

May 20, 2019

ADDENDUM ACKNOWLEDGEMENT FORM

To Whom It May Concern:

Concerning the **PSJA ISD NEW SWIMMING FACILITIES BID # 18-19-039**, to be opened at 4:00 p.m., Wednesday, May 22, 2019. Please consider the following:

Addendum Number:	Description of REVISED Addendum:
3	QUESTIONS AND ANSWERS REVISED SPECIFICATIONS / DRAWINGS

For any questions pertaining to these changes, please contact Emily Garza, Director of Purchasing at (956) 354-2000.

Sincerely,



Emily Garza
Director of Purchasing

With the acceptance of this form, I acknowledge that I have received the above **“ADDENDUM ACKNOWLEDGEMENT FORM”** for the **PSJA ISD NEW SWIMMING FACILITIES BID # 18-19-039**, to be opened at 4:00 p.m., Wednesday, May 22, 2019. Please include a signed copy of this **“ADDENDUM ACKNOWLEDGMENT FORM”** with your bid/proposal.

Company Name: _____	Authorized Signature: _____
Address: _____	Authorized Signature (Print): _____
City / State / Zip: _____	Email: _____
Telephone Number: _____	Fax Number: _____

START COLLEGE NOW! COMPLETE EARLY! GO FAR!

Addendum Number 03

May 20, 2019

To the Drawings and Specification dated April 11, 2019

PART 1 – GENERAL

1.1 PURPOSE

- A. The modification narrative which follows provides responses to bidder, pre-bid queries and an abbreviated listing of changes to the contract documents in response to those queries. The narrative is not intended to be an all-encompassing or detailed account or explanation of changes or modifications made to the contract documents. Modifications to the contract documents have been annotated within each separate document, whether specification or drawing, to identify the area of modification. The Contractor is responsible to perform a thorough review of the contract documents, including previous and current documents for modifications that affect the work. This narrative is not a part of the contract documents. The printed contract documents have supremacy over any information contained within this document.
- B. The intent of this document is to provide an aid in establishing a general understanding of modifications to the work that may or may not affect the scope, quality, project requirements, contract sum, construction schedule, etc. Any questions regarding modifications or this document should be made to the Architect in writing within five days of the issue of the contract document modification.
- C. Receipt of this Addendum shall be acknowledged on the Proposal Form.

1.2 GENERAL

- A. PROPOSAL DUE DATE & TIME: **Wednesday, May 22, 2019 at 4:00pm**
- B. LAST DAY FOR QUESTIONS: **Friday, May 17, 2019 at 10:00am**

1.3 PRE-PROPOSAL QUESTIONS

- A. On sheet T3.01, keynote #C11 indicates to provide (2) 4” conduits with (4) 1” inner ducts and pull strings from weight room IDF or nearest main building IDF to the natatorium IDF for fiber and copper backbone. Site plan does not indicate such existing buildings and their IDF locations. Please advise.

- 1. **New conduits and pull strings to run from new Aquatics IDF to the existing Weight Room IDF. Refer to exhibit A11.00 and A11.01 attached for reference. Please contact PSJA ISD to schedule a site visit for verification if necessary.**

Jerry Lopez, Construction Department/Project Manager (956) 354-2075

- B. On sheet E1.02 (see attached) electrical sub is requesting more information such as type of electrical primary manhole as noted in note 7. What is the distance from new loop feed transformer installed near existing building next to track as noted in note 2 to proposed transformer note 1 (required for pricing). If we are to follow plans drive will be shut down for some time and drive will be torn up but will be patched (will never be the same). Drive appears to be in good condition and maybe design team could consider placing proposed primary line behind east curb line in green area (see attached google map).
1. Coordinate with utility company on manhole type and size. Contractor to field verify distance between new and existing transformers. Placement of the new primary line can be run as proposed in accordance with the utility company standards and verification of existing site conditions (underground utilities).

PART 2 – SPECIFICATIONS

2.1 DIVISION 07

- A. 07 54 19 – FULLY ADHERED THERMOPLASTIC MEMBRANE ROOFING SYSTEM
1. Revised section for clarification of roofing system and inspection requirements.

END OF ADDENDUM 03



05/20/2019



PBK Sports, Inc.
11 Greenway Plaza
Suite 2210
Houston, Texas 77046-1104
Telephone: 713-965-0608
Fax: 713-961-4571

Project : PSJA ISD NEW SWIMMING
FACILITIES

Project No. : 18309SP

Description: EARLY COLLEGE HS IDF & MDF

Date : 05/20/19

Drawn By : Author

Drawing:

A11.00

Drawing Reference:

Supplementum:



PBK Sports, Inc.
11 Greenway Plaza
Suite 2210
Houston, Texas 77046-1104
Telephone: 713-965-0608
Fax: 713-961-4571

Project : PSJA ISD NEW SWIMMING
FACILITIES

Project No. : 18309SP

Description: MEMORIAL EARLY COLLEGE HS IDF &

Date : 05/20/19

Drawn By : Author

Drawing:

A11.01

Drawing Reference:

Supplement:

SECTION 07 54 19 - FULLY ADHERED THERMOPLASTIC HYBRID MEMBRANE ROOFING SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Providing the entire roofing assembly, including, but not limited to:
 - 1. Tapered edge strips, cant strips, and wood nailers. (Refer to this Section and Section 06 10 00)
 - 2. Curbs (Refer to Section 07 72 00)
 - 3. Fully adhered thermoplastic single-ply membrane roofing
 - 4. Flashings, including sheet metal perimeter edge (fascia) (Refer this Section and Section 07 63 00)
 - 5. Walkway pads, expansion joints, and other work incidental to, the complete and proper installation of a watertight roofing system as shown on the drawings or specified herein, and in accordance with all applicable requirements of the Contract Documents.

- B. It is the intent of this Section that the Work shall:
 - 1. Provide a watertight facility.
 - 2. Conform to all applicable building code requirements and of authorities having jurisdiction.
 - 3. Include Section 07 63 00, and Section 07 72 00, as part of the Work of this Section; and be performed by a single source contractor.
 - 4. Coordinate with General Contractor of temporary equipment and conduit on roof and protection of installed roof membrane.

1.2 RELATED WORK

- A. All Sections of Work relating to the roofing system, including mechanical, plumbing and electrical items penetrating the roof system.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. A385, Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
 - 2. D570, Water Absorption of Plastics
 - 3. D638, Tensile Properties of Plastics
 - 4. D751, Method of Testing Coated Fabrics
 - 5. D882, Tensile Properties of Thin Plastic Sheeting
 - 6. D1004 Initial Tear Resistance of Plastic Film and Sheeting
 - 7. D1204 Linear Dimensional Changes of Non-rigid Thermoplastic Sheeting or Film at Elevated Temperature
 - 8. D2136 Coated Fabrics – Low-Temperature Bend Test
 - 9. D2565 Operating Xenon Arc-Type Light Exposure Apparatus With and Without Water for Exposure of Plastics
 - 10. D3045 Heat Aging of Plastics Without Load
 - 11. D4434 Poly (Vinyl Chloride) Sheet Roofing
 - 12. E108 (Rev. A) Fire Tests of Roof Coatings
 - 13. G21 Determining Resistance of Synthetic Polymeric Materials to Fungi
 - 14. G53 Operating Light – and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

- B. ASCE-7 Wind uplifts requirements for geographical area.

- C. Federal Specifications (FS)
 - 1. TT-S-00230C

- D. National Roofing Contractors Association (NRCA)
 - 1. Roofing and Waterproofing Manual
- E. Single Ply Roofing Institute (SPRI)
- F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
 - 1. Architectural Sheet Metal Manual
- G. Underwriters' Laboratories (UL)
 - 1. Fire Hazard Classifications
- H. International Building Code

1.4 PERFORMANCE REQUIREMENTS

- A. General Requirements: Provide an installed thermoplastic single ply roofing system, flashing and related work that are watertight and will not permit the passage of liquid water, which will withstand wind loads, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
- C. Roofing System Design: Comply with SPRI "Wind Design Guide for Fully Adhered Roofing Systems" for the following ground roughness exposure and system design:
 - 1. Check for geographical exposure (i.e. Exposure B: City, suburban areas, towns and wooded terrain.)
 - 2. Fully Adhered single-ply membrane roofing.
- D. Underwriter's Laboratories Inc. (UL)
 - 1. UL RMSD – Current Roofing Materials and Systems Directory
 - 2. UL Fire Resistance of Roofing Coverings Materials
 - 3. Exterior Fire Exposure Classification: Class A, ASTM E 108, for application and slopes shown.
- E. ASCE-7 Wind uplifts requirements for geographical area.
- F. American National Standards Institute (ANSI)
- G. American Architectural Manufacturer's Association (AAMA)
- H. Occupational Safety and Health ACT (OSHA)

1.5 SUBMITTALS

- A. Product Data: Manufacturer's printed instructions, schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, adhesive, and accessories to be used in the Work.
- B. Certifications:
 - 1. Manufacturer's written certification that installer is approved and licensed to install specified roofing system. (Submit a copy with Proposal Form)
 - 2. Manufacturer's affidavits that materials used in Project contain no asbestos.
 - 3. Installer shall submit resume and project experience list for proposed system for Project Manager and job site superintendent.

4. Installer shall submit written certification that there are no undocumented workers being employed by them or any subcontractor on this project and that covers all workers on this project by workmen's compensation.
 5. Installer shall submit list of all subcontractors with evidence of subcontractor's insurance coverage in compliance with contract requirements.
 6. Manufacturer's written certification of approval / acceptance of these specifications and details.
- C. Referenced Standards: Two (2) copies of each referenced standard and retain approved copies at site.
- D. Shop Drawings: Furnish from copies of the manufacturer's literature or from copies of NRCA "Roofing and Waterproofing Manual", fourth edition.
1. Furnish for approval any proposed details, which differ from those, included with this proposal package. All proposed details shall first be approved in writing by roofing manufacturers prior to submitting to Architect for approval.
 2. Furnish detail project sequencing, staging, material loading, manpower plans, and project construction schedule for approval.
- E. Samples:
1. Furnish copy of sample warranty that is to be issued upon project completion.
 2. Furnish samples of roof membrane.
 3. Furnish sample of metal edge to be installed.
- F. Upon Substantial Completion of Work, submit the following to Architect for his submission to Owner:
1. Manufacturer's Warranty: Manufacturer's written warranty as specified.
 2. Contractor's warranties.
 3. Maintenance Procedures: Three (3) copies of manufacturer have printed instructions for Owner's use regarding care and maintenance of roof.
 4. Affidavits of non-asbestos for material.
 5. Affidavits from the material manufacturers, suppliers and sub-contractors for release of liens.
 6. Refer to section 01 78 39 for additional requirements of close-out documents.

1.6 INSPECTIONS / TESTS

- A. The Owner's, Architect's, and Manufacturer's representative shall at all times have access to the job site and work areas. The contractor will provide proper and safe facilities for such access and inspection.
1. Owner / Architect Inspections:
 - a. The Owner / Architect will be providing periodic inspections throughout the duration of the project. Owner's / Architect's Representative shall be required to inspect after completion of each major phase of construction for approval.
 2. Manufacturer Inspections:
 - a. An inspection shall be made by a representative of the material manufacturer at **appropriate weekly** intervals during performance of Work, but no less than three (3) visits, and at all major phases of construction, to ensure that said project is installed in accordance with the manufacturer's specifications and illustrated details. Written reports by the manufacturer shall be turned over to the Architect, on Monday following the inspection.
 - b. The authorized material manufacturer's field representative shall be responsible for:
 - 1) Keeping the Architect's representative informed after periodic inspections as to the progress and quality of the work observed.

- 2) Calling to the attention of the contractor those matters observed which are considered to be in violation of the contract requirements.
 - 3) Reporting to the Architect's representative, in writing, any failure or refusal of the contractor to correct unacceptable practices called to his attention.
 - 4) Confirming, after completion of the work and based on his observation and test, that he has observed no application procedures in conflict with these specifications. Final payment will not be released until the Architect has received all specified warranties.
- B. Any failure by the Owner's, Architect's or Manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the contractor, or reduce, or in any way limit, his responsibility of full performance of work required of him under these specifications.
- C. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. If required by architect, Laboratory tests will be performed in accordance with ASTM standard procedures.
1. Owner will select testing laboratory and will pay for Work required by testing laboratory.
 2. Retest for work which fail initial tests or contractor shall pay inspections.
 3. **Non compliance with contractor requirements will result in the Architect/Owner to assign full time quality control and will be subject to reimbursement by the construction manager/contractor.**

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Classification by Underwriters' Laboratories, Inc. as a Class A roof covering.
 2. Roofing system shall be installed in accordance with ASCE-7-10 wind uplift requirements for geographical location of B and a 150 MPH 3-second gust wind speed zone with a Risk Category III based on IBC requirements. Wind-resistance loads listed below have a safety factor of 2.0 incorporated into the calculation.
 - a. Zone 1 Field 48.6 or as otherwise indicated by Structural
 - b. Zone 2 Perimeter 81.5 or as otherwise indicated by Structural
 - c. Zone 3 Corner 122.6 or as otherwise indicated by Structural
 3. Follow local, state, and federal regulations of safety standards and codes. Refer to applicable building code or International Building Code for roofing system installation requirements and limitations.
- B. Installer shall be an experienced single firm specializing in the type of roofing and sheet metal work required, employing only experienced workers for the class of work in which they are employed, having at least five (5) years successful experience on projects similar in size and scope and acceptable and licensed as applicators by the material manufacturer.
- C. No subcontracting of sheet metal fabrication or installation will be accepted. Contractor must have a sheet metal shop on the company premises.
- D. Contractor: The contractor is responsible for the management and control of the work. He shall give his personal superintendence of the work or have a competent resident manager or superintendent satisfactory to the Architect on the job site at all times while work is in progress, with full authority to act for the contractor as his agent.

- E. Work and materials hereinafter specified shall be best of kind described and, unless specified otherwise, shall be new and of best quality. All roofing materials utilized in performance of each type of work shall be the products of one manufacturer or supplier. Unless otherwise indicated, the materials to be used in this specification are those specified and denote the type, quality, performance, etc. required. All proposals shall be based upon the use of the specified material.
- F. Materials will be securely fastened in place in a watertight, neat and workmanlike manner. Contractor shall plan and conduct the operations of the work so that each section started on one day is complete, details installed and thoroughly protected before the close of work for that day.
- G. Application of materials shall be in accordance with the manufacturer's recommendations. In the instance of a conflict between these specifications and those of the manufacturer, the most stringent shall take precedence.
- H. Roof system shall be installed in accordance with ASCE 7 wind uplift requirements and ANSI/SPRI perimeter flashing requirements and shall meet Underwriter's Laboratory Class "A" fire rating.
- I. Contractor shall ensure that fastener pull out resistance tests on existing decks were performed and approved by Architect and coordinated with Roofing Consultant prior to starting roofing application.
- J. Contractor shall take all necessary precautions to protect the new roof mat and deck from damage. The contractor shall be responsible for repairing all new areas of damage caused by the negligence of the contractor, at the contractor's expense. The Architect's on-site representative shall determine damage caused by contractor negligence.
- K. Contractor shall keep the job clean and free from all loose materials and foreign matter. Contractor shall take necessary precautions to keep outside walls clean and shall allow no roofing materials to remain on the outside walls.

1.8 INSTALLATION CONFERENCE

- A. Refer to Section 01 31 13 – Project Coordination.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened packaging with all tags and labels intact and legible. Carton and can labels, shall indicate appropriate warnings, storage conditions, lot numbers, and usage instructions. Handle and store materials and equipment in such a manner as to avoid damage. The proper storage of materials is the sole responsibility of the contractor. Materials damaged in shipping or storage shall not be used. Wet or damaged roofing materials shall be discarded, removed from job site, and replaced with new materials prior to application.
- B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be accepted minimum for exterior coverings. All materials stored, as above shall be minimum of four (4) inches off the substrate, and the tarpaulin tied off with rope.
- C. Products liable to degrade as a result of being frozen shall be maintained above 40° F in heated storage.

- D. Moisture sensitive products shall be maintained in dry storage areas or properly covered. Roofing insulation and felts must always be covered or stored in a dry area when not being used.
- E. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

1.10 WARRANTY

- A. Roofing Manufacturer: Warrant the roofing and associated Work for 20 years from date of Substantial Completion as follows:
 - 1. The warranty shall be a NDL "No Dollar Limit" / no penal sum type, with total replacement cost.
 - 2. The warranty shall guarantee the entire roof system and associated work against defective materials and workmanship of installation, with NO exclusion for ponding water.
 - 3. The roof system including insulation, flashing, metal work, labor, and material shall be guaranteed against failure of workmanship and materials. Repair of the system, including materials and labor, shall be done at no cost to the Owner.
- B. Roofing Contractor: Jointly with any subcontractors employed by him, shall guarantee the work required and performed under this contract will be free from defects in workmanship and materials, and that the building will be and remain waterproof for a five (5) year warranty period, after the Architect accepts the work as substantially complete. The warranty shall be in approved notarized written form, to obligate the Contractor, and subcontractors, to make good the requirements of the warranty. The warranty will be held jointly with the Bonding Company for the first two (2) years and the manufacturer for the remaining three (3) years.
- C. Make arrangements with the materials manufacturer to provide the required warranty. Final warranty shall be submitted to Owner at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Compatibility: Provide materials for the roof system recommended by manufacturer(s) to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.
- B. The components of the roof system are to be products of a single manufacturer as required providing the specified system warranty.
- C. Install all materials in accordance with manufacturer's current written specifications and details. Deviations shall not be made without prior written approval from the manufacturer and the Owner's Representative. Should any specifications or details conflict with the Contract Documents, submit to Owner the recommended alternative that provides the best long term moisture protection and complies with manufacturer's warranty requirements for approval.
- D. Bitumen kettles or tankers shall have a visible thermometer and thermostatic control to provide positive monitoring of the bitumen temperature when it is heated in accordance with manufacturer's instructions. All kettles shall be equipped with afterburners to minimize fumes. Circulate bituminous materials, do not allow bituminous materials to stand in luggers for long periods. Use insulated hot transport lines and luggers. Kettle shall be kept a minimum of 20 feet away from building, placed so that fumes, odors, and smoke, do not

enter building through windows, doors, fresh air vents or similar entrances; are not directed towards freshly painted or anodized surfaces, glass or other glazing materials. Do not place kettle under trees or near vegetation. The assigned kettle man shall remain in close attendance, within 25 feet of ground level, while burners are lit. Kettle lids are to remain closed except for loading. Level of bitumen shall be kept within eight (8) inches from top of kettle.

1. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with equiviscous temperature method ("EVT Method") as recommended by the manufacturer. Discard bitumen that has been held at temperature, exceeding finished blowing temperature (FBT) for a period exceeding three hours. Do NOT heat bitumen to a temperature higher than 25 degrees F (14 degrees C) below flash point.
2. Asphalt Temperatures: If the EVT information is not provided, the following asphalt temperature shall be observed. Maximum heating temperature shall be 525 degrees F. Minimum application temperature shall be 400 degrees F.
3. Asphalt Moppings: Ensure that all moppings do not exceed a maximum of 25 pounds per square. Mopping shall be total in coverage, leaving no breaks or voids.

2.2 APPROVED MANUFACTURERS

- A. Specifications are based on fully adhered Thermoplastic Fleece back *single-ply* **"Hybrid"** roofing system (PVC) **with finish ply being "Flex FB 60 Elvaloy KEE Roof Membrane"** manufactured **by Flex Membrane International Corp. ~~the~~ The** following Manufacturers whose products meet or exceed the specifications, who have manufactured and installed roof materials and systems of the type specified for a minimum of ten (10) years and who maintains a single source responsibility for the total roofing system, as described herein, may apply for approval as a substitution in accordance with Division 1 requirements regarding substitutions.
1. Flex
 2. Sarnafil
 3. Johns Manville
 4. Carlisle Syn-Tec
 5. GAF- EVERGAURD
 6. Soprema
- B. All materials shall be manufactured, specified, or accepted in writing by membrane manufacturer issuing the warranty. Proposed materials shall ensure full system warranty from said manufacturer. Installer shall be an applicator licensed by the manufacturer.
- C. Samples of all materials used on the project, which are not supplied by the membrane manufacturer, shall be submitted to the membrane manufacturer for written approval prior to starting work.
- D. All materials used on the project shall be asbestos free.

2.3 ROUGH CARPENTRY

- A. All nailers, cants and wooden curbs shall be No. 2 or better treated (MCA, MCQ or Borate) lumber selected to meet design details and field dimensions and requirements of Section 06 10 00, Rough Carpentry.

2.4 ROOF MEMBRANE ASSEMBLY / UNDERLAYMENT DESCRIPTION

- A. Roofing Inter-ply Modified Bitumen Base Ply: A high performance modified bitumen base ply consisting of a reinforcing mat impregnated and coated with high quality modified bitumen: (Coordinate with manufacturer for special membrane type requirements when installed over insulation.)

1. Flex: Flex SBS 80 Mil S/S
2. Sarnafil Product: Soprema Elastophene
3. Johns Manville: DynaBase
4. Carlisle: SureMB 90 SBS
5. GAF: Ruberroid 20
6. Soprema: Elastophene

B. Dry Sheathing Paper: (For use as a slip sheet as required) Rosin coated 5 lbs per 100 SF.

2.5 ROOF MEMBRANE ASSEMBLY / FLASHING MEMBRANE AND FINISH PLY DESCRIPTION

A. Thermoplastic Sheet: Uniform, flexible sheet formed from polyvinyl chloride, complying with ASTM D 4434-96, of the following type, thickness, and exposed face color:

1. Classification Type II, Grade - I.
2. Thermoplastic Polymer Thickness: 60 mils minimum.
3. ASCE-7 wind uplift criteria.
4. UL Class A.
5. Exposed Face Color: White

B. Physical Properties:

<u>Property</u>	<u>Value</u>	<u>Test Method</u>
Overall Thickness, mil	0.060	ASTM D 638
Thickness Over Scrim, mil	27	
Felt Weight, oz. per sq. yd.	9	
Breaking Strength, lbf	80	ASTM D 751
Elongation at Break, %, Machine Direction	250	ASTM D 751
Elongation at Break, %, Cross Machine Direction	220	ASTM D 751
Seam Strength, % of Original	Pass	ASTM D 751
Retention of Properties After Heat Aging		ASTM D 3045
Tensile Strength, % of Original	Pass	ASTM D 751
Elongation, % of Original	Pass	ASTM D 751
Tearing Resistance, lbf	17.5	ASTM D 1004
Low Temperature Bend at -40° F	Pass	ASTM D 2136
Accelerated Weathering Test		ASTM G 154
(Fluorescent) - 10, 000 hours	Pass	
Cracking (7x magnification)	None	
Discoloration (by observation)	Negligible	
Crazing (7x magnification)	None	
Linear Dimensional Change, %	0.02	ASTM D 1204
Weight Change after Immersion in Water, %	1.9	ASTM D 570
Static Puncture Resistance, lbf	Pass	ASTM D 5602
Dynamic Puncture Resistance, ft-lbf	Pass	ASTM D 5635

2.6 ROOFING SHEET METAL

A. Refer to Section 07 62 00, Roof Related Sheet Metal.

2.7 ROOF INSULATION

A. Recover Board (Unless noted otherwise): Inorganic, Glass-Faced Gypsum Roof Board equal to UL rated Type X "Dens Deck Prime" as produced by Georgia-Pacific. Board sizes shall be 48" x 96" x 1/2" or as indicated on drawings for roof assembly. 1/4" SOPRABOARD is approved substitution with Soprema roofing system. Provide as required by manufacturer recommendation primer for Roof System. Approved substitute, SECUROCK by USG.

- B. Substrate Board: Where required for fire rating or as indicated, 5/8 inch thick Gypsum Board, tapered-edged, conforming to ASTM C36, Type X. Sizes shall be 4 feet-0 inches wide by longest practical length to minimize joints.
- C. Polyisocyanurate Roof Insulation: Shall comply with ASTM C1289 and Federal Specification (FS) HH-I-1972/Gen and HH-I-1972/2, with a 20 psi minimum compressive strength. Insulation shall be surfaced on both sides with a non-asphaltic fiberglass facers. Thickness shall be a minimum of 4.4" (see plans) over all conditioned air space, see drawings for details. Approved product shall be Enrgy 3 as manufactured by Johns Manville or pre-approved equal.
- D. Tapered ISO. Insulation: Factory cut 48 inches x 48 inches polyisocyanurate board cut to 1/4 inch per foot slope; thickness varies; ASTM C1289, UL Class A, Factory Mutual Class 1. Approved product shall be Tapered E'NERGY 3 manufactured by Johns Manville or pre-approved equal. Provide 1/2 inch recovery board similar to that specified above over tapered polyisocyanurate board insulation if used.
- E. Tapered Edge Strip: 1-1/2 inches to 0 inches (or as required, field verify), 18 inches x 48 inches, install at all expansion joints, curbs, projections, crickets, saddles and base flashings. Approved material shall be as manufactured by Cant Products or pre-approved equal.

2.8 ROOFING ACCESSORIES

- A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing materials.
 - 1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdictions.
- B. Flashing and Flashing Accessories: As recommended by the Thermoplastic sheet manufacturer's printed instructions for reinforced sheet flashing of same material, type, thickness, and color as sheet membrane.
- C. Mechanical Fasteners: FM Approved corrosion resistant steel screws of the appropriate size for fasteners for roof membrane and insulation attachment and for sheet metal flashing. Fasteners for the membrane shall be supplied by the thermoplastic manufacturer and are to be installed as recommended by Thermoplastic sheet manufacturer's printed instructions.
 - 1. Shall be Factory Mutual approved and supplied by the manufacturer for the specific application.
 - 2. Fastener for Brick: Zamac Nailin. Shall be 1/4 inch x 2 inches, stainless steel nail, one piece unit, flat head, as manufactured by Power Fasteners, or approved equal.
 - 3. Fastener for Metal Deck: Shall be a #14 Factory Mutual approved fastener, fluorocarbon coated, with CR-10 coating. A minimum 0.200 inch diameter shank and 0.250 inch diameter thread. To be used with Factory Mutual approved, round pressure plates or bar, and having a fluorocarbon CR-10 coating, when subjected to 30 Kesternich cycles (DIN 50018) shows less than ten percent (10%) red rust which surpasses Factory Mutual Approval Standard 4470 as manufactured by Olympic Manufacturing Group, Inc., or pre-approved equal.
 - 4. Nails: G-90 galvanized or non-ferrous type, size as required to suite application, minimum 11 gauge with 3/8 inch diameter head.
- D. Attachment Options for Recovery Board (insulation to be secured to metal deck with screws and plates):

1. Mopping Asphalt: Asphalt that has been certified for full compliance with the requirements for Type IV asphalt listed in Table I, ASTM D312. Each container or bulk shipping ticket shall indicate the equiviscous temperature EVT, the finished blowing temperature, FBT, and the flash point, FP.
 - a. Approved Product: Trumbull asphalt or as required by membrane.
 2. Low Rise Foam as recommended by Roofing manufacturer
 3. Bonding Adhesive as recommended by Roofing manufacturer
- E. Attachment Options for Modified Membrane
1. Mopping Asphalt: Asphalt that has been certified for full compliance with the requirements for Type IV asphalt listed in Table I, ASTM D312. Each container or bulk shipping ticket shall indicate the equiviscous temperature EVT, the finished blowing temperature, FBT, and the flash point, FP.
 - a. Approved Product: Trumbull asphalt or as required by membrane.
 2. Torching as recommended by Roofing manufacturer
 3. Bonding Adhesive As recommended by Roofing manufacturer
- F. Attachment Options for Thermoplastic Membrane
1. Mopping Asphalt: Asphalt that has been certified for full compliance with the requirements for Type IV asphalt listed in Table I, ASTM D312. Each container or bulk shipping ticket shall indicate the equiviscous temperature EVT, the finished blowing temperature, FBT, and the flash point, FP.
 - a. Approved Product: Trumbull asphalt or as required by membrane.
(Ensure Manufacturers product will not allow bleed through)
 2. Lowrise foam as recommended by Roofing manufacturer
 3. Bonding Adhesive As recommended by Roofing manufacturer
- G. Bonding Adhesive: As recommended by thermoplastic sheet manufacturer's printed instructions to develop a bond between the membrane and the substrate to which the membrane is to be attached. Sarnacol 2121 Adhesive or approved equal.
- H. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, pre-punched.
- I. Metal Flashings, Copings, Edge Trim and Accessories: Provide all roofing manufacturer's metal required for a complete roofing system covered under the manufacturer's warranty.
- J. Sealants: Membrane manufacturer's approved sealant shall be used to seal penetrations through the membrane system and at miscellaneous sealant applications that come in contact with roof systems components.
- K. Air Seal Membrane: If required by manufacturer to meet wind design requirements. Air seal membrane shall be a minimum 4 mil. Polyethylene sheeting or as required by roof system manufacturer.
- L. Sealing Tape Strip: Compressible foam with pressure-sensitive tape on one side. Sealing tape strip is to be used with metal flashing as a preventive measure against air and wind blown moisture entry.
- M. Metal Reglet: Manufacturer's 6063T5 extruded aluminum counter-flashing, approximately 2.25 inches wide and 0.10 inch thick, pre-punched at 8 inches o.c. for attachment to the wall or curb. Use prefabricated mitered inside and outside corners where walls interest.

- N. Miscellaneous Accessories: Provide pourable sealants, performed cone and vent sheet flashings, pre-formed inside and outside corner sheet flashings, T-joint covers, termination reglets, and other accessories as recommended by roofing system manufacturer for intended use.
- O. Other miscellaneous materials shall be of the best grade available and approved in writing by roof system manufacturer, prior to use, for the specific application.

2.9 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Other materials shall be as shown, specified or required and be of the best grade for the proposed use as recommended by the manufacturer.
 - 1. Expansion Joint: As detailed on drawings and outlined in NRCA and SMACNA manuals.
 - 2. Sealant Backer Rod: Provide compressible rod stack of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, non-absorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant. Where used with hot-applied sealant, provide heat-resistant type which will not be deteriorated by sealant application temperature as indicated.
 - 3. Pipe Hangers and Supports: Provide and install all necessary supports for gas lines, conduit, chilled water lines, duct work, condensate lines, etc. Refer to Section 07 72 00, Roof Accessories.
 - 4. Cant Strips: Shall be wood fiber where used for non-structural purposes. Shall be treated solid wood where used for structural purposes meeting NRCA, Factory Mutual and Underwriters Laboratory guidelines. If solid wood cant is used where insulation exists, cant is to be toe nailed into treated solid wood nailer the same height as insulation.
 - 5. Termination Bar:
 - a. Material: Extruded aluminum bar with lip profile.
 - b. Size: 0.090 inch thick by 3/4 inch wide with 3/16 inch lip width and a 45 degree lip angle, factory punched 1/4 inch x 3/8 inch oval holes spaced six (6) inches on center.
 - c. Approved Product/Manufacturer: "LIPTB 06" manufactured by Olympic Manufacturing Group, Inc., or approved equal.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Existing Conditions: Examine existing building and new construction to determine existing physical conditions that affect installation of new roofing.
- B. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.
- C. Environmental Requirements:
 - 1. Apply roofing in dry weather.
 - 2. Do not expose roof components and flashing in inclement weather or when it is predicted 30% or more possibility for inclement weather.
 - 3. When ambient temperature is below 40 degrees Fahrenheit, expose only enough sensitive cements, sealants, and adhesives as required for use within a four-hour period.
 - 4. Do not expose membrane and accessories to a constant temperature of 180 degrees Fahrenheit.

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- D. Protection:
 - 1. Provide special protection and avoid traffic on completed areas of membrane installation.
 - 2. Restore to original condition or replace work or materials damaged during handling of roof materials.
 - 3. Take precautions as required to protect adjacent work and structures.
- E. Emergency Equipment: Maintain on site equipment necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather.
- F. Restrictions:
 - 1. Comply with General Requirements on use of site.
 - 2. Smoking is prohibited on all roof areas or in existing buildings.
 - 3. Maintain facility and all utility services in a functional condition.
 - 4. Provide sanitary facilities for employees.

3.2 EXAMINATION

- A. Examine and verify that receiving substrate surfaces of the structure have no defects or errors, which would result in poor or potentially defective application or cause latent defects in workmanship.
 - 1. Examine substrate to which roofing material is to be applied to ensure that its condition is satisfactory for roofing application. Do not permit voids greater than 1/4 inch wide in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges, and debris. Inspect substrates, and correct defects before application of thermoplastic sheets.
- B. Verify that roofing openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected. Starting installation shall imply acceptance of surfaces and conditions.

3.3 NAILERS

- A. Wooden nailers shall be installed at perimeter edges or drip edges on outside perimeter of building.
- B. All Construction: Nailers shall be the same height as the new insulation and recovery board being installed or to existing raised roof edge whichever is applicable. Nailers shall be anchored to resist a pullout force of 300 pounds per linear foot per Factory Mutual Data Sheet 1-49. Fasteners shall be no less than 1/2" bolts at 2'-0" on center or #12 screws at 6" on center. Provide nailers at all penetrations. Raise all curbs, flashing, etc, a minimum of eight (8) inches above the deck.

3.4 SUBSTRATE PREPARATION

- A. Substrate Surface: Prepare substrate surfaces to insure proper and adequate installation, in strict accordance with the Contract Documents and approved Shop Drawings, or manufacturer's requirements.
- B. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with same materials as the substrate.

- C. The membrane manufacturer shall specify types of substrates that are suitable for use with the bonding adhesive.
- D. Protection of Adjacent Areas or Surfaces: Protect adjacent areas or surfaces from damage as a result of the Work of this section. Remove sharp projections.
- E. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- F. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.5 APPLICATION OF INSULATION

- A. General:
 - 1. Manufacturer's Instructions: In regard to attachment, the manufacturer's instructions or specifications shall determine the suitability for an application.
 - 2. Precautions: The surface of the insulation must not be ruptured or damaged prior to installation of the roof membrane. Replace damaged boards.
 - 3. Thermal insulation boards shall be laid on the substrate in parallel rows with end joints staggered and butted as close as possible. All joints shall be tight and at the roof perimeter and roof penetrations, insulation shall be cut neatly and fitted to reduce openings to a minimum. All openings 1/4 inch or larger shall be filled with insulation.
 - 4. Insulation shall be tapered or feathered at drains and scuppers to provide proper drainage (if applicable).
 - 5. No more insulation shall be installed than can be covered by the completed roof system by the end of the day or the onset of inclement weather.
 - 6. Tapered insulation and crickets, when specified, shall be placed in accordance with the drawings and/or as required NRCA standards.
- B. Steel Decks: Specified rigid insulation shall be mechanically fastened to the steel deck meeting ASCE-7 wind uplift requirements as dictated by wind zone applicable to location of project. Fasteners and fastening patterns shall be determined by building height, location and geographical area of the United States. It is the contractor's responsibility to consult current publications, literature, and bulletins of current codes and the manufacturer that are in effect at the time of this project.
- C. For subsequent layer or layers of insulation or specified recovery board, the layers shall be applied using offset joints, so that all individual insulation layers joints are offset a minimum of six inches (6") both ways with the preceding layer, and immediately walked in place. Applications for adhesion are listed above.

3.6 INSTALLATION OF BASE PLY

- A. Membrane Application: Install roofing in accordance with roofing system manufacturer's current published instructions and the following requirements. Application of roofing membrane components shall immediately follow application of insulation as a continuous operation.
- B. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project. Make necessary preparations, utilize

recommended application techniques, apply the specified materials and exercise care in ensuring that the finished application will be acceptable to the Owner.

- C. Adhesive Application: Apply cold adhesive with a spray equipment or squeegee or as otherwise directed by the manufacturer in a smooth even, continuous layer without breaks or voids at the rate of 1 ½ to 2 gallons per square per ply. (The porosity of some substrates may require a heavier application to ensure full adhesion. Refer to manufacturer's requirements).
- D. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.
- E. All fishmouths shall be repaired daily. Fishmouths may not be "walked-in". Fishmouths shall be cut out and replaced by the same number of plies affected. No exceptions.
- F. After completion of work, surface shall be checked for "fishmouths" or other objects causing separation between the reinforcing plies. Discrepancies shall be repaired to the Architect's acceptance. Areas indicating voids shall be cored, tested, repaired to manufacturer's acceptance. Aggregate surfacing may begin after test cuts or membrane is accepted by manufacturer and Architect. Provide copy of results from manufacturer to the Architect. This document is one of the prerequisites needed for surfacing to begin.

3.7 INSTALLATION OF THERMOPLASTIC MEMBRANE

- A. General: Install in strict accordance with manufacturer's latest published requirements, instructions, specifications, and details and approved shop drawings.
- B. Over the properly installed and prepared substrate, manufactures adhesive (Sarnacol 2121 or approved equal) shall be poured out of the pail and spread using notched ¼" X ¼" X ¼" rubber squeegees. The adhesive shall be applied at a rate according to manufacture requirements. No adhesive is applied to the back of the feltback membrane. ***Do not allow adhesive to skin over or surface-dry prior to installation of feltback membrane.***
- C. The Fleeceback roof membrane is unrolled immediately into the wet adhesive. Adjacent rolls overlap previous rolls by 3 inches. This process is repeated throughout the roof area. Immediately after application into the adhesive, each roll shall be firmly pressed into place with a water filled, foam covered lawn roller by frequent rolling in two directions. ***Do not allow adhesive to skin over or surface dry prior to installation of fleeceback membrane.***
- D. Weld cover strips at all seams that do not have a factory selvage edge.
- E. For application of hot asphalt as an adhesive for the membrane, refer to manufacturer's recommendations.

3.8 THERMOPLASTIC SEAM INSTALLATION

- A. Clean seam areas, overlap sheets, and weld side and end laps of sheets and flashings according to manufacturer's written instructions to ensure a watertight seam installation. Weld seam as follows:
 - 1. Weld Method: Hot Air
- B. Test lap edges with probe to verify seam weld continuity on a daily basis.
- C. Repair tears, voids, and lapped seams in roofing that do not meet requirements.

3.9 FLASHING INSTALLATION

- A. Install sheet flashings and performed flashing accessories and adhere to substrate according to roofing system manufacturer's written instructions.
- B. 3/4" plywood is to be used at all parapets that receive wall flashings.
- C. Apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- D. Flash penetrations and field-formed inside and outside corners with sheet flashing as recommended by manufacturer.
- E. Clean seam areas, overlap seams, and firmly roll flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- F. Test lap edges with probe to verify seam weld continuity. Apply lap sealant, if required by roofing manufacturer, and seal exposed edges of sheet flashing terminations per manufacturer's requirements.
- G. Terminate and seal top sheet flashings and mechanically anchor to substrate through termination bars.

3.10 METAL FLASHINGS, COPINGS, EDGE TRIM AND ACCESSORIES INSTALLATION

- A. General: Secure metal flashings accessories at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

3.11 OVERNIGHT SEAL / WATER CUT-OFF

- A. Over Night Seal: Shall be performed according to accepted roofing practice as outlined in the NRCA Roofing Manual.
- B. Water Cut-Off: At the end of day's work or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to resumption of roofing.

3.12 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

- A. The following is a list of descriptions for correct installation of components integrated into the roof membrane assembly. In all cases, unless otherwise approved, incorporate flanged components into the system between the application of the base ply and finish ply. The flange must be primed with a uniform coating of approved ASTM D41 asphalt primer and allowed to dry thoroughly; all flanges must be set in approved mastic.
- B. Sealant: Caulk all exposed finish ply edges at gravel stops, waste stacks, pitch pans, vent stacks, etc., with a smooth continuous bead of approved sealant.
- C. Sheet Metal: Refer to Section 07 62 00, ROOF RELATED SHEET METAL.

3.13 QUALITY CONTROL

- A. Roofing Applicator: On-site evaluation welded seams shall be made by the contractor to locations as directed by the owner's representative or thermoplastic manufacturer's

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technical representative. Two-inch wide cross-section samples shall be taken three times a day minimum through completed seams. Correct welds shall display failure from shearing of the membrane prior to separation of weld. The contractor at no extra charge to the owner shall patch each test cut. Test seam samples shall be label with location of seam cut, date of seam cut, and retain for owner's representative or thermoplastic manufacturer's technical representative for test cut inspection.

- B. Manufacturer's Quality Control Inspection: The Manufacturer's Technical Representative shall review the on-going work as indicated in Part 1 above. All defects noted non-compliance with the specifications or the recommendations of the thermoplastic manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor to the satisfaction of the owner's representative and the thermoplastic manufacturer.

3.14 PROTECTING AND CLEANING

- A. Protect sheet membrane roofing from damage and wear during remainder of construction period.
- B. Immediately remove all spots, smears, stains, residues, adhesives, etc., from the Work of this Section and/or upon adjacent areas or surfaces, which result from the Work of this Section.
- C. Upon completion of the Work of this Section, dispose of, away from the Site, all debris, trash, containers, residue, roofing remnants and scraps which results from the Work of this Section.
- D. Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

3.15 ACCEPTANCE

- A. Prior to demobilization from the site, the owner/project manager, architect and installer shall review the work. All defects noted noncompliance with the specifications or the recommendations of the thermoplastic manufacturer should be itemized in a punch list. These items must be corrected immediately by the contractor prior to demobilization to the satisfaction of the owner/project manager, and the thermoplastic manufacturer.
- B. Notify Architect and Owner 48 hours in advance of the date and time of inspection.
- C. All warranties, as required for the project by this specification, shall be submitted for approval prior to final payment.

END OF SECTION