SECTION 075423
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.01 DESCRIPTION

A. The CN ICW roof overlay project located at 3227 S Muskogee Ave #5405, Tahlequah, OK 74464. David Moore, Project Manager/Coordinator, is the Owner's Representative and may be contacted regarding any questions or for a pre-bid job site inspection, (918) 526-2177.

B. The project consists of installing Carlisle's Sure-Weld (TPO) Slate Gray FleeceBACK 115 membrane adhered with Flexible FAST Adhesive as outlined below:

C. Apply the Sure-Weld FleeceBACK Adhered Roofing System in conjunction with Insulation Type over the existing metal panel roof. The existing metal roof is approximately 40,000 sq.ft.

1.02 EXTENT OF WORK

A. Provide all labor, materials, tools, equipment, and supervision necessary to complete the installation of the Sure-Weld FleeceBACK Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.

B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.

C. The roofing contractor shall confirm all given information and advise the building owner, prior to bid, of any conflicts that will affect their cost proposal.

D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturer must submit for pre-qualification in writing fourteen (14) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection. Bids stating "as per plans and specs" will be unacceptable.

1.03 SUBMITTALS

A. Prior to starting work, the roofing contractor must submit the following:
   1. Shop drawings showing layout, details of construction and identification of materials.
   2. A sample of the manufacturer's Membrane System Warranty.
   3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
   4. Certification from the membrane manufacturer indicating the membrane thickness over the reinforcing scrim (top ply membrane thickness) is nominal .015-mil or thicker.
   5. Certification of the manufacturer's warranty reserve.

B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

B. Comply with the manufacturer's written instructions for proper material storage.
   1. Store Sure-Weld membrane in a dry, cool, shaded area in the original undisturbed plastic. Sure-Weld membrane that has been exposed to the elements for approximately 7 days must be prepared with Weathered Membrane Cleaner prior to hot air welding.
   2. Store curable materials (adhesives and sealants) between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.
   3. Store materials containing solvents in dry, well-ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

C. Insulation must be on pallets, off the ground and tightly covered with waterproof materials.

D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.05 WORK SEQUENCE

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath or wick into any completed sections of the membrane system.

B. Do not disrupt activities in occupied spaces.

1.06 USE OF THE PREMISES

A. Before beginning work, the roofing contractor must secure approval from the building owner's representative for the following:
   1. Areas permitted for personnel parking.
   2. Access to the site.
   3. Areas permitted for storage of materials and debris.
   4. Areas permitted for the location of cranes, hoists and chutes for loading and unloading materials to and from the roof.

B. Interior stairs or elevators may not be used for removing debris or delivering materials, except as authorized by the building superintendent.

1.07 EXISTING CONDITIONS

A. If discrepancies are discovered between the existing conditions and those noted on the drawings, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.08 PRECONSTRUCTION CONFERENCE

A. A pre-bid meeting will be held at the job site. Contact the owner's representative, listed above if there are any questions.

B. Prior to bid submittal, the roofing contractor should schedule a job site inspection to observe actual conditions and verify all dimensions on the roof. The job site inspection may occur on the day of the pre-bid meeting or prior to such a meeting. Should access to the roof be necessary before or after the pre-bid meeting, the contractor must contact the owner's representative, to coordinate an appropriate time.

C. Any conditions which are not shown on the shop drawings should be indicated on a copy of the shop drawing and included with bid submittal if necessary to clarify any conditions not shown.

1.09 TEMPORARY FACILITIES AND CONTROLS

A. Temporary Utilities:
   1. Water, power for construction purposes and lighting are available at the site and will be made available to the roofing contractor.
   2. Provide all hoses, valves and connections for water from a source designated by the owner when made available.
   3. When available, electrical power should be extended as required from the source. Provide all trailers, connections and fused disconnects.

B. Temporary, Sanitary Facilities
   1. Sanitary facilities will not be available at the job site. The roofing contractor shall be responsible for the provision and maintenance of portable toilets or their equal.

C. Building Site:
   1. The roofing contractor shall use reasonable care and responsibility to protect the building and site against damages. The contractor shall be responsible for the correction of any damage incurred as a result of the performance of the contract.
   2. The roofing contractor shall remove all debris from the job site in a timely and legally acceptable manner so as to not detract from the aesthetics or the functions of the building.

3. 3. The roofing contractor shall at a minimum provide a six-foot chain-link construction fence around stored material on site and immediate work area, (where ladders or equipment to access the roof are located).
4. The contractor shall be responsible for any theft or damages to materials in place/installed, stored or any tools onsite.

D. Security:
1. Obey the owner's requirements for personnel identification, inspection and other security measures.

1.10 JOB SITE PROTECTION

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.

B. During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary, temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.

C. Do not overload any portion of the building, by either use of or placement of equipment, storage of debris, or storage of materials.

D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

E. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.

F. Store moisture susceptible materials above ground and protect with waterproof coverings.

G. Remove all traces of piled bulk material and return the job site to its original condition upon completion of the work.

1.11 SAFETY

A. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state, federal and Cherokee Nation requirements that are safety related. Safety shall be the responsibility of the roofing contractor. All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.12 WORKMANSHIP

A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.

C. There shall be a supervisor on the job site at all times while work is in progress.

1.13 QUALITY ASSURANCE

A. The Sure-Weld Membrane Roofing System must achieve a UL Class A

B. The specified roofing assembly must have been successfully tested by a qualified testing agency to resist the design uplift pressures calculated according to
1. 1A-90 uplift rating

C. The membrane must be manufactured by the material supplier. Manufacturer's supplying membrane made by others are not acceptable.

D. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

E. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply roofing systems and having installed at least one (1) roofing application or several similar systems of equal or greater size within one year.

F. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.

G. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by written certification on manufacturer's letterhead and presented for the specifier's consideration.

H. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.14 JOB CONDITIONS, CAUTIONS AND WARNINGS

A. Refer to Carlisle's FleeceBACK Adhered Roofing System specification for General Job Site Considerations.

B. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.

C. Do not apply Flexible FAST Adhesive when surface and/or ambient temperatures are below 25□F.

D. The contractor must exercise caution during adhesive spraying to avoid overspray.
   1. Use a non-atomizing spray tip such as the Graco Spatter Tip and reduce spray pressure to 500 – 800 psi to increase adhesive droplet size and reduce airborne mist. Maintain handheld wind screens on-site for use as necessary.
   2. Extruding Flexible FAST Adhesive method may be used to eliminate overspray concerns.

E. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

F. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

G. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.

H. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage. Provide protection, such as 3/4-inch-thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

I. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

J. New roofing shall be complete and weather tight at the end of the workday. Care must be taken to avoid wicking water though the fleece by properly sealing exposed edges of the membrane

K. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.15 WARRANTY

A. Provide manufacturer's 20-year Total System Warranty covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 55, measured at 10 meters above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.

B. Warranty shall also cover leaks caused by accidental punctures:
   1. 16 man-hours per year for 115-mil FleeceBACK
   2. When Flexible FAST is specified and installed an additional 4 man-hours per year can be included.

C. Warranty shall also cover leaks caused by hail:
   1. Hail up to 2" diameter when 115-mil FleeceBACK is installed
   2. When Flexible FAST is specified and installed an additional 1" diameter hail can be included.

D. Pro-rated System Warranties shall not be accepted.

E. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART 2 PRODUCTS

2.01 GENERAL

A. All components of the specified roofing system shall be products of Carlisle SynTec or accepted by Carlisle SynTec as compatible.

B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including adhesives, insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the warranty.

C. Install new curbs for roof top units

2.02 MEMBRANE

A. Note: Special Color TPO (Medium Bronze, Rock Brown, Terra Cotta, Slate Gray and Patina Green) is available in 115-mil and 12' wide x 100' long membrane ONLY. Special Color FleeceBACK TPO is available by special order and a lead time will be required.

B. Furnish Sure-Weld Slate Gray FleeceBACK 115-mil, reinforced TPO (Thermoplastic Polyolefin) membrane. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal .015-mil or thicker.

C. Membrane Weathering Performance: The TPO membrane shall be formulated with OCTAGUARD XT Weathering Package to withstand 60 days of exposure at a 275° F temperature and a minimum of 17,000 kj/m2 xenon arc resistance at 80°F without cracking or showing signs of material failure, exceeding ASTM 6878.

D. Special Color TPO Slate Gray Membrane Sheets are 12' wide by 100' long.

2.03 INSULATION/UNDERLAYMENT

A. When applicable, insulation shall be installed in multiple layers and mechanically fastened or secured with Carlisle FAST Adhesive to the substrate in accordance with manufacturer's published specifications.

B. Insulation shall be EPS flute fill as supplied by Carlisle SynTec with a SecurShield HD Cover Board.
   1. Carlisle SecurShield HD Cover Board– a rigid insulation panel composed of a high-density, closed-cell polyisocyanurate foam core laminated to moisture resistant coated-

glass fiber-mat facer for use as a cover board or recover board meeting ASTM 1289-06, Type II, Class 2 (109 psi max). Available 1/2" thick 4' x 8' panel weight 11 lbs with an R-value of 2.5.

2. InsulFoam II (EPS: Expanded Polystyrene) – A closed-cell lightweight expanded polystyrene (EPS) that meets ASTM C578, Type II. Nominal density of 1.5 lbs/cubic ft (pcf) available in 4' x 4' or 4' x 8' sizes with thickness from ¼" to 40". Custom lengths, widths and tapered boards are available. Specified beneath Sure-Seal HP Recovery Board, Dens-Deck Prime or Securock.

2.04 FASTENING COMPONENTS

A. To be used for mechanical attachment of insulation and to provide additional membrane securement:

B. Fasteners, Plates and Bars
   1. Minimum penetration ¾"
   2. Pullout requirements
      a. Testing data to be provided by contractor
         1) 22 gauge or heavier
            (a) 300lbs
         2) Less than 22 gauge
            (a) 360lbs
   3. HP-X Fasteners: A heavy duty #15 threaded fastener with a #3 phillips drive used for membranre or insulation securement into steel, wood plank or minimum 15/32-inch-thick plywood when increased pullout resistance is desired.
   4. Piranha Plates: A 2-3/8" diameter metal barbed fastening plate used with Carlisle HP-X or HP-14-10 Fasteners for membrane securement. This plate can be used for insulation securement.
   5. InsulFast Fasteners: A threaded #12 fastener with #3 phillips drive used for insulation attachment into steel or wood decks.
   6. Insulation Fastening Plates: a nominal 3-inch diameter plastic or metal plate used for insulation attachment.

2.05 ADHESIVES, CLEANERS AND SEALANTS

A. All products shall be furnished by Carlisle and specifically formulated for the intended purpose.

B. Flexible FAST Adhesive: A two-component (Part A and B), low-rise polyurethane adhesive designed for bonding FleeceBACK membrane and/or insulation to various substrates. Flexible FAST Adhesive is packaged in 50- and 15-gallon drums, as well as 5-gallon Jug, Dual Tanks and Dual Cartridges that can be applied in full spray on or extrusion, depending on dispensing type. Dual Tank may also be used in a bead or splatter application.
   1. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412
   2. MDI content of Part A material less than 25%

C. Cut-Edge Sealant: A white or clear colored sealant used to seal cut edges of reinforced Sure-Weld membrane. A coverage rate of approximately 225 - 275 linear feet per squeeze bottle can be achieved when a 1/8" diameter bead is applied.

D. Water Cut-Off Mastic: Used as a mastic to prevent moisture migration at drains, compression terminations and beneath conventional metal edging (at a coverage rate of approximately 10' per tube or 100' per gallon).

E. Universal Single-Ply Sealant: A 100% solids, solvent free, voc free, one part polyether sealant that provides a weather tight seal to a variety of building materials. It is white in color and is used for general caulking such as above termination bars and metal counter flashings and at scuppers.

F. Thermoplastic One-Part Pourable Sealer: A one-part, moisture curing, elastomeric polyether sealant used to fill TPO Molded Pourable Sealant Pockets. Packaged in 4, 2-liter foil pouches inside a reusable plastic bucket. 1 pouch will fill 2 TPO Molded Pourable Sealant Pockets.

G. Weathered Membrane Cleaner: Used to prepare membrane for heat welding that has been exposed to the elements or to remove general construction dirt at an approximate coverage rate of 400 square feet per gallon (one surface).

H. TPO Primer: A solvent-based primer used to prepare the surface of Sure-Weld Membrane prior to application of Pressure-Sensitive Cover strip and TPO Pressure-Sensitive RUSS.

I. Design (LEED) Requirements for Volatile Organic Compounds.

J. Carlisle CAV-GRIP III Low-VOC Aerosol Contact Adhesive/Primer: a low-VOC, methylene chloride-free adhesive that can be used for a variety of applications including: bonding Sure-Weld membrane to various surfaces, enhancing the bond between Carlisle's VapAir Seal 725TR and various substrates, priming unexposed asphalt prior to applying Flexible FAST Adhesive and for adhering Sure-Weld/Sure-Flex FleeceBACK and Sure-Weld TPO membrane to vertical walls. Coverage rate is approximately 2,000-2,500 sq. ft. per #40 cylinder and 4,000-5,000 sq. ft. per #85 cylinder as a primer, in a single-sided application and 750 sq. ft. per #40 cylinder and 1,500 sq. ft. per #85 cylinder as an adhesive for vertical walls, in a double-sided application.

2.06 METAL EDGING AND MEMBRANE TERMINATIONS

A. Drip Edge: a metal fascia/edge system with a 22 or 24 gauge continuous anchor cleat and .032 inch thick aluminum or 24 gauge steel fascia. Metal fascia color shall be as designated by the Owner's Representative.

B. Termination Bar: a 1" wide and .098" thick extruded aluminum bar pre-punched 6" on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.

C. Gutter: Install new gutters around roof where required

D. Downspouts: Install new downspouts in accordance with 10 Year Storm Drainage requirements for the area.

2.07 WALKWAYS

A. Protective surfacing for roof traffic shall be Sure-Weld TPO Walkway Rolls installed per manufacturer's requirements.

2.08 OTHER MATERIALS

A. Install new curbs for all rooftop equipment where needed

PART 3 EXECUTION

3.01 GENERAL

A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, job site considerations and weather restrictions.

B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

C. Install new curbs for roof top units where required

3.02 INSULATION PLACEMENT

A. Install insulation or membrane underlayment over the substrate with boards butted together. Fill joints or gaps greater than 1/4 inch with Flexible FAST Adhesive. Stagger joints both horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with mechanical fasteners in accordance with the manufacturer's specifications.

3.03 MEMBRANE PLACEMENT AND BONDING

A. Position and unroll successive sheets and align to provide a minimum 2-inch overlap (use pre-marked overlap line) along the selvage edge. At end laps (along the width of the sheet), membrane shall be butted together which will be overlaid with 6 inch wide Sure-Weld Reinforced Membrane and hot air welded on all edges.

B. FleeceBACK Membrane shall be fully adhered to an acceptable substrate with Carlisle Flexible FAST Adhesive. The adhesive is spray applied or extruded to the substrate only and the membrane is rolled into the wet adhesive once it has foamed up and reached string/gel time (approximately 2 minutes). Roll the membrane with a 30” wide, 150-pound weighted segmented steel roller to set the membrane into the adhesive.
   1. Exercise care to prevent overspray onto the membrane. If Flexible FAST Adhesive should contaminate the splice area, immediately (while the adhesive is still in liquid form) clean with Weathered Membrane Cleaner or allow Flexible FAST Adhesive to cure and remove with a paint-type scraper.

C. Position adjoining sheets to allow a minimum overlap of 2 inches to provide a minimum 1-1/2” hot air weld.

D. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

3.04 MEMBRANE HOT AIR WELDING PROCEDURES

A. General
   1. The FleeceBACK membrane has a selvage edge (the fleece-backing is discontinued) along the length of the sheet for membrane splicing. Selvage edges are not provided along the width of the membrane; adjoining membrane sheets must be butted together and overlaid with 6 inch wide Sure-Weld Reinforced membrane heat welded on all sides.

B. Hot Air Welding Procedures
   1. Hot air weld the Sure-Weld FleeceBACK membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
      a. Note: When using 115-mil thick or thicker membrane, all splice intersections shall be overlaid with Sure-Weld T-Joint covers or non-reinforced flashing
   2. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
   3. Repair all seam deficiencies the same day they are discovered.
   4. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.05 FLASHING

A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld FleeceBACK membrane or Sure-Weld reinforced membrane. Sure-Weld non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.06 WALKWAYS

A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified.

3.07 DAILY SEAL

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the workday, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Use Flexible FAST Adhesive or other similar material in accordance with the manufacturer's requirements.

3.08 CLEAN UP

A. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION