

MEMORANDUM

To: All Interested Vendors

From: Wanda Dixon
Procurement Analyst

Date: September 7, 2021

Subject: Addendum No. 21-018 New Albany Roof Replacement
Summary of Pre-Bid Meeting
Questions and Answers

Part I. Summary of Pre Bid Meeting

On Thursday, September 2, at 10:00 AM the Columbus Metropolitan Library (“CML”) conducted a pre-bid meeting for the New Albany Roof Replacement. The pre-bid meeting was held at the CML New Albany Branch, located at 200 Market Street, New Albany, Ohio. The following CML representatives were in attendance:

Matt Brown, Senior Project Manager
Wanda Dixon, Procurement Analyst

The following companies were also in attendance:

ACI Inc.
Master Renovations, Inc.
Meade Construction
Phinney Industrial Roofing
5K Commercial Roofing LLC

Ms. Dixon welcomed all participants to the meeting and reviewed the solicitation documentation. At the conclusion of the documentation review, company representatives were provided the opportunity to ask questions on the solicitation.

Part II. Questions and Answers

Q1: Is this project a Prevailing Wage Project?
A1: Yes, the project is a prevailing wage project.

Q2: Is there a specific shingle color to spec?
A2: Basis of design is “GAF Timberline AS II”, color “Weathered Wood”.

- Q3: Will CML accept alternate shingles?
A3: Alternates will be considered but are subject to approval by owner and City of New Albany. All alternates must be bid as a single system from single manufacturer.
- Q4: Is there a preferred TPO manufacturer?
A4: See Addendum for TPO Specifications that include preferred manufacturers. All bids shall be for complete system from single manufacturer.
- Q5: Where can we locate dumpster and staging area?
A5: Location is not yet determined.
- Q6: What is the thickness of the TPO insulation?
A6: See Addendum for TPO Specifications. Minimum ½" coverboard required. Existing roofing system has 4" of ISO and 1.5" coverboard.
- Q7: How should TPO be attached?
A7: See Addendum for TPO specifications. Upon review, a fully adhered system is required.
- Q8: What is thickness of decking on pitched roofs?
A8: For bidding purposes, assume ½" thickness but any required replacements shall match existing.
- Q9: Are the gutters to be replaced?
A9: No, gutters will remain.
- Q10: Are there any restrictions on when the work can be performed?
A10: No, work can be performed any time the library is open

Note:

- Refer to Addendum for additional TPO, shingle and flashing specifications.
- Pricing for flat roofs shall include FULL removal of existing coverboard and insulation and installation of all new coverboard and insulation.
- Provided estimated lead times for materials and project duration.
- The Library will consider phasing the project (1st phase: Shingles, 2nd phase: TPO) if necessary.
- All existing copper will remain.
- Appendix A Pricing worksheet has been updated to reflect all changes.

BIDDERS ARE REQUIRED TO ACKNOWLEDGE THE RECEIPT OF THIS MEMORANDUM (ADDENDUM NO. 1) ON THE ACKNOWLEDGEMENT OF ADDENDA FORM IN THE ITB DOCUMENTS.

Appendix A (Updated)

ITB # 21-018- Roof Replacement Project at New Albany Branch

Bids must be submitted on this form only.

Bid Summary:

Item	QTY APPROXIMATE SFT (A)	Unit Price (B)	Total (A) x (B) = (C) (C)
Roof construction of pitched shingled roof	14,000	\$	\$
Roof construction of flat membrane roof including full insulation and coverboard removal and replacement	8,000	\$	\$
Roof construction of flat canopy roof	100	\$	\$
Plywood/OSB Decking Unit Cost ½" thickness (4' x 8') (as needed)	1	\$	\$
Total			\$

Signed By: _____ Date: _____

Printed Name: _____ Title: _____

Company Name: _____

Notes:

- A. On the price proposal form, CML has included approximate square footage for roofing services as described in this solicitation. Based upon the measurements required in §II (A), the Contractor shall be compensated for actual services provided. The quantities included in the price proposal form are estimates for bid evaluation purposes.

- B. The Contractor shall submit a fixed fee for all roofing replacement services. This fee shall be fully burdened, and shall include but shall not be limited to, labor, materials, statutory payroll taxes, social security, Medicare, fuel, vehicles, travel time, insurance, bonds, consumable materials, general and administrative expenses, and Contractor profit. This fee shall remain fixed for the duration of this Agreement and is not subject to any cost-of-living adjustments, modifications, increases, or changes at any time.
- C. CML is not responsible for any waiting time, travel time, fuel surcharges, or additional fees at any time. All modifications to the fee structure are at the sole discretion of CML and must receive written approval from the CFO.
- D. CML does not guarantee a fixed quantity of work. CML will compensate the Contractor only for services rendered and approved by the CML Authorized Representative.
- E. All prices shall remain fixed for the duration of the Agreement and shall not be subject to any markups, cost of living adjustments, or increases at any time.
- F. CML is a tax exempt organization.

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide flashing and sheet metal work as shown and specified. Work includes:
 - 1. Gutters, and downspouts including brackets and supports.
 - 2. Manufactured gravel stops.
 - 3. Flashing and counterflashing.
 - 4. Miscellaneous flashings.
 - 5. Miscellaneous rooftop concealed flashing.
 - 6. Fasteners, sealants, solder and accessories to complete the work.

1.02 RELATED SECTIONS

- A. Masonry Flashing: Section 04 00 00.
- B. Aluminum Composite Materials: Section 07 42 44.

1.02 QUALITY ASSURANCE

- A. Comply with Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual" recommendations for fabrication and installation of the work.
- B. Reference Standards
 - 1. American Society for Testing and Materials (ASTM).
 - 2. American Architectural Manufacturers Association (AAMA)
 - a. AAMA 2605; Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 3. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
 - a. SMACNA "Architectural Sheet Metal Manual".
 - 4. Single Ply Roofing Industry: SPRI ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. Subcontractor: Subcontract sheet metal associated with roofing as a part of the roofing contract for undivided responsibility.
- D. Attachments to or penetrations in roofing systems to be made only with full

approval of roofing manufacturer. Obtain approvals as required for installation of work under this section. Notify Architect if deviations from documents is required to obtain approval from roofing manufacturer prior to fabrication.

- E. SPRI Wind Design Standard: Manufacture and install gravel stop and roof edge components tested according to SPRI ES-1 and capable of meeting the design pressures indicated on the Structural Drawings.
- F. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit on all sheet metal work specified herein. Drawings to show all expansion joint details, joint details, waterproof connections to adjoining work and at obstructions and penetrations, methods of attaching to building and all formed sections. Include the following:
 - 1. Gutter and downspout construction, including brackets, supports and gutter expansion joints.
 - 2. Gravel stops.
- B. Submit 8" square material samples for each type of sheet metal required.
- C. Submit full width by 8" long samples of all manufactured and fabricated items. Provide with specified finish and color.

1.04 PROJECT CONDITIONS

- A. Do not proceed with the installation of flashing and sheet metal work until substrate construction, blocking and other construction to receive the work are completed.
 - 1. Metal roofing work is to follow progress of substrate as close as practical to limit exposure of insulation and wood materials.

1.05 WARRANTY

- A. Contractor's warranty required for membrane roofing system work shall include all related roof flashing and sheet metal work. Refer to Section 07 54 23.
- B. Provide Contractor's guarantee for all sheet metal work under this Section to be free from defects of material and workmanship for a period of two years. Work that is not water tight or is damaged by winds that do not exceed 90 mph will be considered defective.
- C. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM

D523) and chalking shall not less than a rating of 8 per ASTM D4214.

1. Warranty Period: 20 years.

PART 2 PRODUCTS

2.01 MATERIALS

A. Galvanized Steel Sheet - All Flashings Exposed to View

1. Material: Galvanized steel, ASTM A653, G90 coating with factory applied finish.
2. Finish
 - a. Exposed Surfaces
 - 1) Material/Manufacturer: Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duronar" by PPG; "Fluropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
 - 2) Reference: Meet the requirements of AAMA 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 3) Color: As selected by Architect from paint manufacturer's complete specified line.
 - 4) Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
 - b. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.
3. Thicknesses: Provide the following minimum thicknesses:
 - a. Flashing and Counterflashing: 0.0276".
 - b. Gutters and Downspouts: 0.0396".
 - c. Others: 0.0276".

B. Miscellaneous Flashing - Not Exposed to View: Galvanized steel, ASTM A653 G60. Mill phosphatized for paint adhesion. 0.0276". minimum unless otherwise indicated.

C. Fasteners: Provide same metal as sheet metal or other non-corrosive compatible metal recommended by sheet metal manufacturer.

D. Joint Sealants: See Section 07 92 00. Color matched to factory finished materials at roofing, cornice, fascia, coping and similar type systems.

E. Metal accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work; matching or compatible with material installed, non-corrosive, size and gage as required for performance.

F. Underlayment

1. Membrane: Bituthene Ice and Water Shield by W. R. GRACE; Polyken 640 Underlayment Membrane by POLYKEN TECHNOLOGIES; Polyguard Deck Guard by POLYGUARD PRODUCTS; Weather Watch by GAF; Winterguard by CERTAINTEED, a modified bituminous membrane, minimum 40 mils thick, self-adhering, self-sealing moisture barrier.
2. Slip sheet: 4 lb./100 sq. ft., rosin-sized building paper.

G. Wood members: Comply with requirements of Wood Blocking, Section 06 10 50.

2.02 PREFABRICATED MATERIALS

A. Gravel Stop: Provide in custom shapes and radius as indicated.

1. Fabricated in 10'-0" lengths to sizes indicated of 0.05" smooth aluminum, formed. Provide with galvanized spring clip (retainer) spaced at 12" on center.
2. Provide factory welded and mitered corners, butt joints and concealed .032" aluminum cover plates.
3. Basis of Design Manufacturers: METAL-ERA One Gravel Stop
4. Other Manufacturers:
 - a. OMG ROOFING PRODUCTS,
 - b. CARLISLE SYN TEC, INC
 - d. FIRESTONE BUILDING PRODUCTS
 - e. JOHNS MANVILLE, INC

B. Finish

1. Exposed Surfaces
 - a. Material/Manufacturer: Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duramar" by PPG, "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils
 - b. Reference: Meet the requirements of AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
 - c. Color: Color selected by Architect to match color selected for "Prefinished Sheet Aluminum".
 - d. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
2. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.

2.03 FABRICATION

A. Shop fabricate sheet metal work to comply with standard industry standards as shown by SMACNA in the "Architectural Sheet Metal Manual."

- B. Form sections square, true and accurate to size and profile, free from distortion and other defects detrimental to appearance or performance.
 - 1. Make all lines, edges, angles and moldings straight, sharp and true; reinforce for rigidity and strength.
- C. Fabricate for watertight and weatherproof performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form exposed sheet metal work with exposed edges folded back to form hems.
 - 1. Fabricate with seams overlapping in the direction of water flow.
- D. Fabricate non-moving seams in sheet metal with flat lock or butt hairline joints except as otherwise indicated. Fabricate corners mitered, soldered and sealed as one piece. Locate corner joints 2'-0" from corners and intersections.
- E. Seal movable non-expansion type joints with joint sealant. Form joints as indicated, when not indicated, in compliance with industry standards to receive joint sealants.
- F. Provide for separation of metal from non-compatible or corrosive substrates by coating concealed surfaces with bituminous coating or other permanent separation as recommended by the sheet metal manufacturer.
- G. Gutters
 - 1. Form to size and shape as detailed or comply with (SMACNA) recommendations if not indicated. Provide adequate reinforcing, brackets, straps and fasteners for attachment to building as indicated and as required.
 - 2. Provide downspout outlets as indicated on drawings.
- H. Downspout: Form to size and shape detailed or comply with (SMACNA) recommendations if not indicated.
- I. Trim for Roof Hatches: Provide galvanized sheet metal trim to cover all construction from bottom of roof deck to hatch or vent.
 - 1. Trim to form 90° bend at bottom of roof deck with minimum 3-inch return and lap hatch or vent curb not less than 2".
 - 2. Provide hemmed edge at curb.
 - 3. Provide lapped covers for joints or corners if trim package fabricated from more than one piece. Joint covers to lap joints by minimum 2" and have hemmed edges.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and installation conditions. Do not install flashing and sheet metal work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- C. Coordinate flashing and sheet metal work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing and rain drainage.

3.02 INSTALLATION

- A. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations, and drawing details for installation of the work.
- B. Install prefabricated items in accordance with manufacturer's instructions and recommendations.
- C. Anchor units securely in place by methods indicated, providing for thermal expansion. Conceal fasteners and expansion provisions whenever possible. Install joint sealants where indicated.
- D. Set units true to lines and levels indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- E. Separate sheet metal work from dissimilar metals, treated wood, and cementitious materials. Provide roofing felt underlayment and rosin-sized paper slip sheet over treated wood surfaces.
- F. Fabricate, support and anchor downspouts in a manner which will withstand thermal expansion, stresses and full loading by ice or water without damage, deterioration or leakage.
- G. Continuously seal exposed joints where flashing or counter flashing terminates into reglets after sheet metal is adequately wedged and secured.
- I. Metal flashings which may be built into masonry mortar joints shall be preformed with corrugations, ribs or crimps which will maintain integrity of mortar bond for masonry.
- J. Roof Edge
 - 1. Install membrane roofing flashing over top of parapet substrate prior to installing. See Section 07 53 23. Coordinate installation.
 - 2. Apply continuous bead of sealant on both sides of joints immediately prior to setting coverplates.

END OF SECTION

07 3113 ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.
 - 3. Metal flashing and trim.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. ~~Prepare submittals per requirements of Section 01-3300--Submittal Procedures.~~
- B. Product Data:
 - 1. Asphalt shingles.
 - 2. Underlayment.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For synthetic underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer warranty.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer recommendations.
- B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

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- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
- B. GAF Smart Choice Protection/Warranty:
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - 2. Material Warranty Period: 40 years from date of Substantial Completion, prorated, with first 10 years nonprorated.
 - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 130 mph for 15 years from date of Substantial Completion.
 - 4. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 20 years from date of Substantial Completion.
 - 5. Workmanship Warranty Period: 20 years from date of Substantial Completion.
- C. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt-shingle roofing that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES -

- 1. Manufacturers: Basis of Design:
 - a. GAF Materials Corporation. Timberline AS II
 - b. Color: Weathered Wood
- B. Hip Shingles: Manufacturer's standard units to match asphalt shingles.

2.3 UNDERLAYMENT MATERIALS

- A. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GAF Materials Corporation.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: AS RECOMMENDED BY ROOFING MANUFACTURER TO MEET THE WARRANTY REQUIREMENTS. NOT LESS THAN ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip

galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, sharp-pointed, with a minimum 3/8-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking.

- C. Synthetic-Underlayment Fasteners: As recommended by synthetic-underlayment manufacturer for Project applications.
- D. Felt-Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

2.5 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Section 07 6200.
 - 1. Sheet Metal: Stainless steel.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA *Architectural Sheet Metal Manual* that apply to design, dimensions, metal, and other characteristics of the item.
 - 1. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.

3.2 UNDERLAYMENT INSTALLATION

- A. Synthetic Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides and ends and treat laps as recommended in writing by manufacturer. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer. Fasten according to manufacturer recommendations. Cover underlayment within period recommended in writing by manufacturer.
 - 1. Install in single layer on roofs sloped at 4:12 and greater.
 - 2. Install in double layer on roofs sloped at less than 4:12.
 - 3. Hips: Extend 18 inches on each side.
 - 4. Roof-Penetrating Elements: Extend beyond penetrating element 18 inches.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Section 07 6200.
 - 1. Install metal flashings according to recommendations in ARMA publication "Residential Asphalt Roofing Manual" and NRCA publication "NRCA Guidelines for Asphalt Shingle Roof Systems."

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- B. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT-SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer recommendations, recommendations in ARMA publication "Residential Asphalt Roofing Manual," and recommendations in NRCA publication "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles **1/2 inch** over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Fasten asphalt-shingle strips with a minimum of recommended number of roofing nails located according to
 - 1. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC POLYOLEFIN ROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide a thermoplastic membrane roofing system as shown and specified. Work includes:
1. Adhered, single ply polyester reinforced thermoplastic polyolefin (TPO) membrane.
 2. Insulation.
 3. Cover board.
 4. Flashing, pipe seals, and roofing accessories.
 5. Installing roof flashings and sheet metal furnished under Section 07 62 00.
 6. Membrane flashing under metal copings.

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 10 50.
- B. Flashing and Sheet Metal: Sections 07 62 00.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: To participate as a qualified company in production of Elasto/Plastic materials, the company must have a minimum of five (5) years as the sole manufacturer of the brand name. Manufacturer shall also furnish notarized certification that he has been in business and had roofs installed for a minimum of five (5) years.
- B. Installer Qualifications: An experienced roofing installer approved or licensed by roofing materials manufacturer and with not less than five (5) years of successful experience installing thermoplastic membrane roofing systems similar to those required for this project.
- C. Manufacturer's representative shall conduct timely inspection of the roof installation to satisfy all warranty requirements.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108 "Standard Test Methods for Fire Tests of Roof Coverings," for application and roof slopes indicated.
- E. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience
- C. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
1. Fire/Windstorm Classification: Class 1A-90.
 2. Hail Resistance: SH.
- D. Fire Classification: U.L. Class A.

1.05 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include as a minimum the following:
1. Layout of roof showing sheet sizes and field joint locations.
 2. Location and type of penetrations.
 3. Perimeter, penetration and special details.
 4. Description of all materials.
 5. Conformance to fire classifications requirements of IBC 1505.
 6. Layout of tapered insulation, including slopes.

- C. Manufacturer's Approval: Obtain manufacturer's written approval of final shop drawings prior to beginning roofing operations.
- D. Samples: Submit samples of all roofing and flashing materials.
- E. Submit certification from roofing manufacturer that the roofing membrane and the selected roofing insulation are compatible.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged, labeled bundles or containers.
- B. Store roofing materials, insulation and accessories at the site in storage trailers or the building in a dry, well-ventilated, weather tight place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
 - 1. Handle rolled goods to prevent damage to edge or ends.
 - 2. Do not apply roofing materials to damp, frozen, dirty or dusty substrate surfaces.
- C. Protection
 - 1. Protect adjacent materials and surfaces from damage and soiling during roofing system installation.
 - 2. Provide special protection or avoid heavy traffic on completed roofing work.
 - 3. Protect paving and structure walls adjacent to hoists before starting work.
 - 4. Do not overload the building structure with storage of materials or installation equipment on the substrate decking.
 - 5. Handle and store materials and equipment to avoid damage to substrate decking.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.07 WARRANTY

- A. Contractor and roofing subcontractor shall warrant the total roofing system (membrane, insulation and flashing) with respect to workmanship and proper application for two (2) years from the date of acceptance by the Owner. Should any leaks covered under the warranty occur during this period, corrective action will be taken by the Contractor to repair the roof to the satisfaction of the owner and membrane manufacturer. **ALL CORRECTIVE WORK WILL BE DONE AT NO COST TO THE OWNER.** Work includes all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, substrate boards, vapor retarders, roof pavers, and walkway products.

- B. The manufacturer(s) of the materials used shall provide a written **twenty (20)** year guarantee on the complete roof installation. Upon warranty inspection and acceptance of the roof, the guaranty will be turned over to the Owner on behalf of the Contractor, by an authorized representative of the manufacturer. The guaranty shall begin when the project is completed and accepted by the Owner. Submit final guaranty in triplicate.
 - 1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories and other components of membrane roofing system.
- C. Corrective measures on leaks shall be undertaken within seventy-two (72) hours after notification has been received by the Contractor or membrane manufacturer from the Owner.

PART 2 PRODUCTS

2.01 MEMBRANE ROOFING

- A. Thermoplastic Polyolefin (TPO) Type
 - 1. Thermoplastic Sheet Membrane: Reinforced single ply membrane factory fabricated into flexible sheets.
 - 2. Material Standard: Conform to ASTM D6878, Standard Specification for Thermoplastic Polyolefin Based Sheet.
 - 3. Thickness: Minimum 60 mils.
 - 4. Physical Properties
 - a. Breaking Strength - ASTM D751: 330 lbf/in.
 - b. Elongation at Break - ASTM D751: 30%.
 - c. Seam Strength - ASTM D751: 75 lbf.
 - d. Retention of Properties After Heat Aging - ASTM D3045
 - 1) Breaking Strength - ASTM D751: 330 lbf.
 - 2) Elongation - ASTM D751: 25% of original.
 - e. Tearing Strength - D1004: 156 lbg.
 - f. Low Temperature Bend - D2136: Pass.
 - g. Accelerated Weathering Test (Xenon Arc) - D2565: 10,000 hrs.
 - 1) Cracking (7x magnification): None.
 - 2) Discoloration (By Observation): Negligible.
 - 3) Cracking (7x magnification): None.
 - h. Linear Dimensional Change - ASTM D1204: 0.1%.
 - 5. Color: White.
- B. Flashing: 60 mils nominal thick reinforced sheet factory fabricated to the required shapes and sizes to suit project conditions; furnished by sheet roofing membrane manufacturer.
 - 1. Inside and Outside Corners and Vent Flashing: Preformed.

2. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.
- C. Adhesive: Provide types as recommended by manufacturer for materials and conditions encountered.
1. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.
- D. Flashing Bars and Screws: Manufacturer's standard bars and fasteners. Spacings as required to meet design loads.
- E. Mechanical Fasteners: As recommended by roofing manufacturer.
- F. Splice Wash, Lap Sealant, Fastener Sealer, Etc.: Sheet material manufacturer's recommended materials for waterproof sealing of seams in membrane and waterproof sealing of joints between flashings and roofing membrane, adjoining surfaces, projections and penetrations through the roofing membrane. Compatible with materials with which used.
- G. Membrane-covered Roof Expansion Joint Cover: Bellows type consisting of .06" thick membrane, support and attachment flanges.
1. Joint Bellow Widths: As indicated.
 2. Membrane Cover: Material recommended by roofing manufacturer; compatible with roof membrane, integrally attached to bellow supports and attachment flange fabric.
 3. Bellow Supports: Closed cell foam, 3/8 in. minimum thickness.
 4. Concealed Attachment Flanges: Tin strip wrapped with neoprene-coated nylon fabric.
 5. Provide matching factory-fabricated corners, transitions, intersections and terminations.
 6. Termination Bar: Prepunched extruded aluminum bar.
- H. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. GEN FLEX ROOFING SYSTEMS
 2. JOHNS MANVILLE
 3. GAF
 4. CARLISLE
 5. FIRESTONE.
 6. VERSICO.

2.02 INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289 "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type II, glass-fiber mat facer on both major surfaces.

1. Tapered Insulation: 1/4" per foot. No slope under 1/4" per foot will be permitted.
 2. R-Value: Provide thickness for average R of 25 over entire roof area.
 3. Minimum Thickness at Drain: 2".
- B. Provide adhesives and mechanical fasteners as recommended by insulation manufacturer for substrates encountered.
- C. Crickets (Tapered Insulation): Provide tapered insulation crickets sloped approximately 1/4" per foot. Locate and arrange as indicated on drawings or as required to divert water at rooftop equipment or vertical obstructions.
1. Material: Polyisocyanurate; conform to requirements and manufacturers specified herein.
- D. Coverboard: Provide one of the following:
1. 1/2" High Density Wood Fiberboard: ASTM C208 cellulosic-fiber insulating board, Type II, Grade 1. (adhered in hot asphalt)
 2. 1/2" glass-mat, water-resistant gypsum substrate, primed surface; ASTM C1177, (adhered in adhesive). Dens-Deck by GEORGIA-PACIFIC, Secure Rock Roof Deck by USG, GlasRoc Roof Board by CERTAINTEED (adhered in adhesive)

2.03 MISCELLANEOUS ITEMS

- A. Wood Members: Comply with requirements of wood blocking, Section 06 10 50, for wood members indicated as roofing system work. Provide wood pressure treated as specified.
- B. Mastic: Type as recommended by roofing manufacturer.
- C. PVC Walkway Membrane: Roof manufacturer's recommended reinforced PVC heat weldable walkway membrane; minimum 30" wide x lengths indicated. Minimum 2.4mm thick (0.096").

2.04 FASTENERS

- A. Provide roofing membrane manufacturer's recommended type mechanical fastener for deck. Type, size and spacing shall be as required to maintain manufacturer's 15 year system warranty and FM I-90.

PART 3 EXECUTION

3.01 INSPECTION

- A. Pre-Installation Conference: Not less than two weeks before start of roofing installation, meet at project site with Architect, Owner's representative, Contractor, roofing installer, and roofing material manufacturer's representative.

1. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.
- B. Examine substrates and installation conditions. Do not proceed with insulation and roofing work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Verify that work which penetrates roof deck, or requires men or equipment to traverse roof deck, has been completed.
- B. Examine substrate surfaces for adequate anchorage, foreign materials, moisture and unevenness that would prevent the execution of roofing system specified.
- C. Correct unsatisfactory conditions before starting roofing. Roof deck surface conditions shall comply with manufacturer's requirements and be acceptable to the roofing system installer.
- D. Protect other work from spillage of roofing materials. Repair or replace other work damaged by installation of the thermoplastic membrane roofing system work.

3.03 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 12 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened and Adhered Insulation for Metal Roof Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 3. Install subsequent layers of insulation in a cold fluid-applied adhesive.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
1. Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 2. Fasten to resist uplift pressure at corners, perimeter, and field of roof.

3.04 ADHERED MEMBRANE INSTALLATION

- A. Comply with roofing manufacturer's instructions and recommendations for handling and installing roofing system.
- B. Flash and make watertight equipment curbs for mechanical equipment located on the roof.
- C. General flashing details for roof penetrations, curbs, parapets and roof perimeters shall comply with roofing material manufacturer's standard details and recommendations for flashings.
1. Provide base flashing at perimeters and edges of membrane abutting walls, curbs or other construction. Provide prefabricated pipe seals for pipe and conduit penetrations, properly cemented to membrane and sealed to pipe or conduit with stainless steel clamp and top bead of sealant.
 2. Mechanical fasteners below counterflashing, where required at perimeter flashings, to be fully enclosed with suitable membrane to form water tight seal.
 3. Minimum height of membrane flashing terminations to be 8" above top of membrane, unless otherwise indicated.
- D. Install roof flashing and sheet metal work provided herein and furnished under Section 07 62 00.
- E. PVC Walkway Pads: Locate pads as indicated. Maintain approximately 4"

between pads. Secure pads to membrane as recommended by membrane manufacturer.

- F. Blocking Shim blocking solidly as required to make top surface of blocking level with top of insulation.
- G. Perform test cuts at lap edges (seams) to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 1. Perform test cuts after stoppages in the work and when recommended by roofing manufacturer after environmental changes.
 - 2. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

3.07 CLEANING AND PROTECTION

- A. Patch installations by other trades and make all necessary repairs as required.
- B. Upon completion of roofing work, clean gutters and drains of foreign materials and aggregate and remove all debris and surplus materials.
- C. Protect finished roof areas from foot traffic and construction damage until Contract Completion.