 – Polyvinyl Chloride (PVC) Membrane Roofing

F. Section 076200 – Flashing and Sheet Metal

1.2 SUMMARY

A. Installation of new primary drain bowls at deck height with drain extensions to accommodate the height of the finished roof, as specified herein.

1.3 REFERENCE STANDARDS

A. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.

B. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

C. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

D. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

E. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

F. AIA – American Institute of Architects

G. NRCA – National Roofing Contractors Association.

H. SCBC – South Carolina Building Code, 2021 Edition

I. SCPC – South Carolina Plumbing Code, 2021 Edition

J. SCEBC – South Carolina Existing Building Code, 2021 Edition

K. IECC – International Energy Conservation Code, 2009 Edition

L. OSHA – Occupational Safety and Health Administration

M. NFPA – National Fire Protection Association

N. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

O. ASME A112.6.4 – Standard Specification for Roof, Deck, and Balcony Drains.

P. ASTM C564 – Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

Q. ASTM A888 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

R. ASTM C1277 – Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

S. Manufacturers Standardization Society SP-58-2009 – Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Preparation instructions and recommendations
   2. Storage and handling requirements and recommendations
   3. Installation methods
   4. Include data regarding installation and rigging as well as all necessary Restrictive and Non-Restrictive General Safety and Usage Notes.

B. Refer to submittal section of this specification for additional information.

C. Drainage Plan
   1. Submit plan to provide drainage throughout construction including during tear-off, installation of lightweight insulating concrete, and membrane application.

D. Operation and Maintenance Data:
   1. Include parts catalog with complete list of equipment replacement parts; identify each entry with equipment's descriptions and identifying part numbers.
   2. Include technical information for servicing equipment.

E. Close-out Submittals:
   1. Provide manufacturer's maintenance instructions that include recommendations for inspection frequency, periodic checking and adjustment of hangers/anchors, and other periodic cleaning and maintenance of all components.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Work of this Section to be executed by manufacturers specializing in the fabrication of the materials specified. Manufacturer shall have a minimum of 10 years of continuous, concurrent experience providing specified materials including the current year.

B. Installer Qualifications: Work associated with the installation of new drains, drain leaders, and piping shall be performed by a plumbing contractor licensed to perform such work in the state of Georgia and shall have a minimum of 5 years of experience in this type of work.

1.6 ENVIRONMENTAL CONDITIONS

A. Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials shall be installed with ambient temperature is below 40 degrees or above 110 degrees Fahrenheit. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 ROOF DRAINS

1. Diameter to match existing piping, Cast-Iron, General-Purpose Roof Drains as manufactured by one of the following:
   a. Zurn Plumbing Products Group (Basis of Design)
   b. Josam Company.
   c. Smith, Jay R. Mfg. Co.
2. ASME A112.6.4, for general-purpose roof drains.
3. Cast Iron Body.
4. Nominal 15-inch diameter.
5. Combination Flashing Ring and Gravel Stop,
6. Static Extension or Adjustable Extension
7. Bottom Outlet. No Hub Connection
8. Under-deck Clamp.
9. Flat Receiver Plate
10. Aluminum or Cast Iron Dome
11. No-Hub Coupling
    a. 4-band, No-Hub coupling meeting ASTM C1277. Coupling gaskets meeting ASTM C564. Model NH-66 as manufactured by Fernco Incorporated or approved equal prior to bid.
       1) For use connecting drains to leaders.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inspect all surfaces to which drainage system is to be applied. Do not install unless surfaces are even, sound, clean, dry and free from defects which might affect the application.

B. Examine project prior to installation and report in writing to Owner and Designer any defects or other site conditions that would cause problematic installation products or possible deficiency.

C. Follow published instructions of the product manufacturer for installation of extruded or proprietary metal products, unless otherwise specified herein.

D. Use nails, screws, bolts, cleats or other fasteners as recommended by the approved drainage system manufacturer.

E. Changes to pipe in size or direction shall be made with pre-manufactured fittings.

F. Contractor shall furnish and install temporary protection for interior work in accordance with appropriate section of the specification.

3.2 Roof Drains:

A. Ensure drainage can occur during all stages of construction including tear-off, installation of lightweight insulating concrete, and membrane application.

B. Adjust the existing primary roof drains at existing locations so that the drain bowl is flush to the existing deck.
1. Cut leader square with the axis using a soil pipe cutter.
2. Re-connect the drain bowl to drain leaders using 4-band no-hub clamps. Any new leader, if necessary, shall be PVC and shall match the existing leaders in diameter. All new connections shall be made using 4-band no-hub clamps. Apply new minimum R-10 insulating wrap on the underside of the drain bowl to the first 10-feet of piping.
   a. Any clamping rings and/or drain strainers that are damaged and/or lost during the roof replacement project shall be replaced with new cast iron clamping rings and aluminum drain strainers to match the existing at no additional cost to the Owner.

C. After installation of insulation and roofing raise the height of the drains using static or adjustable drain extensions to match the height of the new roof.
1. Sumps around drains will be rejected.

3.3 OPERATIONS AND CLEANING

A. Ensure that all lines, drains, and other drainage system components are clean and clear of debris at the time of final acceptance by the Owner.

B. The Contractor shall water test all drains prior to the final acceptance by the Owner.
1. Water shall be applied to each overflow drain using a spray nozzle in accordance with AAMA 501.2 for a minimum of 15 minutes. The Owner will supply water and electricity, and the Contractor shall provide any other necessary items to perform the test, including hoses, spray nozzles, and water pumps.
2. The cost for any repairs or adjustments required to any new drainage system component as a result of a failed water test due to leaking, including the overflow drain or connections to existing piping shall be borne by the Contractor at no additional cost to the Owner.

END OF SECTION 221400

SECTION 030150 – CONCRETE DECK REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 072600 – Vapor Retarder

C. Section 075419 – Polyvinyl Chloride (PVC) Membrane Roofing

D. Section 076200 – Flashing and Sheet Metal

1.2 SUMMARY

A. Repair of damaged concrete deck as needed.

1.3 REFERENCE STANDARDS: Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:

A. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.
   1. ASTM C928 - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs

B. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

C. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

D. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

E. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

F. AIA – American Institute of Architects

G. NRCA – National Roofing Contractors Association.

H. SCBC – South Carolina Building Code, 2021 Edition

I. SCPC – South Carolina Plumbing Code, 2021 Edition

J. SCEBC – South Carolina Existing Building Code, 2021 Edition

K. IECC – International Energy Conservation Code, 2009 Edition

L. OSHA – Occupational Safety and Health Administration

M. NFPA – National Fire Protection Association

N. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

1.4 ACTION SUBMITTALS

A. Prior to the start of work, submit the following to the Owner for approval:
   1. Product submittals required within Section 013000, including technical data sheets and Material Safety Data Sheets for products proposed for use.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed to install the specified products and is eligible to receive a manufacturer's warranty. The firm shall have a minimum of 5 years documented experience performing work equal or similar to the specified work.

B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.

C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.

D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state or local regulatory agencies, the product manufacturer, industry roofing standards, or Owner-mandated requirements are discovered, notify the Owner immediately for resolution.

E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the Owner immediately for resolution.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.

B. Store materials in weather protected environment, clear of ground and moisture. Cover insulation, roofing materials, and other moisture-sensitive products with a canvas tarp.

C. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not perform concrete repair work during inclement weather. Refer to product manufacturer for outdoor temperature requirements for installation of materials. Do not install materials at times when the outdoor temperature does not fall within the minimum/maximum temperature requirements of the manufacturer.

B. Safety Data Sheets (SDS) of all specified products shall remain on site for the duration of this project.

PART 2 - PRODUCTS

2.1 CONCRETE DECK REPAIR MATERIALS

A. For use at "Repair at Opening Caused by Obsolete Roof Penetration Removal", as described within paragraph 3.2.A:
   1. Steel plate: 16-gauge galvanized with pre-drilled holes for fasteners and plates.
   2. Fasteners and plates: For securing steel plate to concrete deck: Structural concrete deck plate and fastener system such as JM "Structural Concrete Deck Fasteners and Plates", #14 fasteners with knurled thread, and minimum 3-inch galvalume plates; fastener length as necessary to penetrate 1-inch minimum into roof deck, manufactured by Johns Manville, Denver, CO, or approved equal.

B. For use at "Localized Concrete Deck Repair", as described in paragraph 3.2.B:
   1. Bonding agent and reinforcement protection: Sika "Armatec 110 EpoCem", manufactured by Sika Corporation, Lyndhurst, NJ, or approved equal.
   2. Concrete patch material: Rapid hardening, early strength gaining, cementitious, patching material for concrete, complying with ASTM C 928; such as "SikaQuick 1000", manufactured by Sika Corporation, Lynhurst, NJ, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Inspect existing concrete decks for holes, spalling, cracks, and other defects. If an opening less than or equal to 8-inches in diameter exists, refer to paragraph 3.2.A, "Repair at Opening Caused by Obsolete Roof Penetration Removal". If a surface defect exists that will make installation of the specified adhered underlayment or insulation impossible, refer to paragraph 3.2.B, "Localized Concrete Deck Repair".

3.2 CONCRETE DECK REPAIR

A. Repair at Opening Caused by Obsolete Roof Penetration Removal:
   1. At openings in the deck less than 24-inches on any side, cover the existing opening with 1/8-inch steel plate. Lap the plate a minimum of 8-inches beyond the opening on all sides. Fasten the steel plate with specified fasteners and plates 12-inches on center. Secure the plate a minimum of 2-inches in from the outside edge of the repair plate.
   2. At openings larger than 24-inches, furnish and install new minimum Z-purlins that shall extend onto the roof deck a minimum of 6 inches, down into the opening a minimum of 1-

1/2" and into the opening a minimum of 6 inches on all sides. At a minimum, the Z-purlin shall be able to support the new steel deck ends on all sides. Secure the Z-purlins to the concrete roof deck using a continuous bed of the specified epoxy adhesive down the length of the purlin in accordance with the manufacturer's written instructions. Furnish and install new specified steel decking supported by the Z-purlins on all sides. The deck flutes shall extend across the shortest pans. Secure the new deck to the new Z-purlins with specified deck screws at spacings not to exceed 6 inches on center. At any side laps, furnish and install a minimum of 3 specified side lap screws.

B. Localized Concrete Deck Repair (Unit Price Work):
   1. To the extent indicated by the Owner, remove any damaged or loose existing concrete deck material from the repair area.
   2. Apply bonding agent and reinforcement protection to the repair area following the requirements and recommendations of the product manufacturer.
   3. Apply concrete patch material to the repair area following the requirements and recommendations of the product manufacturer. Ensure finished patch is level and flush with adjacent deck surface.
   4. Allow the patch material time to cure. If necessary, provide temporary protection from inclement weather while the concrete patching material cures. Refer to manufacturer's requirements for cure time. Inspect the completed repair to ensure the roof deck is suitable to receive new roofing materials.

END OF SECTION 030150

SECTION 035216 – LIGHTWEIGHT INSULATING CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 072600 – Vapor Retarder

C. Section 075419 – Polyvinyl Chloride (PVC) Membrane Roofing

D. Section 076200 – Flashing and Sheet Metal

E. Section 221400 – Facility Storm Drainage

1.2 SUMMARY

A. Roofing System No. 2 - Installation of new lightweight insulating concrete and expanded polystyrene panels.

1.3 REFERENCE STANDARDS

A. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.

B. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

C. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

D. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

E. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

F. AIA – American Institute of Architects

G. NRCA – National Roofing Contractors Association.

H. SCBC – South Carolina Building Code, 2021 Edition

I. SCPC – South Carolina Plumbing Code, 2021 Edition

J. SCEBC – South Carolina Existing Building Code, 2021 Edition

K. IECC – International Energy Conservation Code, 2009 Edition

L. OSHA – Occupational Safety and Health Administration

M. NFPA – National Fire Protection Association

N. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Refer to submittal section of this specification for additional information.

C. Submit manufacturer's instructions for proper placement of the proposed lightweight insulating concrete roof insulation system.

D. Submit a letter from the supplier of the proposed lightweight insulating concrete system confirming that the expanded polystyrene used as a component in the lightweight insulating concrete system is to be furnished by the supplier of the proposed lightweight insulating concrete system.

E. Submit a sample copy of the roof system guarantee covering the proposed lightweight insulating concrete system and roof membrane system.

F. Submit shop drawings including roof plans, a slope layout plan, and thickness of insulation for the new lightweight insulating concrete system for approval prior to construction.

G. Submit a letter from the roof membrane manufacturer confirming the intention to issue the roof system guarantee covering the proposed lightweight insulating concrete system and roof membrane system at project completion.

H. Submit a letter from the proposed lightweight insulating concrete system manufacturer stating that the Contractor is approved to install the approved system.

1.5 QUALITY ASSURANCE

A. Acceptable Contractor: The contractor must be certified in writing prior to bid by the supplier to install the proposed lightweight insulating concrete system.

B. Agency Approvals: The proposed lightweight insulating concrete system shall conform to the following requirements. No other testing agency approvals will be accepted.
   1. Tested by Underwriters Laboratories in accordance with the procedures of ASTM E119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory. Lightweight insulating concrete roof insulation components are defined by Underwriters Laboratories under sections CCVW for foamed plastic and CJZZ for floor or roof - topping mixture in the latest edition of the Underwriters Laboratories Fire Resistance Directory.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in the supplier's original unopened packages, fully identified as to manufacturer, brand or other identifying data and bearing the proper Underwriters Laboratories label.

B. Store bagged concrete aggregate products in a dry location until ready for application. Expanded polystyrene board should not be stored in areas of standing water prior to application but can be exposed to rainwater before application. Boards must be clean and free from foreign substances.

1.7 PROJECT/SITE CONDITIONS

A. Requirements Prior to Job Start
1. Notification: Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
2. Permits: Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.
3. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

B. Environmental Requirements
1. Precipitation: Do not apply materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials and building interiors are protected from possible moisture damage or contamination,
2. Temperature Restrictions: When air temperatures of 40°F (4.4°C) or above are predicted to occur within the first 24 hours after placement, normal mixing and application procedures may be used. When air temperatures of 32°F to 40°F (0°C - 4.4°C) are predicted to occur within the first 24 hours after placement, warm water may be used. The mix temperature should not exceed 100 degrees Fahrenheit (37.8°C) at the point of placement. Do not install the lightweight insulating concrete system when air temperatures are below 32°F (0°C).

1.8 WARRANTY

A. Roof System Guarantee: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the roof system manufacturer's 20-year labor and materials roof system guarantee. The roof system guarantee shall include both the roofing and flashing membranes, and the specified new lightweight insulating concrete system consisting of aggregate fill, patented-pre-formed polystyrene panels, and base sheet fasteners. All repair or replacement costs covered under the guarantee shall be borne by the roofing membrane manufacturer. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Owner. Specific items covered under the roof system guarantee include:
1. The actual resistance to heat flow through the roof insulation will be at least 80% of the design thermal resistance, provided that the roofing membrane is free of leaks.
2. Should a roof leak occur, the insulating performance of the roof insulation will be at least 80% of the design thermal resistance within a 2-year period following repair of the leak.

3. The roof insulation will remain in a reroofable condition should the roof membrane require replacement (excluding damage caused by fastener pullout during removal of the old membrane.)
4. The roof insulation material will not cause structural damage to the building as a result of expansion from thermal or chemical action.

B. Prior to final payment, Contractor shall submit one original and three copies of the lightweight insulating concrete system manufacturer's twenty year, No Dollar Limit Guarantee. This guarantee shall include that the system will remain in sound condition for reroofing should the membrane require replacement and that the new system shall cause no damage to the structure due to expansion and contraction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
1. Siplast
2. Sika Sarnafill
3. Approved equal prior to bid.

2.2 LIGHTWEIGHT INSULATING CONCRETE

A. Provide a lightweight insulating concrete roof insulation system incorporating Portland cement, vermiculite aggregate, and expanded polystyrene board supplied by a single manufacturer conforming to the following:
1. Portland Cement: Must conform to Type I, II, or III as defined by ASTM C 150.
2. Expanded Polystyrene Insulation Boards: Expanded Polystyrene (EPS) insulation board having a minimum nominal density of 1 pcf defined as Type I by ASTM C 578 approximately 3% open area. Minimum R-Value of 4.0 per inch.
3. Water: Potable water that is clean and free of deleterious amounts of acid, alkali, and organic materials.

B. Mix Design:

C. Mix insulating concrete in accordance with ACI 523.1R or manufacturer's written requirements, whichever is more stringent. Minimum 862 kPa (125 psi) when tested in accordance with ASTM C495.

D. One-Way Vents: Membrane-Clad metal for single-ply roofing. As required by the lightweight insulating concrete system manufacturer. OlyVent as manufactured by OMG Roofing Products or approved equal prior to bid.

E. Roofing products: Refer to section 075419 of this specification.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide equipment and application procedures conforming to the material supplier's application instructions.

B. Examine surfaces to receive the lightweight insulating concrete and determine that the surfaces are acceptable prior to placement of the lightweight insulating concrete system.

C. Remove water or any other substance that would interfere with bonding of the lightweight concrete system.

D. The substrate shall be clean, smooth, dry, free of debris and all foreign matter prior to receiving lightweight insulating concrete. Application of new materials shall constitute approval of the substrate by the Contractor. Patch and repair all holes, cuts, and loose laps in the vapor retarder, per vapor retarder manufacturer's written instructions, prior to the application of new lightweight insulating concrete.

E. Ensure that all surfaces to receive lightweight insulating concrete are free of oil, grease, paints/primers, loose mill scale, dirt, or other foreign substances. Where necessary, cleaning or other corrections of surfaces to receive lightweight insulating concrete is the responsibility of the party causing the unacceptable condition of the substrate.

3.2 INSULATION APPLICATION

A. Vapor Retarder: Place a 1/8" minimum thickness slurry coat of lightweight concrete over the vapor retarder before embedding the polystyrene panels.

B. Fit insulation units snugly to each other and to all vertical surfaces.

C. Replace damaged units as required to provide a smooth surface and uniform insulation thickness.

D. Place the thickness of expanded polystyrene insulation boards, as shown on approved shop drawings, within 30 minutes of applying the slurry coat of lightweight concrete to the substrate.

E. Place the expanded polystyrene insulation panels in a brick-like pattern. The maximum allowable step in insulation board shall be one inch.

F. Fill any gaps in the polystyrene insulation larger than ¼" thick with like materials.

G. Furnish and install a tapered polystyrene insulation system over the slurry coat of lightweight where the polystyrene insulation has a minimum thickness of 4 inches at the low points above the substrate, and a minimum finished slope of 1/8 inch per foot. Increase the thickness of the polystyrene insulation to the high points. Refer to Drawings.

3.3 LIGHTWEIGHT CONCRETE APPLICATION

A. Provide equipment and application procedures conforming to the material supplier's application instructions.

B. Install a one-inch minimum thickness lightweight insulating concrete system over top of the expanded polystyrene insulation within the same day's application. Maintain the specified roof slope.

C. Repair any cracks or gaps in the lightweight insulating concrete using the manufacturer's approved methods and materials. Any cracks or gaps in the lightweight insulating concrete are grounds for rejection by the architect/engineer/owner.

D. Furnish and install new one-way lightweight insulating concrete vents approved by the system manufacturer. Install a minimum of 1 vent per 1,000 square feet, unless the manufacturer has more stringent requirements. Install in strict accordance with the manufacturer's written instructions. Refer to Drawings.
   1. At single-ply roofing, set the horizontal flange over the roofing in a continuous bead of sealant. Fastener the edge of the flashing to the lightweight insulating concrete using base sheet fasteners. Strip the horizontal flange with roof membrane that shall extend to the vertical surface of the vent and onto the roofing a minimum of 5 inches. Fully weld the membrane stripping to the vent and the roofing membrane.

3.4 ROOF DRAINS

A. Set roof drains at the height of the surrounding roof. Refer to Section 221400.

B. Provide drainage throughout the application process. DO NOT ALLOW WATER TO POND ON THE ROOF.

3.5 FIELD QUALITY CONTROL

A. Protection: Avoid roof-top traffic over the roof insulation system until the curing period specified by the manufacturer has been reached, but no less than 24 hours.

B. Compressive Strength Testing: The contactor is responsible for hiring a certified third-party testing agency to conduct a compressive strength test of the first concrete batch. Density, thickness, and strength of the concrete shall be tested in accordance with ASTM C 495.
   1. Note: The cost of the initial testing (and any subsequent testing due to failure) shall be borne by the contractor and included in the base bid.

C. The contractor shall monitor the thickness and wet density of the lightweight insulating concrete at the time of placement to ensure conformance with the manufacturer's requirements. Monitor the placement of proper thickness of polystyrene insulation board in accordance with the contract documents. The contractor shall keep a log with date, time, thickness, and wet density for each concrete batch and area covered.

END OF SECTION 035216

SECTION 070150 – PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 03 01 50 – Concrete Deck Repair

C. Section 03 52 16 – Lightweight Insulating Concrete

D. Section 07 22 16 – Roof Board Insulation

E. Section 072600 – Vapor Retarder

F. Section 075419 – Polyvinyl Chloride (PVC) Membrane Roofing

G. Section 076200 – Flashing and Sheet Metal

H. Section 22 14 00 – Facility Storm Drainage

1.2 SUMMARY

A. Facility protection including but not limited to, exterior walls/windows, interiors, existing roofing, installed roofing materials.

B. Installation of Interior Protections for roof tear-off and installation of roofing.
   1. Additive Alternate No. 2 – Furnish and install "Temporary Suspended Ceiling" as specified herein.

1.3 ACTION SUBMITTALS

A. Prior to the start of work, submit the following to the Owner for approval:
   1. Product submittals for all items to be used for interior protections, including technical data sheets and Material Safety Data Sheets for products proposed for use.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed to install the specified products. The firm shall have a minimum of 5 years documented experience performing work equal or similar to the specified work.

B. Provide daily inspections of the temporary suspended ceilings to ensure no damage has occurred. Remove any debris build up occurring and repair temporary suspended ceilings as needed to prevent debris or moisture entering the interior space.
   1. Provide a "Interior Protections Inspection Report" consisting of the following,
      a. No less than 8 photos of the interior protections.

b. Document any repairs to the temporary suspended ceilings.
c. Document any failures which occurred allowing debris or moisture to enter the interior space.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (Add Alt No. 2)

A. Global Wrap: Temporary Suspended Ceiling. Basis of Design

B. Approved equal prior to bid

PART 3 - EXECUTION

3.1 GENERAL

A. Limit size of work sections to safeguard adjacent materials, structures, etc., and to minimize dust and noise. Size of work sections shall be no larger than can be made watertight in the same day and prior to any inclement weather.

B. Protect existing facilities from damage during work. Do not overload existing paving, curbs, sidewalks, etc. with vehicle traffic. Do not overload new or existing construction with demolition debris, equipment, etc.

C. Walls, windows, roof edges, etc., adjacent to pump lines, hoists, and staging areas shall be protected using canvas tarpaulins. Plastic or felt will not be acceptable.

D. Plywood, minimum ¾" thick, or other suitable materials shall be used to protect roof areas from damage that may be caused by concentrated equipment loads and foot traffic.

E. Roof traffic shall be confined to work areas. Contractor shall be responsible for leaks that develop in traffic areas during and after project completion.

F. Self-supporting ramps shall be used where expansion joints, area dividers, etc. are to be crossed.

G. Contractor shall protect interior operations from adverse weather during roofing operations.

H. At the end of each work day, the contractor shall apply nightly temporary tie-ins to ensure that the building is weather tight, and that newly installed materials are free from moisture and debris. Newly installed materials coming in contact with moisture and debris is grounds for rejection of materials and shall constitute the replacement of the materials with like materials at no additional cost to the Owner.

I. The Contractor will be held liable for any damages to the building, building contents, its occupancy, grounds or landscaping resulting from work under the Contract. In the event of damage, Contractor will restore property to a condition equivalent to that at the time the project started.

J. The Contractor shall keep existing drainage facilities and associated leaders/downspouts clear of debris and bitumastic materials during construction. The Contractor will be required to use elastomeric plugs to protect leaders/downspouts during demolition and re-roofing operations.

K. Prior to the start of re-roofing operations, the Contractor has the option to water test all drain leaders and lines for clogs prior the start of work. All findings shall be immediately reported to the Owner/Engineer in writing for direction prior to proceedings.
   1. Failure to perform this option and proceeding with work shall serve as the acceptance of the existing drain leaders and lines to be functioning at one hundred percent (100%) capacity prior to the start of re-roofing operations.
   2. Furthermore, with this acceptance, the Contractor shall be responsible to ensure that drain leaders and lines are functioning at one-hundred (100%) capacity prior to the Final Payment at no additional cost to the Owner.

L. Prior to the start of re-roofing operations, the Contractor shall provide Owner personnel with plastic bags/tarps which will be used by personnel to protect televisions, computers, and other associated equipment during the period of time that re-roofing operations are occurring. Bags/tarps shall be provided a minimum of one week prior to the start of re-roofing operations. Costs for providing such materials shall included in the Base Bid.

M. Contractor will still be required to provide any other additional protection to interior items as may be deemed necessary to comply with the requirements of the Contract Documents.

3.2 INTERIOR PROTECTIONS – TEMPORARY SUSPENDED CEILING

A. Provide temporary suspended ceilings beneath all areas of tear-off and installation of lightweight insulating concrete.
   1. Provide controlled drainage throughout the temporary suspended ceiling to control the ponding and location of water within the temporary suspended ceiling.

B. Inspect temporary suspended ceiling for debris, water or other instructions daily.
   1. Remove intrusions and provide repairs to the temporary suspended ceiling as recommended by the manufacturer.

C. Remove and dispose of temporary suspended ceiling and all entrapped debris after installation of primary roof membrane is complete.
   1. Removal shall be performed by the original installer in a manner that prevents entrapped debris from damaging the interior space.

END OF SECTION 070150

SECTION 072216 – ROOF BOARD INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 072600 – Vapor Retarder

C. Section 075419 – Polyvinyl Chloride (PVC) Membrane Roofing

D. Section 076200 – Flashing and Sheet Metal

E. Section 221400 – Facility Storm Drainage

1.2 SUMMARY

A. Roofing System No. 1: Installation of insulation, tapered roof insulation, and cover board over the vapor retarder and structural concrete roof deck.

1.3 REFERENCE STANDARDS

A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:

B. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.
1. ASTM C472-20 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete
2. ASTM C1289-22 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
3. ASTM C1325-21 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units
4. ASTM D3273-21 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
5. ASTM E84-21a - Standard Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E108-20a - Standard Test Methods for Fire Tests of Roof Coverings

C. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

D. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

E. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

F. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

G. AIA – American Institute of Architects

H. NRCA – National Roofing Contractors Association.

I. SCBC – South Carolina Building Code, 2021 Edition

J. SCPC – South Carolina Plumbing Code, 2021 Edition

K. SCEBC – South Carolina Existing Building Code, 2021 Edition

L. IECC – International Energy Conservation Code, 2009 Edition

M. OSHA – Occupational Safety and Health Administration

N. NFPA – National Fire Protection Association

O. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Submit separate letters from the membrane manufacturer and the insulation manufacturer stating he has examined the plans, specifications and details for this project and approves the use of his products and systems on this project.

C. Submit a letter from the insulation manufacturer acknowledging the brand name and type of roof membrane being proposed and his approval of the use of the roof membrane and system with his product.

D. Submit manufacturer's tapered insulation layout.

E. Submit a sample copy of the roof system guarantee covering the insulation and membrane.

F. Submit shop drawings including roof plans, a slope layout plan, and thickness of insulation for the new tapered polyisocyanurate insulation for approval prior to construction.

G. Submit a letter from the roof membrane manufacturer confirming the intention to issue the roof system guarantee covering the vapor barrier, insulation, and roof membrane system at project completion.

H. Submit a letter from the roof system manufacturer stating that the Contractor is approved to install the approved system.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive a manufacturer's warranty. Company shall have a minimum of 5 years documented experience certified by roofing system manufacturer.

B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by roofing system manufacturer for specified roofing system and shall be in compliance with specified regulatory requirements.

C. Examine the technical specifications and drawings. Verify all dimensions, detail conditions, roof plan notes and existing site conditions that may affect the work. Verification of existing dimensions and site conditions is the responsibility of the Contractor. No additional compensation will be considered for failure to verify existing dimensions, detail conditions, roof plan note callouts, and existing site conditions.

D. Upon examination, if conflicts between the technical specifications and drawings, and those of federal, state, or local regulatory agencies, the product manufacturer, industry roofing standards, or Owner-mandated requirements are discovered, notify the Owner immediately for resolution.

E. During work, if conditions are discovered which do not allow for continuation of the work per the technical specifications and drawings, notify the Owner immediately for resolution.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.

B. Store materials in weather protected environment, clear of ground and moisture. Cover insulation, roofing materials, and other moisture-sensitive products with a canvas tarp. Protect foam insulation from direct sunlight exposure.

C. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.7 PROJECT/SITE CONDITIONS

A. Requirements Prior to Job Start
   1. Notification: Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
   2. Permits: Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.
   3. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

B. Environmental Requirements
   1. Do not perform work during inclement weather. Refer to product manufacturer for outdoor temperature requirements for installation of materials. Do not install materials at times

when the outdoor temperature does not fall within the minimum/maximum temperature requirements of the manufacturer.

2. Cold weather precautions:
3. Store products that may be negatively affected by exposure to cold weather, such as primers, adhesives, sealants, and cements, in a heated location. Refer to the roofing manufacturer and NRCA requirements and recommendations for additional cold weather application recommendations and restrictions.
4. Safety Data Sheets (SDS) of all specified products shall remain on site for the duration of this project.

1.8 WARRANTY

A. Roof System Guarantee: Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the roof system manufacturer's 20-year No-Dollar-Limit labor and materials roof system guarantee. The roof system guarantee shall include the insulation, roofing flashing membranes, and edge metal. All repair or replacement costs covered under the guarantee shall be borne by the roofing manufacturer. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and be issued at no additional cost to the Owner. Specific items covered under the roof system guarantee include:
   1. The actual resistance to heat flow through the roof insulation will be at least 80% of the design thermal resistance, provided that the roofing membrane is free of leaks.
   2. Should a roof leak occur, the insulating performance of the roof insulation will be at least 80% of the design thermal resistance within a 2-year period following repair of the leak.
   3. The roof insulation will remain in a reroofable condition should the roof membrane require replacement (excluding damage caused by fastener pullout during removal of the old membrane.)
   4. The roof insulation material will not cause structural damage to the building as a result of expansion from thermal or chemical action.

B. Prior to final payment, Contractor shall submit one original and three copies of the manufacturer's twenty year, No Dollar Limit Guarantee. This guarantee shall include that the system will remain in sound condition for reroofing should the membrane require replacement and that the new system shall cause no damage to the structure due to expansion and contraction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Carlisle Syntec
   2. Johns Manville
   3. Sika Sarnafill
   4. Approved equal prior to bid.

B. ROOF INSULATION
   1. Tapered polyisocyanurate roof insulation system; ASTM C1289-20, Type II, Class 2, Grade 2 (20 psi); HCFC-Free and Zero Ozone Depletion Potential (ODP); product type acceptable to the roofing manufacturer.
   2. Roof Areas Refer to Drawings:

a. Slope: 1/8 inch per foot minimum.
   1) Slope varies by Roof Area, refer to drawings.
   2) Crickets, saddles, and sumps shall be minimum of double the roof's slope. (Example: ½-inch tapered insulation shall be applied where the roof slope is ¼-inch-per-foot)
      a) Wood Fiber Tapered Edge Strips: ASTM C208, Type II, Grade 1 (Built-Up Roofs), C209. Approved for use by approved roofing system manufacturer .
b. Thickness: Minimum insulation thickness of 3.5 inches at drains and gutters.
c. Long Term Thermal Resistance (LTTR) Value: 5.6 minimum per inch, with a minimum start of 3.5 inches insulation thickness at low point of roof slope.
d. Board Size:
   1) Insulation used as "fill" for the overlying tapered insulation system: 4-feet by 4-feet. Staggering fill insulation is required.
e. Overlying tapered insulation system: 4-feet by 4-feet.

C. ROOF COVER BOARD
1. Type: Gypsum Fiber Board, Nominal ½ inch thick, ASTM C 1177, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, nominal 900 psi minimum compressive strength, Class A, non-combustible, 4' x 8' board size.
2. Approved by roof system manufacturer to adhere roof membrane.
3. Approved by the roofing membrane manufacturer for use within the assembly.
4. Board size shall not exceed 4-feet by 4-feet.

D. SEPARATOR BOARD
1. Gypsum Fiber Board, nominal 1/4" thick, ASTM C 1177 or C1278, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, nominal 900 psi minimum compressive strength, Class A, non-combustible, 4' x 8' board size. Approved for use by the roofing system manufacturer to adhere membrane flashings.

E. ADHESIVES, FASTENERS, & PLATES
1. Low-Rise Adhesive Fastener: double or single-component low-rise polyurethane adhesive as approved by the roofing system manufacturer.

PART 3 - EXECUTION

3.1 COORDINATION AND INSPECTION

A. The substrate shall be clean, smooth, dry, and free of debris and all foreign matter prior to receiving insulation and cover board. Application of new materials shall constitute approval of the substrate by the Contractor.

3.2 GENERAL: ROOF INSULATION AND COVERBOARD

A. Apply insulation with end joints staggered approximately one-half the length of the units.

B. Offset insulation joints from the preceding layer a minimum of six (6) inches.

C. Fit insulation units snugly to each other and to all vertical surfaces.

D. Low-Rise Foam Adhesive: Secure each board to the substrate using low-rise adhesive beads at spacings in accordance with the submitted manufacturer's tested assembly to resist the uplift pressures and/or ratings shown on drawings for each zone. Zone definition is indicated on drawings. Ensure insulation contact with adhesive by weighting units.

E. Replace damaged units as required to provide a smooth surface and uniform insulation thickness.

3.3 GENERAL REQUIREMENTS: CRICKETS/SADDLES

A. Cricket/Saddles shall also meet the requirements of Paragraph 3.2 above.

B. Start cricket construction by striking chalk lines for outer edges of tapered units. Install the first row along the chalk lines, mitering and fitting at the points where lines break.

C. Complete the cricket assembly using tapered isocyanurate and isocyanurate fill units.

D. The thin edge of the tapered insulation shall be ½" and shall be located at the valley created by the tapered insulation and the roof insulation.

E. Remove and replace damaged units with new insulation or repair to provide a smooth surface and uniform insulation thickness.

F. Utilize tapered wood fiber edge strips that transition from 0" to 1/2" as the first layer of tapered insulation to provide a smooth transition. Set wood fiber on top of the insulation in one continuous band of low-rise foam adhesive.

3.4 INSTALLATION: ROOF AREAS A & B (minimum R-20)

A. Apply one layer of 2-inch-thick isocyanurate insulation to the vapor barrier and secure using low-rise adhesive.

B. Apply one layer of 1.0-inch-thick isocyanurate insulation to the first layer of insulation and secure using low-rise adhesive.

C. Furnish and install tapered insulation (minimum 1/8-inch-per-foot) to move water from walls, form valleys/crickets, as shown on roof plans, using factory-tapered isocyanurate units and isocyanurate fill units. Secure using low rise foam adhesive.

D. Furnish and install one layer of nominal 1/2-inch-thick cover board over all isocyanurate insulation and secure using low rise foam adhesive.

END OF SECTION 072216

SECTION 072600 - VAPOR RETARDER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 030150 – Concrete Deck Repair

C. Section 035216 – Lightweight Insulating Concrete

D. Section 072216 – Roof Board Insulation

E. Section 075419 – Polyvinyl Chloride (PVC) Roofing

F. Section 076200 – Flashing and Sheet Metal

1.2 SUMMARY

A. Section includes surface preparation and the application of vapor retarder.

1.3 REFERENCE STANDARDS

A. Reference standards of the following sources are applicable to products and procedures specified in Part 2 - Products and Part 3 – Execution of this Section:

B. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.

C. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

D. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

E. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

F. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

G. AIA – American Institute of Architects

H. NRCA – National Roofing Contractors Association.

I. SCBC – South Carolina Building Code, 2021 Edition

J. SCPC – South Carolina Plumbing Code, 2021 Edition

K. SCEBC – South Carolina Existing Building Code, 2021 Edition

L. IECC – International Energy Conservation Code, 2009 Edition

M. OSHA – Occupational Safety and Health Administration

N. NFPA – National Fire Protection Association

O. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Safety Data: For each type of product.

C. Drainage Plan
1. Submit plan to provide drainage throughout construction including during tear-off, installation of lightweight insulating concrete, and membrane application.

1.5 ENVIRONMENTAL CONITIONS:

A. Removal of existing roofing materials shall not occur if forecasted weather includes a greater than 40% chance of precipitation. Material installation shall proceed only when weather conditions are in compliance with the applicable manufacturer's recommendations for installation and no precipitation is imminent. Materials installed during adverse weather conditions shall be subject to removal and replacement with new materials at no additional cost to Owner. No more materials shall be removed than can be installed to a watertight condition in the same day and prior to any forecasted precipitation.

1.6 QUALITY ASSURANCE

1. Warranty: As required by Section 075419 Polyvinyl Chloride (PVC) Roofing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials as required by material manufacturers.
1. Modified bitumen rolls shall be stored upright.
2. All materials shall be protected by rain and weather.

1.8 WARRANTY

A. Shall be included in the warranty of roof system manufacturer. Refer to section 075419.

PART 2 - PRODUCTS

2.1 VAPOR RETARDER

A. Self-adhered membrane consisting of tri-laminate woven polyethylene film over a high quality SBS rubber and asphalt blend rated to provide temporary weather protection for a minimum of 90-days. ASTM 6163, Type I, Grade S.
   1. Manufacturer:
      a. Siplast
      b. Carlisle
      c. Sikasarnafil
      d. Johns Manville
      e. Approved equal prior to bid.

2.2 ACCESSORIES

A. Roof Cement: ASTM D2822-91(1997), Class I. Class II cement will be used if applied to damp or wet surfaces.

B. Primer: As required by the manufacturer and manufacturer's approved tested assembly prior to adhering vapor retarder.

PART 3 - EXECUTION

3.1 INSPECTION

A. The decking shall be clean, smooth, dry, free of debris and all foreign matter prior to installation of the roof membrane. Application of new materials shall constitute approval of the substrate by the Roofing Contractor.

3.2 VAPOR RETARDER INSTALLATION

A. Check roof surface carefully for damage and application defects and make appropriate repairs and corrections prior to application of vapor barrier.

B. Roll out membrane and allow to "relax" in accordance with roofing system manufacturer's written instructions.

C. Prior to application of vapor retarder, apply appropriate primer and allow to thoroughly dry.

D. Beginning at the lowest point of the roof, one ply of the vapor retarder sheet without voids or wrinkles.

E. Release the film on the underside of the vapor retarder and adhere directly to the substrate.

F. Lap sides and ends in accordance with the roofing system manufacturer written requirements. However, side laps shall be lapped a minimum of 2-inches and end laps a minimum of 6-inches. Roll laps with a 2-inch roller as required by manufacturer.

G. Apply water-cut off at t-joints as required by manufacturer.

H. Using a weighted roller smooth membrane to the substrate.

I. At field intersections, install the manufacturer required patches and sealant.

J. Whenever possible, the entire roll shall be applied in a continuous manner.

K. Finished sheet must have a uniform appearance throughout.

L. At internal roof drains, membrane shall be extended into the drain bowl. Flash the drain in accordance with the manufacturer's written recommendations.
   1. Material shall be removed from the drain bowl after new roofing materials are installed prior to installation of drain extensions.

M. All membrane shall be turned up curbs and walls above roof level as shown on drawings. Fully adhere the vapor retarder to the new roof insulation. At locations where it is not practical to turn up the membrane and extend the membrane to the edge of the deck and cut off neatly. Where the membrane is cut at the end of the deck, form a sleeve from membrane and flash penetrations to extend up the vertical surface to the distance shown on drawings. Extending flashing onto the vapor barrier a minimum of 2-inches. Seal the edge of the vapor barrier with roofing cement

N. At curb and wall corners, form the flashing detail in accordance with manufacturer written instructions and install the manufacturer required patches and sealant.

3.3 TEMPORARY ROOF

A. The vapor retarder shall not be exposed for longer than allowed by the roofing system manufacturer's written literature. Failure to cover the vapor retarder within this limitation will result in rejection of the membrane and will require the membrane be replaced or recovered with additional membrane as allowed by the roofing system manufacturer's written literature.

END OF SECTION 072600

SECTION 075419 – POLYVINYL CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 035216 – Lightweight Insulating Concrete

C. Section 072216 – Roof Board Insulation

D. Section 076200 – Flashing and Sheet Metal

E. Section 221400 – Facility Storm Drainage

1.2 SUMMARY

A. Roofing System No. 1 - Section includes surface preparation and the application of 60-mil PVC roof system, walkway pads, and non-penetrating roof top pipe supports.

B. Roofing System No. 2 – Section includes surface preparation and the application of fleece backed PVC membrane adhered directly to the light weight insulating concrete, walkway pads, and non-penetrating roof top pipe supports.

1.3 REFERENCE STANDARDS

A. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.

B. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

C. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

D. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

E. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

F. AIA – American Institute of Architects

G. NRCA – National Roofing Contractors Association.

H. SCBC – South Carolina Building Code, 2018 Edition

I. SCPC – South Carolina Plumbing Code, 2018 Edition

J. SCEBC – South Carolina Existing Building Code, 2018 Edition

K. IECC – International Energy Conservation Code, 2009 Edition

L. OSHA – Occupational Safety and Health Administration

M. NFPA – National Fire Protection Association

N. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

O. MSS SP-58 - Pipe Hangers and Supports -- Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry.

P. MSS SP-69 - Pipe Hangers and Supports -- Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. All product data shall be the manufacturer's latest edition.

B. Safety Data: For each type of product.

C. Shop Drawings: Shall be full and complete showing all material to be installed and label fastener spacings, materials used, and measurements.
   1. Tapered Layout
   2. Membrane Adhesive Pattern
   3. Primary Drain Detail
   4. Gutter Detail
   5. Gravel Stop Detail
   6. Membrane Expansion Joint Detail
   7. Deck Expansion Joint Detail
   8. Curb Flashing Detail
   9. Deck Patch Detail
   10. Pipe Flashing Detail

D. Roof Assembly: Contractor shall provide tested assemblies approved and reference in one of the following registries, Florida Product approval, Miami-Dade N.O.A., or FMG RoofNav tested assembly, other agencies may obtain approval prior to bid. Tested assembly shall meet the below criteria.
   a. Fire Rating: UL 790 Class A
   b. Wind Uplift: Refer to Drawings

E. Certificates:
   1. Submit evidence satisfactory to Owner/Designer that the proposed applicator is currently approved by the manufacturer of the roofing materials. Submit copies of "Certificate of License" issued to roofing applicator by manufacturer.
   2. A Manufacturer's Notice of Intent to Issue Roof Warranty, prior to the use of any of the manufacturer's materials on the project.

F. Reports
1. Prior to start of installing work of this Section, and as part of the required written report on the Pre-Application Roofing Conference, submit a written and detailed step-by-step description of the methods of installation as agreed to in the Pre-Application Roofing Conference.

1.5 PROJECT MEETINGS

A. Pre-Application Roofing Conference
1. Approximately two weeks prior to scheduled commencement of roofing installation and associated work, arrange a meeting at project site with installers of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of roof-top units and other work in and around roofing which must precede or follow roofing work including mechanical and electrical work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the work. Record discussions of conference and decisions and agreements (or disagreements) reached and furnish copy of record to each party attending.
2. Review methods and procedures related to roofing work, including, but not necessarily limited to, the following:
   a. Review roofing system requirements (Drawings, Specifications, and other Contract Documents) for possible conflicts and resolve.
   b. Communication channels and procedures. Organization of contractor, subcontractor, and suppliers.
   c. Review required submittals, both completed and yet to be completed.
   d. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   e. Review required inspection, testing, certifying, and materials usage accounting procedures.
   f. Field change orders and procedures
   g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
   h. Construction schedule
   i. Review work safety requirements.
   j. Review interior protections and inspection schedule for interiors.

B. Ongoing Construction Meetings
1. Project meetings shall be conducted at a minimum of once every two-weeks.
   a. Project meetings may be conducted virtually unless designer requires an onsite meeting. Only requested individuals will be required to be onsite.
   b. Review construction schedule
   c. Review Change Orders
   d. Review quality control
   e. Review problems/issues encountered, and actions taken.

1.6 QUALITY ASSURANCE

A. Coordinated installation: Except as otherwise indicated, perform roofing and flashing work as a single integrated unit of work, without division of responsibility between separate installers (single installer responsibility required).

B. Manufacturer qualifications: Obtain primary products, including roof membrane, base flashings, membrane adhesives, roof insulation boards, roof insulation fasteners and adhesives products from a single manufacturer. Manufacturer must have a minimum of 10 years of documented experience producing the specified type of membrane products. Provide secondary products recommended by the manufacturer of primary products for use with roofing system provided.

C. Installer Qualifications:
   1. A single installer (Roofing Contractor) must perform the work of this Section and have not less than 10 years of successful experience in installation of roofing systems similar to those specified for this project and which is acceptable to and approved and/or licensed by manufacturer of primary roofing materials.
   2. Obtain written certification from manufacturer of roofing system certifying that installer is approved by manufacturer for installation of specified roofing system and approved at a level capable of providing the specified warranty. Provide copy of certification to Owner prior to pre-application roofing conference.
   3. Installer must maintain full-time non-working supervisor/foreman on job site during times that roofing is in progress. Supervisor must have minimum of 10 years of experience in roofing work of similar nature and scope as specified roofing.

D. The roofing systems manufacturer shall provide qualified company personnel to attend pre-construction & in-progress meetings, and to perform periodic weekly job site visits as necessary. The manufacturer shall also provide non-sales related field auditors for the purpose of performing quality assurance inspections, both in-progress and final inspections. Provide copies of the manufacturer's field auditor inspection report to the Contractor, Designer, and Owner.

E. Manufacturer's inspections: Provide manufacturer's inspection services of roofing application. Manufacturer's inspection services shall include inspection of installation:
   1. within 2-days of start of system installation and ONE Weekly in-progress inspection for duration of installation, immediately after completion. Inspection shall point out deficiencies in workmanship and application of materials during and after work of other trades, requiring access/traffic on finished roofing has been completed. Inspect for damage resulting from the work of other trades subsequent to the "completion of installation".

1.7 PRODUCT HANDLING

A. Delivery:
   1. Deliver materials in manufacturer's original, unopened containers with manufacturer's labels intact and legible.
   2. Deliver materials requiring fire resistance classification to the job with labels attached and packaged as required by labeling service.
   3. Deliver enough materials to allow continuous work.

B. Storage:
   1. Store rolled goods on end on raised platforms and protected from the weather until installed in the roofing system.
   2. Deliver, store, and handle materials in accordance with manufacturer's printed instructions. Deliver materials in manufacturer's original wrappers, dry, and undamaged with seals and labels intact. If inside storage is not available at the job site, protect materials by covering with breathable tarpaulins.
   3. Store insulation materials on raised platforms, protected from the weather, and handled in a manner to avoid edge damage. Wet insulation shall be immediately removed from site.

4. Adhesives, flashing cements, and pail goods must be stored in original containers with lids tightly in place and protected from weather exposure, on raised platforms.
5. Unless otherwise recommended by the manufacturer, store and handle materials to protect them from:
   a. Moisture, whether due to rain, other situations or condensation.
   b. Damage by construction traffic.
   c. Temperatures over 110°F.
   d. Temperatures below 50°F.
   e. Direct sunlight.
   f. Mud, dust, sand, oil, grease, and dirt.
6. Remove products from job site immediately that show indications of moisture damage/infiltration and replace with undamaged materials.

C. Handling:
1. Select and operate materials handling equipment and store materials to keep from damaging existing construction or applied roofing.
2. Immediately remove and dispose of wet materials.
3. Comply with fire, safety, and environmental protection regulations.
4. Do not store materials on roof decks, nor position roofing installation equipment on roof decks in concentrations exceeding design live loads. Contractor shall replace any damaged roof deck caused by improper material storage or overloading of material carts.
5. Minimize traffic atop the work during all phases of installation.
6. Damaged materials shall not be installed.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
1. Along with the roofing applicator and sheet metal installer, verify existing conditions, including:
   a. Roof deck conditions.
   b. Varying deck and wall thickness for length of anchoring devices required.
2. Replace or restore to original condition all materials or work damaged during construction of work of this Section.
3. Protect paving and building walls adjacent to hoists and trash chute when applicable.
   a. Lap protective materials at least 6 in.
   b. Vent plastic sheets are not allowed for purpose of covering materials.
   c. Secure protective coverings against wind.
   d. Leave protective coverings in place until roofing work has been completed.

B. Environmental Requirements:
1. Do not install roofing during rain or start roofing if rain is probable during installation.
2. Do not install roofing when there is ice, frost, surface moisture, or dampness visible on the surface to which roofing is to be applied. The relative humidity shall not be higher than 90%.
3. Do not install roofing if temperatures are 45°F or lower, unless approved otherwise by the Owner & Manufacturer.

C. Protection:
1. Protect surfaces not intended to receive roofing materials from spillage, dripping, spotting and damage during application of the roofing. Should protection not be effective, or not be provided, restore the respective surfaces to their proper conditions by cleaning, repairing, or replacing, as applicable for the circumstances and as directed by Owner.
2. Immediately protect completed portions of roofing from damage of subsequent construction activities in accord with contract requirements. Repair, replace, or as

otherwise required to remedy any damage to roofing resulting from construction activities, for the entire duration of construction.

D. Sequencing:
1. Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counter flashing are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials.

1.9 WARRANTY AND GUARANTY

A. Responsibility: It is the sole responsibility of Contractor to review Contract Documents, field conditions, to coordinate all requirements and conditions with roofing applicator and manufacturer for issuance of warranties and guaranties. Changes required for warranty and guaranty issuance shall be performed at no additional cost to Owner.

B. Warranty and Guaranty: Upon completion of the work of this Section, and as a condition of its acceptance, deliver to Owner the following:
1. Applicator's warranty: Written warranty, as provided at the end of this Section, signed by Contractor and an officer of roofing subcontractor's firm, agreeing to maintain the work of this Section, and its associated flashings and accessories, free from blistering and the penetration of water for a period of 5 years following the Date of Substantial Completion. None leaking blisters exclusions are not acceptable and require immediate repairs by Contractor.
2. Onsite Warranty Signage: Roof Contractor shall provide an onsite roof warranty information signage affixed to the interior space of the roof access hatch or door. The signage must be a minimum of 8.5-inches by 11-inches in size. The signage must include the following information.
a. Roof system manufacturer.
b. Warranty number.
c. Installation date.
d. Warranty expiration date.
e. Name and contact information including phone number and email address of roof installer and manufacturer.

C. MANUFACTURER'S GUARANTY:
1. Written guaranty, full systems NDL warranty to include flashing endorsement signed by an officer of roofing materials manufacturer's company, agreeing to repair or replace the roofing system and damaged roof materials, from penetration of water through the roof membrane for a period of 20 years following the Date of Substantial Completion, without additional cost to Owner. Warranty must meet roof assembly performance criteria noted on paragraph 1.010 Design and Performance Criteria.
a. Manufacturer's Guaranty shall include, at no additional cost to the owner, a 72-mph wind rider.
2. It is the sole responsibility of the Contractor to ensure prior to bidding the project that the proposed system he is proposing meets the noted warranty requirements without exceptions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Siplast

B. Carlisle Syntec

C. Johns Manville

D. Sika Sarnafil

E. Approved alternative prior to bid.

2.2 POLYVINYL CHLORIDE ROOFING MATERIALS.

A. Polyvinyl Chloride Roofing Membrane: ASTM 4434, minimum 60-mil overall thickness with minimum 23 mil thickness above the scrim, as manufactured by the approved roofing system manufacturer.
   1. Maximum sheet width of 12-feet for fully adhered membrane.
   2. Membrane color: White.

B. Fleece-Back Polyvinyl Chloride Membrane: (Roofing System No. 2) ASTM 4434, nominal 60-mil membrane thickness with minimum 23 mil thickness above the scrim, as manufactured by the approved roofing system manufacturer. Overall thickness of 115 mils with a minimum 8-ounce fleece backing.
   1. Maximum sheet width of 12-feet for fully adhered membrane.
   2. Membrane color: White.

C. Membrane Adhesive & Base Flashing Membrane Adhesive (Solvent-Based), as manufactured by the approved roofing system manufacturer.

D. Fleece-Back Membrane Adhesive: (Roofing System No. 2) Single or double low-rise polyurethane foam as manufactured by the approved roofing system manufacturer. For use to adhere roofing fleece-back membrane substrate.

E. General Purpose Sealant (to match membrane color). As manufactured by the approved roofing system manufacturer.

F. T-Joint Covers. As manufactured by the approved roofing system manufacturer.

G. Inside/Outside Molded Corners. As manufactured by the roofing system manufacturer. The use of field-fabricated inside/outside corners is not acceptable.

H. Large and Small Pipe Flashing. As manufactured by the roofing system manufacturer.

I. Universal Pipe Boot. As manufactured by the roofing system manufacturer. Pre-fabricated flashing boot shall include a draw band for securing the top of the flashing boot to the pipe.

J. Unsupported Membrane. As manufactured by the approved roofing system manufacturer. Minimum 55 mil thickness.

K. Cut Edge Sealant. As manufactured by the approved roofing system manufacturer.

L. Membrane Cleaner: As manufactured by the approved roofing system manufacturer. For use in removing foreign debris from the membrane prior to welding.

M. Membrane-Clad Metal: As manufactured by the approved roofing system manufacturer, ASTM A653, minimum 24 ga. galvanized steel clad with membrane.

N. Termination Bar. As manufactured or approved by the approved roofing system manufacturer.

O. Polyurethane Caulk: As manufactured and/or approved by the roofing system manufacturer. To be applied at those locations identified by the manufacturer.

P. Water Cut-Off Mastic: As manufactured and/or approved by the roofing system manufacturer. To be applied at those locations identified by the manufacturer.

2.3 PMMA/PMA MEMBRANE (As Needed):

A. Provided by or approved by roof system manufacturer as specified or shown on drawings. Fully reinforced polymethyl-methacrylate (PMMA) or polymethacrylate (PMA) membrane system. Membrane installation shall consist of PMMA/PA resin; polyester fleece reinforcement; PMMA/PMA resin application. Textured Finish: Horizontal areas of installed PMMA membrane shall receive single coat of PMMA textured finish in color selected by Design Professional. Approved manufacturers: As approved by the roof membrane manufacturer.

2.4 MEMBRANE WELDING MACHINES:

A. As approved by the roofing system manufacturer. Contractor shall provide written documentation that operators have received the roofing system manufacturer's required training to operate equipment. Welders shall be maintained in good working order and shall be operated and maintained in accordance with the welding machine manufacturer's written instructions.

2.5 WALKWAY PADS:

A. As manufactured by the approved roofing system manufacturer. Nominal 30" wide.

2.6 FOAM CORE:

A. Compression tube that is a minimum of 1.5 times larger than the expansion joint opening, as approved for use by the approved roofing system manufacturer.

2.7 ROOFING NAILS:

A. With minimum 1" head, such as Simplex nails or approved equal.

2.8 FASTENERS

A. Membrane Fastener: Minimum #15 steel screw roof fastener for steel decking as approved by the approved roofing materials manufacturer to resist uplift requirements shown on plans. Minimum pull-out in new Grade C, 22 gauge decking is 640 lbs. Fasteners must pass a minimum of 15 cycles in the Kesternich SFW 2.0s DIN 50018 test with less than 15% red rust. Provide fasteners of lengths to penetrate the top of the roof deck a minimum of 1-inch and no more than 1-1/2-inch.

B. Seam Plate: Minimum 2-3/8" grooved, galvalume steel plate. As approved by the roofing materials manufacturer to use in conjunction with the specified membrane fasteners to attach thermoplastic membrane.

2.9 SEPERATOR BOARD:

A. Gypsum Fiber Board, nominal 1/4" thick, ASTM C 1177 or C1278, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, nominal 900 psi minimum compressive strength, Class A, non-combustible, 4' x 8' board size. Approved for use by the roofing system manufacturer to adhere membrane flashings.

2.10 ROOF TOP PIPE SUPPORTS

A. System Description: Support piping on roof with an engineered prefabricated pipe support system designed for installation without roof penetrations, flashing or damage to the roofing material. The system shall consist of bases, made of high-density polypropylene or polycarbonate plastics with UV Protection, a HDG structural steel frame and suitable pipe hangers for the application. Nuts, threaded rods and washers shall be HDG, spring nuts and bolts for spring nuts will be electro-plated. System shall be custom designed to fit piping and conduit to be installed and the actual conditions of service.

B. Manufacturers
1. Miro Industries, 844 South 430 West Suite 100, Heber City, Utah,
2. CADDY, a registered trademark of Erico International Corporation, 31700 Solon Road, Solon, Ohio,
3. PHP Systems, 5534 Harvey Wilson Drive, Houston, Texas,
4. or approved equal prior to bid.

C. Materials
1. Support Spacing: 8 feet unless otherwise specified by the manufacturer and within 12 inches of elbows and junctures.
2. 3-RAH-12 with polycarbonate base and roller for piping up to 3" in diameter.
3. 6-RAH-12 with polycarbonate base and roller for piping up to 6" in diameter.
4. Two (2), Model 2.5-Conduit Support-2 for electrical juncture boxes.
5. Model 1.5 for condensation lines.
6. Refer to manufacturer recommendations and local code requirements for line and piping support.

D. Roof Drains and Drain Extensions – Refer to Section 221400

PART 3 - EXECUTION

3.1 INSPECTION

A. The substrate shall be clean, smooth, dry, free of debris and all foreign matter prior to installation of the roof membrane. Application of new materials shall constitute approval of the substrate by the Roofing Contractor.

B. Insulation joints with gaps greater than ¼" shall be filled with roof insulation in order to provide a smooth surface.

3.2 FULLY ADHERED ROOF MEMBRANE INSTALLATION (Roofing System No.1)

A. Unroll the membrane sheets and allow them to relax in accordance with the roofing system manufacturer's recommendations and ambient temperature at the time of this phase of the work.

B. Remove any damaged or creased membrane sections, and discard.

C. All membrane surfaces to be welded shall be clean and dry. No adhesive shall be present within the lap areas.

D. Solvent-Based Adhesive
1. Fold the sheet back evenly without wrinkles onto itself to expose the underside. Position the sheet at any field splices by overlapping the membrane approximately 5 inches, unless the manufacturer has a more stringent requirement. Once the membrane is in place, mark the bottom sheet ½" - ¾" from the edge of the top sheet every 4' - 6' with a lumber crayon or similar type marking device.
2. Sweep the substrate with a stiff broom to remove materials that will interfere with the proper installation of the membrane.
3. Apply the manufacturer's bonding adhesive to both the exposed underside of the sheet and the substrate to which it will be adhered to allow approximately the same drying time. Apply adhesive to provide an even and uniform film thickness. Care shall be taken not to apply adhesive over an area that is to be later cleaned and spliced to another sheet of flashing.
4. Allow adhesive to flash off until tacky. Touch the adhesive surface with a clean dry finger to be certain that the adhesive does not stick or string. Also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness.
5. Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and evenly to minimize wrinkles. Compress the bonded half of the sheet to the substrate with a stiff push broom.
6. Fold the unadhered half of the membrane sheet back onto itself, and repeat the bonding procedure to complete the bonding of the sheet.

E. At eaves, the membrane shall be mechanically fastened to the eave wood blocking using membrane fasteners and plates spaced no more than 12 inches on-center. Extend an additional membrane over the wood blocking a distance to match the depth of the gutter at gutter eaves or the rake flashing at rake eaves. Extend the additional membrane a minimum of 5 inches onto the roofing past the eave membrane fasteners. Fully adhere the membrane to the wood blocking and fasten to the vertical face of the wood blocking using roofing nails spaced no more than 12 inches on-center. Fully weld the membrane to the roofing. Set the edge of the membrane in continuous multi-purpose tape.

F. Vertical Surfaces:
   1. At vertical surfaces, turn the membrane up the vertical surface a minimum of 2 inches and fully adhere using the manufacturer's approved adhesive. Secure the membrane to the substrate using the roofing system manufacturer's approved termination bar or fasteners/plates, and secure in accordance with their written instructions. Fasteners shall penetrate the substrate at spacings and depths approved by the roofing system manufacturer.
   2. At the base of curbs, parapets, and other vertical surfaces, the membrane shall be mechanically fastened to the metal decking using membrane fasteners and plates spaced no more than 12 inches on-center.

G. Primary Roof Drains: Where membrane laps are within 18-inches of the drain bowl, furnish and install a minimum 36" x 36" target patch centered over the roof drain and secure the exterior edge of the membrane to the roof deck as specified. Cut an opening in the target patch at the center of the drain bowl so that the membrane extends past the interior edge of the drain bowl a minimum of 1 inch. Fully weld target patch and field membrane splices a minimum of 2 inches on all sides. Weld in accordance with this section of the specification. Apply water block between the target patch and the drain bowl prior to applying the drain clamping ring.

H. Furnish and install the roofing system manufacturer's patches at all required locations such as intersecting field seams. Apply the manufacturer's approved seam caulk, as required, at locations specified by the roofing system manufacturer.

I. Prior to final inspection, the surface of the membrane shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

3.3 FLEECE-BACK ROOF MEMBRANE INSTALLATION (Roofing System No. 2)

A. Sweep the substrate with a stiff broom to remove materials that will interfere with the proper installation of the membrane.

B. Roll out membrane and allow the membrane to "relax" in accordance with manufacturer written instructions. Back roll the membrane prior to application.

C. Secure the fleece or felt back membrane to the substrate using low-rise adhesive beads at spacings in accordance with the manufacturer's requirements to resist the uplift pressures and/or ratings shown on drawings for each zone and the approved tested assembly assembly number. However, spacings shall not to exceed 6 inches on-center in the field (Zone 1), 6 inches on center for the perimeter (Zone 2), and 4 inches on center for the corner (Zone 3). Zone definition is indicated on drawings.

D. Using a water-filled, foam covered lawn roller, firmly press the membrane to ensure full contact with the adhesive layer by frequent rolling in two directions.

E. Membrane shall be smooth to the substrate, and wrinkles in the membrane shall be grounds for rejection.

F. Low-rise foam adhesive shall not be used on vertical surfaces.

G. At eaves, extend the membrane over the wood blocking a distance to match the depth of the gutter at gutter eaves or the rake flashing at rake eaves. Fully adhere the membrane to the

wood blocking and fasten to the vertical face of the wood blocking using roofing nails spaced no more than 12 inches on-center. Set the edge of the membrane in continuous multi-purpose tape.

H. Vertical Surfaces:
   1. At vertical surfaces, turn the membrane up the vertical surface a minimum of 2 inches and fully adhere using the manufacturer's approved adhesive. Secure the membrane to the substrate using the roofing system manufacturer's approved termination bar or fasteners/plates, and secure in accordance with their written instructions. Fasteners shall penetrate the substrate at spacings and depths approved by the roofing system manufacturer.
   2. At the base of curbs, parapets, and other vertical surfaces, the membrane shall be mechanically fastened to the metal decking using membrane fasteners and plates spaced no more than 12 inches on-center.

I. At drains, end the fleece-back membrane approximately 12 inches from the center of the drain in all directions. Furnish and install new 36" x 36" membrane flashing target patch centered over the drain. Cut an opening in the membrane at the center of the drain bowl so that the membrane extends past the edge of the drain bowl a minimum of 1 inch. Apply water block between the membrane and the drain bowl prior to applying the drain clamping ring. Fully adhere the target patch to the field membrane using the membrane manufacturer bonding adhesive. Fully weld target patch splices to the field membrane a minimum of 2 inches on all sides. Cover the joint with an additional strip of membrane that extends a minimum of 3 inches from the joint in all directions. Fully weld the stripping to the roof membrane and target patch. Weld in accordance with this section of the specification. Refer to Drawings.

J. At joints in the fleece-back membrane without a selvedge edge, butt the membrane together at the splice location. Furnish and install an unsupported membrane strip over the joint and extend it past the joint a minimum of 3 inches in every direction.

K. Furnish and install the roofing system manufacturer's patches at all required locations such as intersection field seams. Apply the manufacturer's approved seam caulk, as required, at locations specified by the roofing system manufacturer.

3.4 BASE FLASHINGS INSTALLATION

A. Separator Board: At curbs and walls above roof level where bituminous flashings have been removed and new plywood or metal is not installed, furnish and install a new separator board over the substrate where new membrane flashings will be applied. Secure the board to the substrate using specified fasteners and insulation plates at spacings not to exceed 18 inches on-center, in every direction and a minimum of 2 rows of fasteners. Fasteners shall penetrate the substrate a minimum of 1 inch.

B. Roll out the membrane to be used for base flashings and allow to relax in accordance with the roofing system manufacturer's written instructions.

C. Flashing pieces shall extend onto the roof a minimum 3 inches past the roof membrane fasteners at the edge of the sheet and up the vertical surface a minimum of 8 inches.

D. Fully adhere the flashing to the substrate using the roofing system manufacturer's approved flashing adhesive.

E. Base flashing shall be smooth to the substrate, and wrinkles in base flashing shall be grounds for rejection.

F. If base flashings terminate at a corner and edges would be exposed, furnish and install new 4-inch x 4-inch L-type membrane-clad metal closures with an exterior edge caulking cove. If base flashings terminate at walls and edges would be exposed, furnish and install new 4-inch-wide L-type membrane-clad metal closures with an exterior edge caulking cove. The closure shall be set in water cut-off mastic or butyl tape, and fastened to the substrate using appropriate fasteners at spacings not to exceed 12 inches on center. Completely hot air weld the base flashings to the membrane-clad metal. Apply a non-shrinking sealant, such as NP-1 or approved equal, to the caulking cove at the exterior edge of the closure. Completely remove all residual asphalt from the substrate prior to installing any sealant or caulking.

G. At inside and outside corners of curbs and parapets, Contractor shall use the roofing system manufacturer's pre-fabricated corner pieces. The use of field-fabricated pieces is not acceptable. Pre-fabricated pieces shall be installed in accordance with the roofing system manufacturer's written instructions.

H. At locations where base flashing seam transition from vertical to horizontal, the contractor shall furnish and install new unsupported patches at these locations shall extend a minimum of 3 inches past the transition, centered over the seams in all directions.

I. Use the roofing system manufacturer's termination bar at base flashing that exceed 36 inches in height. Install rows of termination equally spaced up the wall. Fastener spacings not to exceed 8 inches on center. Set flashing in water cut-off mastic, set the bar over the edge of the base flashing, and apply caulk at the top of the flashing.

J. At a minimum, extend base flashings up and over the top horizontal surface of curbs and inside the curb a minimum of 1 inch, unless otherwise stated in specification or shown on drawings.

3.5 EXPANSION JOINTS:

A. Install new membrane expansion joints as indicated on drawings. Secure the field membrane at the base of curbs as specified herein. Form a membrane envelope that matches the depth of the curb and roof insulation. Fill envelope with batt insulation. Furnish and fully adhere continuous foam core over the opening using the membrane manufacturer's bonding adhesive. Cover the joint and foam core with the base flashings and/or additional membrane as indicated on drawings. Reinforce the seams over the expansion joint with additional membrane that shall extend a minimum of 3 inches past the expansion joint seams in every direction.

3.6 HEAT WELDING

A. Hot air weld all sheet seams using either a machine or hand-held hot air welder approved by the roofing system manufacturer. A copy of the operating instructions shall be provided to the Designer prior to the start of the project.

B. Monitor the temperature of the hot air welder so as to minimize the amount of smoke that should develop and to ensure that the material from the bottom of the sheet begins to soften and flow from the seam. Hand held welders shall insure that membrane welding is immediately followed by a hand roller to press the heated membrane surfaces together with slow, even movements.

C. All seams shall be manually probed using a blunt rounded instrument daily. Any fishmouths or other seam defects where the seam is not fully adhered shall be repaired in accordance with the roofing system manufacturer's instructions.

D. After seams have set for approximately 8 hours, the Contractor shall make a minimum of 3, 2" x 12" test cuts across the seam, with at least one of the test cuts taken from the first seam of the day. If multiple welders are used, the minimum test cuts are applicable to each welder used. Test cuts shall be repaired by the Contractor daily and shall be done at no additional cost to the Owner. In lieu of test cuts, the contractor may perform peel tests. Peel test shall be performed with two 4" x 12" pieces of membrane that shall be welded together 1-1/2 inch for the machine welder and 2 inches for hand welders. The membrane shall be pulled apart across the seam. Test shall be dated, and one test shall be performed every time a welding device is turned on. An archive of test shall be available for Designer inspection.
   1. Peel-test shall only be considered successful if:
      a. there is a complete cohesion failure in a polymer layer, and/or
      b. there is an adhesion failure between a polymer layer and the scrim.
      c. Other instances as stated in writing by the membrane manufacturer.

E. Seams shall be tested in accordance with the roofing system manufacturer's instructions and evaluated for seam integrity. Seams that fail this test shall be subject to additional test cuts, as directed by the Designer and/or roofing system manufacturer, in order to further quantify the extend of the deficient condition. Repairs to deficient seams and/or test cut locations shall be performed by the Contractor at no additional cost to the Owner.

F. Seal the edges of the membrane where the reinforcing fabric is cut with the roofing system manufacturer's approved seam sealant. Such work shall be done on a daily basis.

3.7 PIPE FLASHING INSTALLATION

A. Pipe penetrations shall be flashed using pre-manufactured pipe flashings. Cut the pipe flashing so that it will fit tight to the pipe penetration. Ensure that the field membrane is secured at the base of the pipe as required herein. Fully weld the pipe flashing flange to the field membrane in accordance with membrane manufacturer written instruction. Set the pipe flashing in water block against the pipe penetration, and secure the top of the pipe flashing to the pipe using a draw-band clamp. Seal the top of the pipe flashing to the pipe penetration using NP-1 sealant, or approved equal.

B. At locations where pre-manufactured pipe flashing cannot be installed, apply PMMA/PMA liquid flashings.

C. Pitch pans are not to be used. Where necessary apply PMMA/PMA liquid flashings.

3.8 PMMA/PMA MEMBRANE INSTALLATION

A. Install PMMA/PMA (fluid) membrane flashings at location shown on drawings.

B. Perform adhesive test of all surfaces to received fluid membrane prior to application. Abrade metal and/or roofing membrane surfaces to receive PMMA/PMA membrane as required by fluid membrane manufacturer.

C. Fill gaps between surfaces with backing and silicone sealant.

D. Mask target area a minimum of 8" onto the field with tape or other material and onto the vertical substrate as shown on drawings. Prime all areas requiring the liquid membrane as required by the flashing manufacturer.

E. Apply fluid membrane flashing base coat a minimum of 8" into the field of the roof and onto the vertical substrate as shown on drawings. Cut reinforcement as to have a maximum of 1/8" of basecoat exposed on both the field and vertical side of the sheet and completely embed the scrim sheet into the liquid flashing base coat. Apply fluid membrane flashing finish coat a maximum of 1/8" beyond the scrim outline. Immediately remove the masking tape.

F. Apply in accordance with manufacturer written recommendations.

3.9 WALKWAY PAD

A. Apply one row of walkway pads around all roof access hatches, at the base of roof access doors, at the top and bottom of ship ladders, and as shown on drawings. Install walkway pads in accordance with the roofing system manufacturer's written instructions. Refer to Drawings.

B. Walkway pads shall be spaced approximately 1 inch apart. Leave small opening on the downslope side of walkway pads to allow for any water beneath the pads to exit.

C. Clean the surface of the membrane to receive the walkway pads in accordance with the roofing system manufacturer's written instructions. Fully adhere the walkway pad to the membrane and hot-air weld all sides of the pads to the surface of the membrane in accordance with the roofing system manufacturer's written instructions.

3.10 ROOF TOP PIPE SUPPORTS

A. The use of wood for supporting piping is not permitted.

B. Support Spacing: 8 feet unless otherwise specified by the manufacturer and within 12 inches of elbows and junctures.

C. Furnish and install walkway protection pads. Membrane pads shall be partially adhered with manufacturers approved adhesive to the substrate. The pad shall be a minimum of 18" x 18" in size but shall be a minimum of 12 inches wider than the base.

D. Adhere support bases in the middle of walkway protection pads using continuous double-sided butyl tape on all four sides of the base. Leave a minimum 1-inch gap at each side for nominal water exit underneath base.

E. At condensation lines, secure the condensate lines to the plastic bases using steel U-clamps and nails. Extend all lines to the nearest gutter or primary roof drain. Set the plastic bases in double-sided butyl tape on a nominal 12" x 12" strip of walkway pad.

F. Once all supports are in place, adjust the height of supports so that piping is uniformly loaded.

G. Install pipe supports in accordance with manufacturer written instructions.

3.11 Roof Drains shall be at the height of the adjacent roof refer to Section 221400.

3.12 FIELD QUALITY REQUIREMENTS:

A. Manufacturer's Field Services: Upon Owner's request, provide material manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

B. Minimum Manufacturer Inspections: Provide inspections by a Technical Representative employed by the roofing system manufacturer who shall not perform any sales functions. Contractor shall complete any necessary repairs required for issuance of warranty. Minimum schedule of material manufacturer inspections:
1. Pre-Construction Conference
2. Mock-Up Evaluation
3. 25% Completion
4. 50% Completion
5. Final Completion

C. Contractor shall provide Owner and Designer a copy of the manufacturer's inspection report within 48-hours of each inspection.

D. Prior to final inspection, the surface of the membranes shall be cleaned of all debris, dust, and foreign material. This may require the use of water, detergents, and other cleaning agents approved by the roofing system manufacturer. Contractor will be responsible for providing the necessary items to perform this task. Do not use any abrasive pads that can score the polymer.

3.13 CLEANING AND PROTECTION

A. Remove all packaging, unused fasteners, adhesive, and other installation materials from the project site.

B. Remove adhesive from exposed surfaces of supports and bases and leave the work in clean condition.

C. Provide protection as required to leave the work in undamaged condition at the time of substantial completion.

END OF SECTION 075419

SECTION 076200 – FLASHING & SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 035216 – Lightweight Insulating Concrete

C. Section 072216 – Roof Board Insulation

D. Section 075419 – Polyvinyl Chloride (PVC) Roofing

1.2 SUMMARY:

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, and other items indicated on Drawings, as required to complete the Work and to make the building weathertight.

1.3 REFERENCE STANDARDS

A. ASTM - American Society of Testing and Materials. A society formed for the development of standards on characteristics and performance of materials, products, systems and services; and the promotion of related knowledge.

B. U L – Underwriters' Laboratories. A non-profit, independent organization which tests devices, systems and materials to determine their performance to life, fire, casualty hazards and crime prevention.

C. ANSI – American National Standards Institute. A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

D. F M – Factory Mutual or Factory Mutual Research Corporation. Has a charter similar to Underwriters' Laboratories.

E. SMACNA – Sheet Metal and Air Conditioning Contractors National Association.

F. AIA – American Institute of Architects

G. NRCA – National Roofing Contractors Association.

H. SCBC – South Carolina Building Code, 2021 Edition

I. SCPC – South Carolina Plumbing Code, 2021 Edition

J. SCEBC – South Carolina Existing Building Code, 2021 Edition

K. IECC – International Energy Conservation Code, 2009 Edition

L. OSHA – Occupational Safety and Health Administration

M. NFPA – National Fire Protection Association

N. ASCE 7 – Minimum Design Loads and associated criteria for buildings and other structures; most recent edition cited by referring code or reference standard.

O. ANSI/SPRI ES-1: Code required test standard for edge metal.

P. ANSI/SPRI GT-1: Code required test standard for gutters.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
1. All product data shall be the manufacturer's latest edition.

B. Safety Data: For each type of product.

C. Shop Drawings: Shall be full and complete showing all material to be installed and label fastener spacings, materials used, and measurements.
1. Gutter Detail
2. Gravel Stop Detail
3. Deck Expansion Joint Detail
4. Curb Flashing Detail

D. Certificates:
1. Submit evidence satisfactory to Owner/Designer that the proposed applicator is currently approved by the manufacturer of the roofing materials. Submit copies of "Certificate of License" issued to roofing applicator by manufacturer.
2. Submit metal fabricator's ANSI/SPRI ES-1 approval.
3. Submit metal fabricator's ANSI/SPRI GT-1 approval.

E. Reports
1. Prior to start of installing work of this Section, and as part of the required written report on the Pre-Application Roofing Conference, submit a written and detailed step-by-step description of the methods of installation as agreed to in the Pre-Application Roofing Conference.
2. Contractor shall provide ES-1 test data for edge details.
3. Contractor shall provide GT-1 test data for gutter details.

1.5 PROJECT MEETINGS

A. Pre-Application Roofing Conference
1. Approximately two weeks prior to scheduled commencement of roofing installation and associated work, arrange a meeting at project site with installers of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of roof-top units and other work in and around roofing which must precede or follow roofing work including mechanical and electrical work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with

performance of the work. Record discussions of conference and decisions and agreements (or disagreements) reached and furnish copy of record to each party attending.

2. Review methods and procedures related to roofing work, including, but not necessarily limited to, the following:
   a. Review roofing system requirements (Drawings, Specifications, and other Contract Documents) for possible conflicts and resolve.
   b. Communication channels and procedures. Organization of contractor, subcontractor, and suppliers.
   c. Review required submittals, both completed and yet to be completed.
   d. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   e. Review required inspection, testing, certifying, and materials usage accounting procedures.
   f. Field change orders and procedures
   g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
   h. Construction schedule
   i. Review work safety requirements.
   j. Review interior protections and inspection schedule for interiors.

B. Ongoing Construction Meetings
   1. Project meetings shall be conducted at a minimum of once every two-weeks.
      a. Project meetings may be conducted virtually unless designer requires an onsite meeting. Only requested individuals will be required to be onsite.
      b. Review construction schedule
      c. Review Change Orders
      d. Review quality control
      e. Review problems/issues encountered, and actions taken.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience, and members of SMACNA, Architectural Division.

D. Contractor shall ensure all materials provided are compatible with the other components of the Work, are acceptable for the specified use, and meet the requirements of the Specifications.

1.7 PRODUCT HANDLING

A. Shop form all metal shapes, which are to be formed of prefinished metal, with protective plastic film in place. Do not remove plastic film until just prior to (or, if possible, after) installation.
   1. Shop required to be ES-1 certified.
   2. Shop required to be GT-1 certifled.
   3. Plastic film must be removed prior to completion of installation.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
   1. Along with the roofing applicator and sheet metal installer, verify existing conditions, including:
      a. Roof deck conditions.
      b. Varying deck and wall thickness for length of anchoring devices required.
   2. Replace or restore to original condition all materials or work damaged during construction of work of this Section.
   3. Protect paving and building walls adjacent to hoists and trash chute when applicable.
      a. Lap protective materials at least 6 in.
      b. Vent plastic sheets are not allowed for purpose of covering materials.
      c. Secure protective coverings against wind.
      d. Leave protective coverings in place until roofing work has been completed.

B. Environmental Requirements:
   1. Do not install roofing during rain or start roofing if rain is probable during installation.
   2. Do not install roofing when there is ice, frost, surface moisture, or dampness visible on the surface to which roofing is to be applied. The relative humidity shall not be higher than 90%.
   3. Do not install roofing if temperatures are 45ºF or lower, unless approved otherwise by the Owner & Manufacturer.

C. Protection:
   1. Protect surfaces not intended to receive roofing materials from spillage, dripping, spotting and damage during application of the roofing. Should protection not be effective, or not be provided, restore the respective surfaces to their proper conditions by cleaning, repairing, or replacing, as applicable for the circumstances and as directed by Owner.
   2. Immediately protect completed portions of roofing from damage of subsequent construction activities in accord with contract requirements. Repair, replace, or as otherwise required to remedy any damage to roofing resulting from construction activities, for the entire duration of construction.

PART 2 - PRODUCTS

2.1 GALVANIZED STEEL:

A. Copper structural quality galvanized steel Coating Class G-90, ASTM A653.

2.2 TERMINATION BAR:

A. ¼" x 1" aluminum.

2.3 KYNAR 500-BASED FINISH:

A. Shall be factory applied, oven-finish. Finish and primer shall be applied in strict accordance with the formulator's specifications and shall meet the performance criteria of AAMA 605.2-90 specification. Finish coat thickness shall be a minimum of 1.0 mil. Primer coat thickness shall be a minimum of 0.3 mil. Color to match the existing color to be selected by owner.

2.4 NON-SHRINKING SEALANT:

A. ASTM C920, Type S or M, Grade NS, Class 25, for Use NT, M, A, and O.

2.5 METAL WEIGHTS

A. Minimum Acceptable Metal Weights (All metal to be finished with Kynar 500 coating or approved equal prior to bid unless otherwise specified).

1.	A-Style Eave Flashing:	24-gauge galvanized steel (membrane-clad)
2.	A-Style Eave Flashing Cleat:	22-gauge galvanized steel
3.	L-Style Eave Flashing:	24-gauge galvanized steel (membrane-clad)
4.	Counterflashing:	24-gauge galvanized steel
5.	Face Extender:	24-gauge galvanized steel
6.	Face Extender Cleat:	22-gauge galvanized steel
7.	Gutter:	24-gauge galvanized steel
8.	Downspout:	24-gauge galvanized steel
9.	Gutter Outlet:	24-gauge galvanized steel

EXECUTION

2.6 GENERAL INSTALLATION REQUIREMENTS:

A. Inspect all surfaces to which metal is to be applied. Do not install metal unless surfaces are even, sound, clean, dry and free from defects which might affect the application.

B. Follow recommendations of the National Roofing Contractors' Association (NRCA) and Sheet Metal and Air Conditioning Contractors National Association Architectural Sheet Metal Manual (7th Edition) for fabricating in-shop and on-site, and for installation, unless otherwise specified herein.

C. Metal flashings installed at edges and/or parapets of low-sloped roofing shall adhere to ANSI/SPRI ES-1 wind uplift requirements, as necessary. Specified fastening along with metal flashing thicknesses, gauges, and/or weights listed herein are the minimum required. In the event additional fastening or thicker, lower gauge, or heavier metal flashings are required, the contractor shall satisfy the requirements of ANSI/SPRI ES-1. In some instances, shop-formed metal flashings cannot satisfy ANSI/SPRI ES-1 requirements without additional testing or proprietary systems are necessary. Such cost for testing and/or propriety systems shall be included in the Bid as required.

D. A. Gutters shall adhere to ANSI/SPRI GT-1 wind uplift requirements, as necessary. Specified fastening along with metal flashing thicknesses, gauges, and/or weights listed herein are the minimum required. In the event additional fastening or thicker, lower gauge, or heavier metal flashings are required, the contractor shall satisfy the requirements of ANSI/SPRI GT-1. In

some instances, shop-formed metal cannot satisfy ANSI/SPRI GT-1 requirements without additional testing or proprietary systems are necessary. Such cost for testing and/or propriety systems shall be included in the Bid as required.

1. Gutter system components 8-feet or longer shall have identification embedded in or affixed to gutter system components stating the gutter system has been tested according to the ANSI/SPRI test standard for gutter systems.

E. Follow published instructions of the product manufacturer for installation of extruded or proprietary metal products, unless otherwise specified herein.

F. Use nails, screws, bolts, cleats or other fasteners of the same material or of material chemically compatible with the contacted metal.

G. Fabricate cleats to be a minimum of one gauge heavier than fascia metal.

H. Do not place dissimilar metals in direct contact or in positions where water sheds across both metals.

I. Install metal to be water and weather tight with lines, arises and angles sharp and true and with paint surfaces free of waves and buckles.

J. Install shop-formed metal flashings in 10-foot lengths maximum with a minimum number of pieces in each straight run.

K. Shop form all metal shapes, which are to be formed of prefinished metal, with protective plastic film in place. Do not remove plastic film until just prior to (or, if possible, after) installation.

L. At all corners, shop form corner pieces of fascia and drip edge flashing from a single section of metal with minimum 36-inch legs on either side of the corner.

M. Cleats: Cleats shall be secured with nails that penetrate the wood a minimum of 1 inch at spacings not to exceed 6 inches on center. Nails shall be applied along the vertical face of the wood blocking and located approximately 1-3/4-inch from the bottom of the cleat. Metal flashing drip legs shall be fold snugly over the cleat.

N. Lapped Metal: Refer to NRCA Detail SM-01 and Drawings. Apply a continuous bead of caulk between any lapped metal sections, except for counterflashing lapped joints. The application of caulk after metal components have been lapped is unacceptable and will be grounds for rejection.

2.7 A-STYLE FLASHING:

A. At locations shown on Drawings, furnish and install new A-type flashing. The flashing shall extend a minimum of 1 inch above the roof level. The flashing shall have a 4-inch horizontal flange. Refer to NRCA Details SM-14 and UL-25A and Drawings. The flashing shall cover the exterior wall cladding a distance to match the existing; however, the vertical flange of the flashing shall not be more than 8 inches. If additional area of wall needs to be covered with flashing to match the existing, furnish and install new face extenders. Install face extender prior to installing flashing.

1. Prior to installing the flashing, ensure the roof membrane turns down the exterior face of the wall a distance to the match the flashing but exceeds the length of the wood blocking.
2. Set horizontal flange in a continuous bead of sealant on top of the roofing.
3. At low and high eaves, join sections using cover plates.

4. At rake eaves, join sections by lapping.

B. Flashing shall engage a continuous cleat.

C. Form new A-style closures using similar metal as shown on Drawings.

D. Strip in the flange as specified elsewhere.

2.8 COUNTERFLASHING:

A. Form and install new continuous skirt counterflashing as shown on drawings and around all RTU curbs. Refer to 2010 NRCA, Detail SM-24 (skirt flashing) and drawings. Slide the top edge of the counterflashing behind existing metal flashing a minimum of 1-inch. Set flange against vertical surface in a solid bed of sealant. Secure the counterflashing using appropriate fasteners at spaced no more than 12 inches on center.
   1. Extend counterflashing down a minimum of 4 inches over base flashing. Secure counterflashing to the reglet using stainless-steel fasteners at spacings not to exceed 12 inches on-center. It is acceptable to provide premanufactured snap-lock counterflashing.
   2. Notch and lap reglet and counterflashing sections a minimum of 3 inches, and offset laps between reglet and counterflashing a minimum of 12-inches.
   3. Notch and lap joints and inside corners. Notch and seam outside corners. Do not rivet or otherwise secure joints and corner.
   4. Fill the cove at the top of the counterflashing with a non-shrink caulk.
      a. Note: A cove is not required where counterflashing is behind a frame and/or existing sheet metal flashing.

2.9 DECK EXPANSION JOINT SLIP PLATE

A. Form new expansion joint covers from 24 ga. galvanized steel and expansion joint cleat from 22 ga. galvanized steel. Refer to detail 1/BE5.02.

B. Prior to the installation of the cover, furnish and install a layer of self-adhered membrane over the joint. Prime the deck with an approved primer. Adhere to the substrate in accordance with the roofing materials manufacturer's written instructions. Lap end joints a minimum of 3 inches.

C. Secure the continuous cleat to the deck using concrete friction-type fasteners at spacings not to exceed 12 inches on center. Maintain a ¼" gap between sections. Cleat shall be fastened to the top of the deck units.

D. Install the expansion joint cover. Refer to detail 1/BE5.02. Lap sections a minimum of 3 inches. Secure the end of the cover to the cleat and maintain minimum dimensions as shown on drawing. Secure the cover to the top of the top of the deck units with appropriate concrete friction-type fasteners at spacings not to exceed 12 inches on center.

2.10 GUTTER INSTALLATION

A. Form new gutter from 24 ga. Galvanized steel with Kynar 500 coating or approved equal. Refer to Drawing No. BE5.02.

B. Gutter size shall box-style and shall be a minimum of 5" x 5". The back of the gutter shall be a minimum of 1 inch higher than the front. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-2, Style A.

C. Provide butt type expansion joints in gutters at spacings required for the type material used to fabricate gutters. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-7. Maximum of 50-feet between expansion joints. A minimum of one downspout shall be in each section of gutter.

D. Provide gutter spacers at 3'-0" on center. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-12. Spacers shall be formed from minimum 1/16" x 1" flat stock aluminum. Continuous nominal ¼" x 1" galvanized steel or aluminum flat bar shall be installed at the front of the gutter and secured with stainless steel bolts and nuts at spacer locations. Refer to Drawing No. BE5.02 .

E. Provide gutter brackets at 3'-0" on center, and alternating in location from gutter spacers. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-12. Brackets shall be formed from minimum ¼" x 1- ½" flat stock galvanized steel and secured with stainless steel screws through pre-drilled holes. Brackets should be primed and double coated with an approved field-applied Kynar 500 paint prior to installation. Refer to Drawing Nos. RD-1B, RD-2B, and RD-4B.

F. Furnish and install gutter outlet tubes in accordance with SMACNA Architectural Sheet Metal Manual Figure No. 1-24C.

G. Furnish and install stainless steel downspout strainers in accordance with SMACNA Architectural Sheet Metal Manual Figure No. 1-24D.

2.11 DOWNSPOUT INSTALLATION

A. Form new downspouts from 0.040" thick aluminum with Kynar 500 finish or approved equal. Refer to SMACNA Architectural Sheet Metal Manual Figure No. 1-32B and 1-32F.

B. Downspouts shall be box-style and shall match existing downspouts in size, unless otherwise specified.

C. Lap sections a minimum of 3 inches and secure sections with a minimum of 2 stainless steel sheet metal screws.

D. Form 45° elbow where water discharges onto the roof or ground.

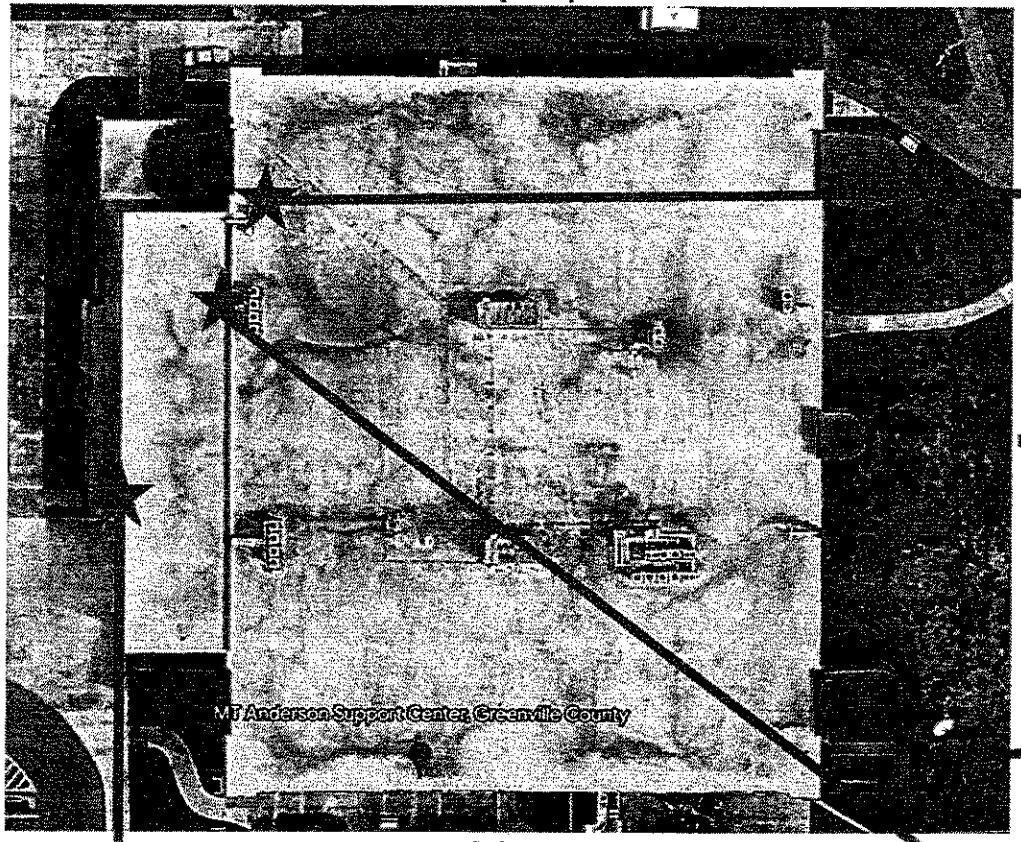
E. Form or provide new round to rectangular downspout metal transition pieces to tie into existing underground drainage system formed from the same material as the downspouts.

F. Form downspout hangers from the same material as downspouts using material not less than 2 gauges heavier than downspouts. Secure downspouts to wall with hangers spaced not more than 5 feet on center. Apply wall hangers no more than 2-feet from the top and bottom of the downspout. Refer to SMACNA Architectural Sheet Metal Manual Figure 1-35G. Apply one coat of metal primer and two coats of field-grade Kynar 500 paint to all hangers. Color shall match the downspouts.

G. Furnish and install new concrete splash blocks where water discharges onto new roofing or grounds. Refer to SMACNA Architectural Sheet Metal Manual Figure No.1- 36.
1. Splash blocks on roofing shall be placed on walkpads to match the roofing materials.

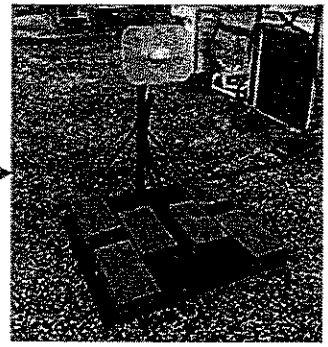
END OF SECTION 076200

North (Back) ADDENDUM 02 - MT ANDERSON - DIAGRAM: EXISTING ROOF COMMUNICATIONS EQUIPMENT



East

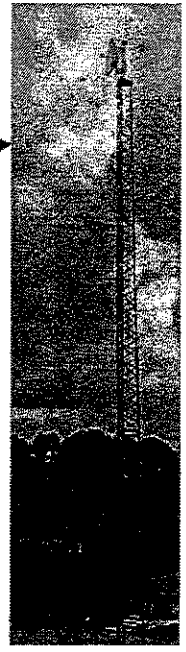
South (Front)



Microwave Antenna to Southside Press Box (In-Active replaced with Fiber)

District Radio Antenna (Lobby Active)

District Radio Antenna (Student Services Active)



Communications Tower District Radios (Active)