



**Additions and Interior Renovations to Gantner,
Gilbert, and 16th Ave. Elementary Schools
D/R Project No. 4132**

January 8, 2024

This Addendum is issued to all Contractors for the purpose of amending the requirements of the Contract Documents, as referred to and noted for the above project, and is hereby made part of said Contract Documents to the same extent as though it were originally included therein. In accordance with laws and the applicable provisions of the Contract Documents, the OWNER hereby issues this Addendum to same. The Contract Documents REQUIRE that each BIDDER acknowledge receipt of this Addendum in the space provided on the Proposal Form. This Addendum shall amend, supplement, and supersede the Contract Documents only as and to the extent explicitly stated herein.

ADDENDUM #1

A. SPECIFICATIONS

1. Spec. Section TABLE OF CONTENTS, dated December 20, 2023. **Replace** with Spec. Section, TABLE OF CONTENTS, dated January 5, 2024, herein attached.
2. NOTICE TO BIDDERS: The bid opening time is being moved to 2:00 pm. The date remains unchanged (February 15, 2024).
3. Spec. Section AIA DOCUMENT A132-2019, dated December 20, 2023. **Replace** with Spec. AIA DOCUMENT A132-2019, dated January 5, 2024, herein attached.
4. Spec. Section 01026 – UNIT PRICES, dated December 20, 2023. **Replace** with Spec. Section 01026 – UNIT PRICES, dated January 5, 2024, herein attached.
5. Spec. Section 07220 – ROOF INSULATION, dated December 20, 2023. **Replace** both versions with Spec. Section, 07220 – ROOF INSULATION, dated January 5, 2024, herein attached.
6. Spec. Section 07520 – MODIFIED BITUMEN MEMBRANE ROOFING-HOT TORCH APPLIED, dated December 20, 2023. **Replace** both versions with Spec. Section, 07520 – MODIFIED BITUMEN MEMBRANE ROOFING-HOT TORCH APPLIED, dated January 5, 2024, herein attached.
7. **Add** Spec. Section 07521 – MODIFIED BITUMEN MEMBRANE ROOFING-HOT COLD APPLIED, dated January 5, 2024, herein attached.
8. Spec. Section 07600 – SHEET METAL FLASHING AND TRIM, dated December 20, 2023. **Replace** both versions with Spec. Section 07600 – SHEET METAL FLASHING AND TRIM, dated January 5, 2024, herein attached.



9. **Add** Spec. Section 07811 – SPRAYED FIRE-RESISTIVE MATERIALS, dated January 5, 2024, herein attached.
10. **Add** Spec. Section 07812 – INTUMESCENT FIRE-RESISTIVE MATERIAL, dated January 5, 2024, herein attached.
11. Spec. Section 09670 – RESINOUS FLOORING, dated December 20, 2023. **Replace** with Spec. Section 09670 – RESINOUS FLOORING, dated January 5, 2024, herein attached.
12. Spec. Section 321313 – CONCRETE PAVEMENT, dated December 20, 2023. **Replace** with Spec. Section 321313 – CONCRETE PAVEMENT, dated January 5, 2024, herein attached.

B. DRAWINGS

1. NO ISSUES

C. MISCELLANEOUS

1. The Pre-Bid Meeting Minutes 1/5/24, are attached herein.

Pre-Bid RFI#1 from DMD Contracting Dated December 29, 2023

1. After review of the specifications, it has been found that there are numerous duplicate specification sections comingled within other specification sections. In addition, the table of contents does not coincide with the issued specifications. Many specification sections are not in the order as listed in the table of contents. We request that a corrected and revised complete Project Manual be reissued so that there is no confusion.

Response: Duplicated specification sections have been revised and are herein attached (per above). All other sections are present, just out of order. Table of Contents has been updated to reflect added specification sections only.

Pre-bid RFI#1 from Vanas Construction Co., Inc. Dated January 4, 2024

1. Unit Prices in Contract bound in specification (AIA A132-2019) are not consistent with the 1 unit prices requested in the bid form. Please eliminate unit prices listed in AIA contract or add all of these unit prices to the bid form.
Response: See attached revised Contract and specification section 01026 – UNIT PRICES herein attached.
2. It is assumed that all work outside to the existing building can be performed during normal work hours and work inside the existing building must be done during the summer months, vacation times or 2nd shift. Please confirm.



Response: See specification section “01010 – Summary of Work” for working hours.

3. Page 01500-1, Paragraph 1.2.D.3 references sidewalk bridges. We do not see sidewalk bridges shown or the need for sidewalk bridges on any of the 3 sites. Please confirm sidewalk bridges are not required.

Response: Provide protection as needed at existing multi-purpose room doors to remain at Gilbert Avenue school adjacent to construction work area.

4. Drawings T1.3 and T1.4 (depending upon the school) has a fireproofing legend. There is no spray fireproofing specification. Is there spray fireproofing at these schools and if so, please issue a spray fire proofing specification.

Response: Appropriate specification sections have been added and are herein attached.

5. Please confirm that Gilbert ES is the only school that is receiving fire sprinklers.

Response: Gilbert is the only school that has an existing sprinkler system. See Gilbert drawing FP1.00 for extent of work.

6. Can the bid opening of 11:00 am be moved to 2:00 pm or later. MEP vendors do not release their prices until the morning of the bid. A 11:00 am bid opening does not allow time for general contractors to review the MEP proposals, address the numerous questions that arise and provide the owner with the best possible price because there is no time to evaluate all of the bids. Please advise.

Response: See above for bid opening time change.

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DRAFT AIA® Document A132® - 2019

Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

AGREEMENT made as of the « day of [REDACTED] in the year
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

Elmwood Park Board of Education
60 East 53rd Street
Elmwood Park, NJ 07407
Telephone Number: 201-796-8700
Fax Number: 201-625-6370

and the Contractor:
(Name, legal status, address, and other information)

for the following Project:
(Name, location, and detailed description)

Additions and Interior Renovations to Gantner, Gilbert, and 16th Ave. Elementary
Schools

The Construction Manager:
(Name, legal status, address, and other information)

Epic Management
136 Eleventh Street
Piscataway, NJ 08854
Telephone Number: 732-752-6100
Fax Number: 732-752-9106

The Architect:
(Name, legal status, address, and other information)

«Di Cara | Rubino Architects »« »
«30 Galesi Drive »
«Wayne, NJ 07470 »
«Telephone Number: 973-256-0202
Fax Number: 973-256-0227 »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™-2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™-2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™-2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

To the extent of any inconsistency between or among any of the Contract Documents, the provision that provides the Owner with the greatest or most beneficial rights shall control. Final rider controls the terms in the event of any inconsistencies.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of the Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement, if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

A date set forth in a Notice to Award by the Owner

If, prior to the commencement of the Work, the Owner requires time to file mortgages, mechanics' liens and other security interest, the Owner's time require shall be as follows:

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » () days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

Portion of the Work

Completion Date

Construction Start Date:

Substantial Completion Date:

, subject to adjustments of this Contract Time as provided in the Contract Documents.

(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

If the Project is not completed and ready for occupancy and resumption of regular school operations by the date specified herein, the Contractor shall pay to the Owner the sum of \$1,500.00 [One Thousand Five Hundred Dollars] per day as liquidated damages, not as a penalty, for each calendar day until the Project is completed. Due to the inability of the parties to calculate damages with any de »

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor’s performance of the Contract. The Contract Sum shall be :

(Check the appropriate box.)

[] Stipulated Sum, in accordance with Section 4.2 below

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be _____ (\$) , subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 The Stipulated Sum is based on the following alternates,if any, which are described in the Contract Documents and are hereby accepted by the Owner;

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

BASE BID \$

TOTAL CONTRACT SUM: \$

§ 4.2.3 Unit prices, if any:

(Identify and state the unit price, and state the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
GC-1 Trucking and Disposing of Historic Fill	Per ton	
GC-2 Excavation and Loading of Soils	Per cubic yard	
GC-3 Import of Structural Fill Material	Per ton	
GC-4 Backfill and Compaction of Structural Fill Material	Per ton	
GC-5 Ton of Steel Fabrication and Installed	Same as allowance/ton	

§ 4.2.4 Allowances included in the Stipulated Sum, if any:
 (Identify allowance and state exclusions, if any, from the allowance price.)

Item	Allowance
No. 1 Contingency	
No. 2 Interior and Exterior Signage	
No. 3 Graphic Signage	
No. 4 Door Hardware	
No. 5 Special Testing and Inspections	

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and upon certification of the Project Application and Project Certificate for Payment or Application for Payment and Certificate for Payment by the Construction Manager and Architect and issuance by the Architect, the Owner will make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

N/A

§ 5.1.3 Payment applications shall be reviewed and paid in accordance with Article 9 of the General Conditions and the Bid Documents.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work and be prepared in such form and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. All payments will be made in accordance with the Prompt Payment Act.

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of the percentage set forth in Section 9.3.1 of the General Conditions. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute may be included as provided in Section 7.3.9 of the General Conditions;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage set forth in Section 9.3.1 of the General Conditions;
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Construction Manager or Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of the General Conditions.

§ 5.1.4.4 The progress payment amount determined in accordance with Section 5.1.4.3 shall be further modified under the following circumstances:

- .1 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of the General Conditions.

§ 5.1.4.5 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.4.3.1 and 5.1.4.3.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« retainage will be 2% and then 5% when remaining Contract value is \$500,000 or less, as per the General Conditions. »

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect; such final payment shall be made by the Owner not more than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

«Final payment less the requisite retainage shall be made after the issuance of the final Certificate of Payment. Vouchers shall be submitted to the Owner upon the issuance of a final Certificate of Payment. Payment shall be made in accordance with Article 9 of the General Conditions. The requisite retainage of the contract sum shall be held by the Owner until the Owner approves the Architect's determination that the Work has been satisfactorily completed and no unsettled claims exist. All punch list items must be fully completed before final acceptance and the issuance of a Certificate for Payment will be made. »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15.2 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 No binding arbitration

For any Claim subject to, but not resolved by, mediation pursuant to Article 15.3 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:

(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[] Arbitration pursuant to Section 15.4 of AIA Document A232–2019.

[] Litigation in a court of competent jurisdiction.

[] Other: *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.3 The Owner's representative:

(Name, address, email address, and other information)

John Susino

§ 8.4 The Contractor's representative:

(Name, address and other information)

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

8.6.3 Warranty:

See A232 Section 3.5

8.6.4 Receipted Bills for Materials, etc.:

It is hereby understood and agreed that no payments shall be made by the Owner to the Contractor for materials delivered and accepted during any month covered by this contract or any work done or labor furnished during the same period, unless and until receipts and any and all other vouchers showing payment by the Contractor for materials and labor, including payments to subcontractors from the preceding payment to Contractor on the same basis set forth in the Certificate for Payment, having been filed with the Owner and annexed to the Certificate covering said payment applied for; anything to the contrary in any of the Contract Documents referred to herein notwithstanding.

It is further agreed and understood that the Contractor shall require all subcontractors, within thirty (30) days after any payment is made to subcontractors to submit sufficient proof of payment, covering both labor and materialmen so that the Contractor is satisfied that no stop notices can be filed against it for any money due the subcontractor or their labor or material men.

8.6.5 Release of Liens:

Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner a complete release of all liens and indemnification, arising out of this Agreement and an affidavit that so far as the Contractor has knowledge or information, the releases include all labor and material for which a lien could be filed, but the Contractor may, if any subcontractor refuses to furnish a release in full, furnish a bond satisfactory to the Owner to indemnify him against any lien. If any claim remains unsatisfied after all payments are made, the Contractor shall indemnify, defend and hold harmless the Owner and refund to the Owner all monies that the Owner may be compelled to pay in discharging such a lien, including all costs and reasonable attorneys' fees.

8.6.6 Waiver:

No action or failure to act by the Owner shall constitute a waiver of any right it may have under the terms of this Contract.

8.6.7 Laws:

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User Notes:

(962815849)

The Contractor shall comply with all applicable federal, state and local laws, statutes, regulations, ordinances and any order issued by any governmental entity. This Agreement shall be governed by the laws of the State of New Jersey. The Contractor shall obtain all permits required by law prior to commencement of any work on the Project.

8.6.8 Affirmative Action:

The Contractor shall comply with the Equal Employment Opportunities Act, 42 U.S.C.A. §2000e and the Law Against Discrimination, N.J.S.A. 10:5-1 et. seq. The mandatory language of N.J.A.C. 17:27, promulgated by the Treasurer pursuant to P.L. 1975 c.127, as amended and supplemented in Exhibit B, attached hereto and made a part hereof, are incorporated into this Agreement as if set forth herein at length, and the Contractor or subcontractor agrees to comply fully with the terms, provisions and obligations of N.J.A.C. 17:27 and any and all other statute and regulation applicable to the Project.

8.6.9 Public Works Contractor Registration Act (P.L. 1999 c.238):

Every Contractor or subcontractor is required to be registered with the State Department of Labor and Workforce Development in accordance with N.J.S.A. 34:11-56.48 et. seq. A copy of the registration certificate shall be filed in the Board office.

In the event the Contractor or subcontractor's certificate is revoked by the State Department of Labor and Workforce Development, the Board reserves the right to terminate the contract and to cause the work to be completed by its own forces or otherwise. Such other sanctions as may be adopted by the State Department of Labor and Workforce Development pursuant to N.J.S.A. 34:11-56.48, et. seq. may be imposed for the aforementioned violations.

8.6.10 Business Registration:

Pursuant to N.J.S.A. 52:34-44, the Board ("Contracting Agency") is prohibited from entering into a contract with an entity unless the bidder/proposer/contractor, and each subcontractor that is required by law to be named in a bid/proposal/contract has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.

Prior to contract award or authorization, the contractor shall provide the Contracting Agency with its proof of business registration and that of any named subcontractor(s).

Subcontractors named in a bid or other proposal shall provide proof of business registration to the bidder, who in turn, shall provide it to the Contracting Agency prior to the time a contract, purchase order, or other contracting document is awarded or authorized.

During the course of contract performance:

- (1) the contractor shall not enter into a contract with a subcontractor unless the contractor first provides the contractor with a valid proof of business registration.
- (2) the contractor shall maintain and submit to the Contracting Agency a list of subcontractors and their addresses that may be updated from time to time.
- (3) the contractor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-REG can be filed online at <http://www.state.nj.us/treasury/revenue/busregcert.shtml>.

Before final payment is made under the contract, the contractor shall submit to the Contracting Agency a complete and accurate list of all subcontractors used and their addresses.

Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a business registration as required, or that provides false business registration information, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000, for each proof of business registration not properly provided under a contract with a contracting

agency.

8.6.11 Pay to Play Disclosure:

- A. The Contractor is advised of the responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC) pursuant to N.J.S.A. 19:44A-20.13 (P.L. 2005, c.271, s.3) if the Contractor receives contracts in excess of \$50,000 from public entities in a calendar year. It is the Contractor's responsibility to determine if filing is necessary. Additional information on this requirement is available from ELEC at 888-313-3532 or at www.elec.state.nj.us.
- B. In addition, pursuant to N.J.A.C. 6A:23A-6.3, no business entity which has made a reportable contribution (as defined in N.J.S.A. 19:44A-1 et seq.) to a member of the Board of Education during the preceding one (1) year shall be awarded a contract in excess of \$17,500.
- C. Any business entity doing business with the School District is precluded from making any reportable contributions to any member of the Board of Education during the term of the Contract.
- D. When a business entity is a natural person, a contribution by that person's spouse or child that resides therewith shall be deemed to be a contribution by the business entity. Where a business entity is other than a natural person, a contribution by the person or other business entity having an interest therein shall be deemed to be a contribution by the business entity.

8.6.12 Educational Facilities Construction & Financing Act:

- A. The Contractor acknowledges that this project is a School Facilities Project as defined in the Educational Facilities Construction and Financing Act, P.L. 2000 c.72, (N.J.S.A. 18A:7G-1 et seq.).
- B. The Board shall not enter into any contract for work on a School Facilities Project with any person or firm who has been debarred, suspended or disqualified from State or Federal government contracting. The Contracted Party, its subconsultants or subcontractor may be debarred, suspended or disqualified from contracting and/or working on the School Facilities Project if found to have committed any of the acts listed in N.J.A.C. 17:19-4.1 et seq. or any applicable regulation issued by the State agencies with jurisdiction over this Project. All bidders shall include the provisions of this paragraph B in all agreements with all subcontractors involved in this Project.
- C.

8.6.13 Access and Record Retention:

- A. The Contractor shall permit Owner, Architect, and Construction Manager employees and agents, and State agencies with jurisdiction over this Project to investigate, audit, examine and inspect all Work produced in relation to the Project and all records related to Project.
- B. The successful Contractor shall keep those records and accounts for the School Facilities Project as necessary in order to evidence compliance with the Educational Facilities Construction & Financing Act, P.L. 2000, c.72 (N.J.S.A. 18A:7G-1 et seq.) the Public School Contracts Law, N.J.S.A. 18A:18A-1 et seq., and all applicable regulations and requirements. Financial records, supporting documents, and all other records of the successful Contractor, which relate in any way to the School Facilities Project shall be retained for ten (10) years following closeout, provided however, if any litigation, claim or audit relating to the Schools Facilities Project is commenced prior to closeout, such records and documents shall be retained until all litigation, claims or audit findings involving the records have been fully resolved.
- C. Pursuant to N.J.A.C. 17:44-2.2 (see also N.J.S.A. 52:15C-14(d)), the Contractor shall maintain all documentation related to products, transactions or services under the Contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request. Where subsection 8.6.13.B requires a longer retention period for any records, subsection 8.6.13.B shall control.

8.6.14 Assignment/Subcontract:

- A. The Bidder to whom the contract is awarded (hereinafter referred to as “Contractor”) may not assign this contract to any person, partnership or corporation nor may it subcontract any part of the work required to be performed under the contract without obtaining the prior written approval of the Board.
- B. Any assignee or successor in interest to the contract who is approved by the Board shall be bound by the terms of this contract.
- C. Any subcontractor approved by the Board shall be bound by the terms of this contract.

8.6.15 Performance Evaluation:

The District shall continually monitor the Contractor’s performance to assure that time schedules are being met and that the completion of the School Facilities Project will occur in a timely, efficient and effective manner. In the event of noncompliance, including, but not limited to, default of any contracted party under any contract, or in the event of a breach of warranty with respect to any contract, the district shall reasonably exhaust the remedies against the defaulting contracted party and against each such surety for the performance of such contracts. The district shall diligently prosecute or defend any action or proceeding, or take any other action involving the contracted party, that the district deems reasonably necessary, or as recommended or required by any State agency with jurisdiction over this Project.

8.6.16 Quality Control:

During the term of this Project, the Contractor will have in place a suitable quality control and quality insurance program and an appropriate safety and health plan.

8.6.17 Debarment:

The Contractor represents and warrants that it is not included on the State Treasurer’s or the Federal Government’s List of Debarred, Suspended or Disqualified Bidders as a result of action taken by the State or Federal Agency. If awarded the contract, the Contractor acknowledges and agrees to insert into all contracts with all subcontractors and subconsultants a clause stating that the Contractor, its subcontractors or subconsultants may be debarred, suspended or disqualified from contracting and/or working on the School Facilities Project if found to have committed any of the acts listed in N.J.A.C. 17:19-4.1, et. seq. or any applicable regulation issued by any State agency with jurisdiction over this Project.

The Contractor shall immediately notify the Owner, in writing, in the event the Contractor or any subcontractor or subconsultant appears on the Treasury’s or the Federal Government’s List of Debarred, Suspended or Disqualified Bidders.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A132–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, as modified by the Owner.

§ 9.1.2 The General Conditions are, AIA Document A232–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as modified by the Owner, are incorporated herein and made a part hereof by reference.

§ 9.1.3 Bidding and Contract Requirements, included as part of the Project Manual are, incorporated herein and made a part hereof by reference.

§ 9.1.4 The Specifications:

- Provided to bidder during bidding process

- All specifications with the Bid Set Project Manual, dated December 21, 2022, for the New Addition/Alteration at the Bergen County Technical High School, Paramus Campus Book 1 of 2 and Book 2 of 2.
- All relevant provisions in the addenda listed in Section 9.1.6 herein.

§ 9.1.5 The Drawings:

- The bid set of Drawings have been provided to bidder during bidding process, together with any updated or amended drawings as provided in any Addendum listed in Section 9.6 herein.



§ 9.1.6 The Addenda, if any:

Number	Date	Pages
[Redacted]	[Redacted]	[Redacted]

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents are:

- Other documents, if any, listed below:
(List here any additional documents which are intended to form part of the Contract Documents. AIA Document A232–2019 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor’s bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)



ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Instruction to Bidders and General Conditions, AIA Document A232–2019.



This Agreement is entered into as of the day and year first written above and is executed in at least three original copies, of which one is to be delivered to the Contractor, one to the Architect for use in the administration of the Contract, and the remainder to the Owner.

OWNER *(Signature)*

Board Secretary/Business Administrator
(Printed name and title)

WITNESS *(Signature)*

CONTRACTOR *(Signature)*

(Printed name and title)

WITNESS *(Signature)*



SECTION 01026 - UNIT PRICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section “Modification Procedures” for submitting and handling Change Orders.
 - 2. Division 1 Section “Quality Control Services” for general inspection requirements.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if the estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus tcost for delivery, installation, insurance, overhead, profit and applicable taxes.
- B. Measurement and Payment: Refer to the Bid Proposal Form for the Unit Price Schedule for the establishment of unit prices.
- C. The Owner reserves the right to reject the Contractor’s measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner’s expense, by an independent surveyor acceptable to the Contractor.
- D. Schedule: A “Unit Price Schedule” is included in the Form of Proposal. Specification Sections referenced in the Schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 UNIT PRICES

- A. Unit prices include labor, materials, tools, equipment, supervision, insurance, bonds, overhead, profit, clean up, disposal and all costs associated with the work.
- B. Unit prices apply during the performance of the contract.

- C. Unit prices apply to net changes in quantities.
- D. Unit prices for ADDS AND DEDUCTS SHALL BE EQUAL.

3.2 SCHEDULE OF UNIT PRICES

- A. Unit Price No. GC-1: Trucking and Disposal of Historic Fill.
 - 1. Description: Cost for transport and disposal of soils classified as Historical Fill above or below the quantities required by the contract scope of work.
Unit of Measurement: **Tons** of soil transported and disposed, based on in-place surveys of volume before and after removal.
- B. Unit Price No. GC-2: Excavation and Loading of Soils
 - 1. Description: Excavation and loading of soils above or below the quantities required by the contract scope of work.
Unit of Measurement: **Cubic Yardage** of soil excavated and loaded.
- C. Unit Price No. GC-3: Import of Structural Fill Material.
 - 1. Description: Import of satisfactory structural fill material above or below the quantities required by the contract scope of work.
Unit of Measurement: **Tons** of imported structural fill material.
- D. Unit Price No. GC-4: Backfill and Compaction of Structural Fill Material.
 - 1. Description: Placement and compaction of satisfactory structural fill material for backfilling operations above or below the quantities required by the contract scope of work.
 - 2. Unit of Measurement: Cubic yards of material backfilled and compacted.
- E. Unit Price No. GC-5: Ton of Steel Fabricated and Installed.
 - 1. Description: Fabrication and installation of approved steel.
Unit of Measurement: Same as allowance per **Ton**.

END OF SECTION 01026

SECTION 07220 ROOF INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes information for the installation of the flat and tapered rigid polyisocyanurate insulation system, and roof recovery board, over the properly prepared metal and concrete roof deck for the specified Modified Bituminous Membrane Roof System.
- B. The Contractor shall provide all labor, equipment and materials to install the specified tapered and flat rigid polyisocyanurate roof insulation over the properly prepared metal roof decks. The base layers of insulation shall be mechanically fastened to the metal roof deck in accordance with the project specification, and the subsequent layers shall be installed in a full mopping of the specified asphalt bitumen. On top of the polyisocyanurate insulation, a fiber-reinforced gypsum substrate recovery board shall be installed in a full mopping of the specified hot asphalt bitumen.
- C. The Contractor shall repair the existing concrete deck where necessary in accordance with the project specification prior to installing the hot applied vapor barrier directly over the concrete substrate **(Gantner Ave School)**.
- D. The Contractor shall prime the existing properly prepared concrete roof deck substrate in accordance with the project specification prior to installing the hot applied vapor barrier directly to the concrete deck **(Gantner Ave School)**.
- E. The Contractor shall install the specified rigid polyisocyanurate roof insulation system over the properly prepared and installed vapor barrier and adhere in hot moppings of the specified hot bitumen in accordance with the project specifications. On top of the polyisocyanurate insulation, a fiber-reinforced gypsum substrate recovery board shall be installed in a full mopping of the specified hot asphalt bitumen in accordance with the project specifications **(Gantner Ave School)**.
- F. Install specified tapered crickets between all drains, and as required to provide complete positive drainage per project drawings.
- G. Install specified tapered crickets/saddles at all roof top equipment.
- H. Install specified tapered sumps at all drains. **No drains will be accepted without tapered sumps. Verify that drain bowl assemblies are set at proper height.**
- I. Smooth any build up of materials along the insulation to prevent air pockets. Shave, trim and grind down any irregularities to make all new insulation fit properly.

1.3 RELATED SECTIONS

- A. Division 6 Section "Rough Carpentry" for wood nailers, cants, curbs, and blocking and for wood-based, structural-use roof deck panels and walls.
- B. Division 7 Section "Modified Bituminous Membrane Roofing – Hot/Torch Applied"
- C. Division 7 Section "Modified Bituminous Membrane Roofing – Hot/Cold Applied (Alternate)"
- D. Division 7 Section "Sheet Metal Flashing and Trim"

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C-1289, Specification for Faced Rigid Polyisocyanurate Thermal Insulation
 - 2. ASTM D-312-00, Specification for Asphalt Used in Roofing.
 - 3. ASTM D-1863, Specification for Mineral Aggregate Used on Built-Up Roofs.
 - 4. ASTM D-2178, Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing.
 - 5. ASTM D-4601, Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
 - 6. ASTM D-5147, Sampling and Testing Modified Bituminous Sheet Material.
 - 7. ASTM E108-00, Test Methods for Fire Test of Roof Coverings.
- B. Cast Iron Soil Pipe Institute, Washington, D.C. (CISPI)
- C. National Roofing Contractors Association (NRCA):
 - 1. Roofing and Waterproofing Manual.
- D. Underwriters Laboratories, Inc. (UL):
 - 1. Fire Hazard Classifications.
- E. Warnock Hersey (WH):
 - 1. Fire Hazard Classifications.
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- G. Steel Deck Institute, St. Louis, Missouri (SDI)
- H. Southern Pine Inspection Bureau, Pensacola, Florida (SPIB)
- I. Insulation Board, Polyisocyanurate (FS HH-I-1972)
- J. Insulation Board, Thermal (Fiberboard) (FS LLL-1-535B)

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's specification data sheets for each product in accordance with this specification.
- B. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- C. Provide a sample of each insulation type.
- D. Shop Drawings

1. Submit four (4) copies of manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, flat insulation system, sequence of installation, layout, drain locations, gutter location, sumps, roof slopes, thicknesses, tapered crickets and saddles.
2. Shop drawing shall include: Outline of roof, location of drains, gutter location, sumps, complete board layout of tapered insulation components, thickness and the minimum and average "R" value for the completed insulation system.

E. Certification

1. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's Edge-to-Edge Roof system warranty.

1.6 QUALITY ASSURANCE

- A. Certify that roof system furnished is approved by an approved third party testing facility in accordance with ASTM E108, Class A (1/4" per foot slope roof areas) for external fire and meets local or nationally recognized building codes.
- B. Certify that the roof system is adhered properly to meet or exceed the specific project wind uplift requirements listed in Section 1.16 "Design and Performance Criteria" of Division 7 Section "Modified Bituminous Membrane Roofing – Hot/Cold Applied".
- C. Pre-installation Meeting: Refer to Division 7 Section Modified Bituminous Membrane Roofing – Hot/Cold Applied specifications for pre-installation meeting requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
- D. In accordance with the manufacturer's recommendations, immediately remove the plastic wrapping on the recovery boards and cover with a watertight, ventilated enclosure (i.e. tarpaulins). Prevent the formation of condensation on the boards.
- E. Store materials off the ground and roof surfaces. Any warped, broken or wet insulation boards shall be removed from the site.
- F. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- G. Asphalt Heating: **Open kettle are not permitted on this project.** The contractor is to use an asphalt roofing kettle equipped with a fume recovery system (FRS). The fume recovery system is to be connected to the asphalt kettle and capable of burning, and/or filtering fumes

minimizing emissions of asphalt fumes and odor. The Contractor is responsible to change the FRS filters at frequent intervals to maintain the effectiveness of the equipment. The filter media shall be as recommended by the FRS equipment manufacturer. The contractor is responsible for maintaining a record on the maintenance of his equipment and filter changes in the event claims are presented by the Owner, adjacent property owners of the Department of Environmental Protection (DEP). Failure by the contractor to maintain his equipment and to produce records of maintenance, which results in a shutdown of the project, may result in claims against the contractor.

- H. It is the responsibility of the contractor to secure all material and equipment on the job site. If any material or equipment is stored on the roof, the contractor must make sure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the contractor will be the sole responsibility of the contractor and will be repaired or replaced at his expense.

PART 2 - PRODUCTS

2.1 APPROVED EQUIVALENT

- A. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- B. Contractor must submit any product not specified to Architect in order for product to be considered for approval. The Architect will notify Contractor in writing of decision to accept or reject request.
- C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 1 provisions.
 - 1. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
 - 2. The Architect's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2 INSULATION MATERIALS

- A. Thermal Insulation Properties and Approved Insulation Boards.

- 1. Rigid Flat Polyisocyanurate Roof Insulation (**ALL ROOF AREAS U.N.O**); ASTM C-1289:

Qualities:	Flat rigid closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
Board Size:	Four feet by four feet (4' x 4') or four feet by eight feet (4' x 8')
Compressive Strength:	20 psi
Thickness:	5.5" (1 layer of 3" + 1 layer of 2.5" thickness)

R-Value: Minimum of 31.8 (5.5" thickness)

Source of Supply: Versicore MP-H; Versico, Inc.
H-Shield; Hunter Panels
Approved Equivalent

Insulation board shall meet the following requirements:
UL, WH or FM listed under Roofing Systems
Federal Specification HH-I-1972, Class 1

2. Tapered Polyisocyanurate Roof Insulation; ASTM C-1289: (**Gantner Ave School**)

Qualities: Factory Tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.

Thickness: Minimum 5.2" @ edge of drain sump (3" @ drain bowl)

Compressive Strength: Minimum 20 psi

Tapered Slope: 1/4": 1' (Four (4) way design)

Source of Supply: Tapered H-Shield; Hutter Panels
Tapered E'NRG'Y-3; Johns Manville
EnergyGuard; GAF
Approved Equivalent

Insulation board shall meet the following requirements:
UL, WH or FM listed under Roofing Systems
Federal Specification HH-I-1972, Class 1

3. Non-structural, water-resistant, fiber-reinforced gypsum substrate recovery board:

Qualities: Non-structural, water-resistant, fiber-reinforced gypsum roof board

Board Size: Four feet by four feet (4' x 4')

Thickness: One-Half (1/2) inch

R-Value: 0.50

Source: Securock by United States Gypsum Company (USG)

Insulation board shall meet the following requirements:
UL, WH, FM listed under Roofing Systems.
Federal Specification LLL-I-535-B.

2.3 RELATED MATERIALS

A. Rigid Cant and Tapered Edge Strips: Preformed rigid organic insulation units of sizes/shapes indicated as per the approved manufacturer.

1. Acceptable Manufacturers:

Johns Manville
GAF
Approved Equivalent

- B. Crickets: Shall be fabricated from tapered polyisocyanurate insulation and shall ensure complete drainage of the roof system.
 - 1. **Shall be fabricated from ½":1' tapered polyisocyanurate and shall be sized at a 2:1 ratio in length to width.**
- C. Sumps: Shall be fabricated from tapered polyisocyanurate insulation and shall ensure complete drainage of the roof system.
 - 1. **Shall be fabricated from ½":1' tapered polyisocyanurate and be 8' x 8' in size.**
- D. Asphalt Primer: V.O.C. compliant, ASTM D41.
- E. Metal Roof Deck Fasteners:
 - 1. OMG Standard corrosion resistant roofing screw fastener with Senti coating as recommended by roof membrane manufacturer.
 - 2. Approved fasteners with three (3) inch coated disc to meet or exceed the specific project wind uplift requirements listed in Section 1.16 "Design and Performance Criteria" of Division 7 Section "Modified Bituminous Membrane Roofing – Hot/Cold Applied". Length as required to penetrate roof deck per the screw manufacturers recommendation or one (1) inch if not listed.
- F. Asphalt: ASTM D-312, Type IV Special Steep Asphalt.
- G. Roof Board Joint Tape: Six (6) inches wide glass fiber mat with adhesive compatible with insulation board facers.

PART 3 - EXECUTION

3.1 INSPECTION OF SURFACES

- A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
 - 1. Verify that deck surfaces and project conditions are ready to receive work of this section.
 - 2. Verify that deck is supported and secured to structural members.
 - 3. Verify that new insert drain assemblies are installed and set at proper height to permit a slope of ½" per foot within the sump. **Raise drains to the proper height above the roof deck to allow for the proper slope within the tapered insulation sump.** The sump shall be an eight (8) foot square sump unless required to be larger to accommodate drainage around equipment.
 - 4. Verify that work which penetrates roof deck has been completed.
 - 5. Verify that wood nailers are properly and securely installed.

6. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
7. Verify that existing wood blocking and nailers that are of the size and type specified to be used are sound and not rotted or deteriorated, and properly attached to the structure. Replace deteriorated wood with new wood of like kind, size and configuration per the project details and specifications.
8. Verify that deck surfaces are dry, free of snow or ice, not rotten or deteriorated, do not have bacterial growth and are structurally sound. Replace decking that is wet, deteriorated, has bacterial growth or is not structurally sound in like kind to match existing.
9. Do not proceed until defects are corrected.
10. Do not apply insulation until substrate is dry. Confirm that moisture content of the wood blocking and nailers does not exceed twelve (12) percent by moisture meter tests.
11. The surface must be thoroughly cleaned immediately prior to application using compressed air, vacuum equipment or hand/power brooms to remove dust, loose dirt or debris.
12. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
13. As required, verify that temporary roof has been completed.
14. Contractor is responsible to verify existing substrate and substrate is sloped, and or level and plumb, as stated in/on the project documents prior to installation of insulation system. All defects in roof pitch to be accommodated with tapered insulation to insure a positive pitch to all roof drains.

3.2 PREPARATION – MODIFIED BITUMEN HOT APPLIED VAPOR BARRIER OVER CONCRETE DECK (**Gantner Ave School**).

- A. Clean roof deck of all dust and debris.
- B. Prime existing concrete roof deck with specified asphalt primer.
- C. Install modified bitumen vapor barrier over the primed BUR membrane in hot asphalt at a rate of 30 lbs per square.

3.3 INSTALLATION

A. Installation of Insulation Stops (**ROOF AREA G**):

1. Install the specified insulation stops per the project specifications and documents on the higher sloped roof area (**ROOF AREA G**). Install wood nailers/insulation stops of the same thickness equal to the thickness of the insulation system and recovery board perpendicular to the roof slope at the ridge, eave and every twelve (12) feet on center (maximum) between. Wood nailers should be at least 3 ½" wide and properly secure to the underlying support structure with approved screws at an approved spacing to resist 200 pounds per linear foot, with a maximum spacing of 12" on center

B. Mechanical Attachment of Polyisocyanurate Insulation to Metal Roof Decks (**ALL ROOF AREAS U.N.O.**):

1. Approved tapered polyisocyanurate insulation shall be installed in continuous straight lines perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together. Boards shall be fully attached to the deck with an approved

mechanical fastening system. As a minimum, the number of fasteners shall be in accordance with the following:

- Six (6) fasteners per 4' x 4' board in Zone 1 (field of roof)
- Nine (9) fasteners per 4' x 4' board in Zone 2 (perimeter of roof)
- Twelve (12) fasteners per 4' x 4' board in Zone 3 (corners of roof)

Zones 2 & 3 must extend onto the roof area a minimum distance equal to 8 feet.

2. Filler pieces of polyisocyanurate insulation boards require at least two fasteners per piece if size of insulation is less than four square feet.
 3. Placement of any fastener from edge of polyisocyanurate insulation boards shall be a minimum of three inches, and a maximum of six (6) inches.
 4. Minimum penetration into deck shall be as recommended by the fastener manufacturer. There is a one (1) inch for metal roof decks where not specified by the manufacturer.
- C. Fully Adhered Polyisocyanurate Insulation to Vapor Barrier with Hot Asphalt Bitumen **(Gantner Ave School)**
1. The surface must be thoroughly cleaned using compressed air, vacuum equipment or hand/power brooms to remove dust, loose dirt or debris.
 2. Embed all layers of flat and tapered polyisocyanurate insulation boards in full moppings of hot asphalt at the rate and temperature recommended by insulation manufacturer, but at a minimum of 33 pounds per square. Stagger all joints of boards so all open joints will be eliminated. Walk in each piece of insulation and leave boards completely adhered to the installed polyisocyanurate insulation board. Each insulation board shall be butt firmly against adjoining panels. All open joints shall be eliminated.
- D. Fully Adhered Polyisocyanurate Insulation over Polyisocyanurate Insulation with Hot Asphalt Bitumen **(ALL ROOF AREAS U.N.O.):**
1. Embed additional layers of polyisocyanurate insulation boards in full moppings of hot asphalt at the rate and temperature recommended by insulation manufacturer, but at a minimum of 33 pounds per square. Stagger all joints of boards so all open joints will be eliminated. Walk in each piece of insulation and leave boards completely adhered to the installed polyisocyanurate insulation board. Each insulation board shall be butt firmly against adjoining panels. All open joints shall be eliminated.
- E. Recovery Board Attachment with Hot Asphalt Bitumen **(ALL ROOF AREAS U.N.O.):**
1. The surface must be thoroughly cleaned using compressed air, vacuum equipment or hand/power brooms to remove dust, loose dirt or debris.
 2. Approved recovery board one-half ($\frac{1}{2}$) inch thickness shall be installed over rigid polyisocyanurate insulation system for the modified bitumen membrane roof system using a full mopping of hot asphalt at the rate of approximately thirty three (33) pounds per square.
- F. General Installation Requirements.

1. Approved insulation shall be sumped and tapered around all roof drains. Tapered insulation sump shall start with a thickness required to achieve $\frac{1}{2}$ " per foot slope for the specified minimum dimension four (4) feet from the center line of the drain for an eight (8) foot square sumps. Install tapered insulation sump in such a way to provide proper slope for runoff. Shape insulation with tool as required so completed surface is smooth and flush with ring of drain. Under no circumstances will the membrane be left unsupported in an area greater than one quarter ($\frac{1}{4}$) inch. Install recovery board over tapered insulation sump as required.
2. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter ($\frac{1}{4}$) inch away from the vertical surface.
3. Install no more insulation at one time than can be roofed on the same day.
4. Install temporary water cut-offs at completion of each day's work and remove upon resumption of work. Install an envelope water stop at the edge of insulation to prevent water infiltration into new insulation/roof system.
5. Cant Strips/Tapered Edge Strips: Install preformed forty five (45) degree perlite cant strips at junctures of vertical surfaces in hot asphalt bitumen. Provide preformed organic tapered edge strips at perimeter of edges of roof that do not terminate at vertical surfaces and/or indicated on the drawings. The wall/cant juncture will be examined for air passage. If airflow is present, joint between cant and wall will be sealed with closed cell joint backing and joint sealant.

3.3 CLEANING

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

END OF SECTION 07 22 00

SECTION 07520 MODIFIED BITUMINOUS MEMBRANE ROOFING – HOT/TORCH APPLIED

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

1.2 SUMMARY

- A. Hot/Torch applied asphalt modified bituminous membrane roofing over prepared substrate and insulation system.
 - 1. Prepare the substrate for the installation of the roof insulation system and modified bituminous membrane roof system.
 - 2. Install the specified roof insulation system and roof recovery board in accordance with Division 7 Section “Roof Insulation”
 - 3. Adhere one (1) ply of the specified field base roofing ply in the hot asphalt bitumen over the recovery board.
 - 4. Adhere one (1) ply of the specified base flashing ply in the hot asphalt bitumen.
 - 5. Adhere one (1) ply of the specified mineral modified asphalt reinforced membrane roofing ply via torch methods.
 - 6. Install one (1) ply modified mineral asphalt membrane top flashing ply via torch methods.
 - 7. Apply specified aluminum coating system to the entire roof area and flashings.

1.3 SECTION INCLUDES

- A. This portion of the specification sets forth the general requirements and describes materials and workmanship for installing the modified bituminous membrane roof system over prepared substrates.
- B. Roofing contractor shall furnish and install all materials described herein unless specifically noted otherwise.
- C. This section is for work on all roofs except where indicated on the drawings as otherwise.

1.4 RELATED SECTIONS

- A. Division 6 Section “Rough Carpentry” for wood nailers, cants, curbs, and blocking and for wood-based, structural-use roof deck panels.
- B. Division 7 Section “Roof Insulation”
- C. Division 7 Section “Sheet Metal Flashing and Trim”
- D. Division 7 Section “Modified Bituminous Roofing - Hot/Cold Applied (Alternate)”

1.5 REFERENCES

- A. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7-10, Minimum Design Loads for Buildings and Other Structures.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D41, Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.

2. ASTM D312, Specification for Asphalt Used in Roofing.
 3. ASTM D451, Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
 4. ASTM D1079, Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
 5. ASTM D1863, Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
 6. ASTM D2178, Specification for Asphalt Glass Felt Used as a Protective Coating for Roofing.
 7. ASTM D2822, Specification for Asphalt Roof Cement.
 8. ASTM D2824, Specification for Aluminum-Pigmented Asphalt Roof Coating.
 9. ASTM D4601, Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
 10. ASTM D5147, Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
 11. ASTM D6162, Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
 12. ASTM D6163, Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
 13. ASTM E108, Test Methods for Fire Test of Roof Coverings.
- C. Factory Mutual Research (FM):
1. Roof Assembly Classifications.
- D. National Roofing Contractors Association (NRCA):
1. Roofing and Waterproofing Manual.
- E. Underwriters Laboratories, Inc. (UL):
1. Fire Hazard Classifications.
- F. Warnock Hersey (WH):
1. Fire Hazard Classifications.

1.6 SYSTEM DESCRIPTION

- A. It is the intent of this specification to install a long-term, quality roof system that meets or exceeds all current NRCA guidelines as stated in the most recent edition of the NRCA Roofing and Waterproofing Manual. Please discuss any concerns with the Architect and Roofing System Manufacturer.

1.7 DISCLOSURE OF MATERIALS AND SUBSTITUTIONS

- A. The materials outlined herein are the type of materials that should be used in this project. When a particular make or trade name is specified, it shall be indicative of the minimum standard required.
- i. If an alternate material is bid, the material must be equal or exceed the specifications, and submitted by the bidding Roofing Contractor to the Architect for approval and include the following:
1. Written application with explanation of why it should be considered.
 2. Material product data sheets.

3. A certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those materials denoted as pre-approved systems or the characteristics noted in the material specification section, including but not limited to the following:
 - a. Modified roofing membrane(s) and flashings substantiating Flexibility, Tensile Strength and Tear Strength. Test results must be dated, notarized and be on testing laboratory stationary. Testing for SBS membrane must follow standard ASTM D 5147 test methods. Testing shall be performed at 77°F. Tests at 0°F shall not be considered.
4. The manufacturer must also have current ISO 9001:2008 certification for the manufacturing of the products to be utilized on this project.
5. The materials installed for the waterproofing membrane must be guaranteed by the material supplier.
6. A sample warranty by the manufacturer of the modified bitumen membrane roofing system. The manufacturer must be the organization that guarantees the modified roofing membrane, pre-manufactured metal edge system and pre-manufactured metal coping cap system.
7. All products must be in accordance with the Health, Safety and Environmental Control (H, S & E) Regulations, e.g., No asbestos materials, no harmful solvent release materials, etc.
8. In making a request for submission, Bidder/Contractor represents:
 - a. He/she has personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
 - b. He/she will provide the same guarantee for substitution as for the product and method specified.
 - c. He/she will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
 - d. He/she waives all claims for additional cost related to substitution, which consequently become apparent.
 - e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.
 - f. He will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitute.
- ii. The Architect reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
- iii. Alternate material submissions shall be sent to the Architect by the bidding Roofing Contractor. Only substitutes approved in writing by the Architect will be considered.

1.8 SUBMITTALS

- A. Submit under provisions of Contract Documents, Division 1 requirements and this section.
- B. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- C. Samples: Submit two (2) samples of each product specified.
- D. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- E. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A (1/4" per foot slope roof areas) for external fire and meets local or nationally recognized building codes.
- F. Manufacturer's Wind Uplift Certificate: The manufacturer supplying the warranty of the modified bitumen membrane must provide certification that the proposed roof system will be secured properly to the structure to meet or exceed the specific project wind uplift requirements per Section 1.16 Design and Performance Criteria.
- G. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001:2008 compliance certificate.
- H. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77°F. Tests at 0°F will not be considered.
- I. Submit a copy of an unexecuted manufacturer's warranty for review.
- J. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- K. Provide a sample of each insulation type.
- L. Shop Drawings:
 - 1. Submit four (4) copies of manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, gutter location, sumps, roof slopes, thicknesses, tapered crickets and saddles.
 - 2. Shop drawing shall include: Outline of roof, location of drains, location of gutter, sumps, complete board layout of tapered insulation components, thickness and the minimum and average "R" value for the completed insulation system.
- M. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-10, Method 2 for Components and Cladding, prepared by an engineer employed by the system manufacturer. In no case, shall the design loads be taken to be less than those detailed in article 1.16 of this specification.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 12 years documented experience and has ISO 9001:2008 certification.
- B. Manufacturer: The manufacturer must also have current ISO 9001:2008 certification for the manufacturing of the products to be utilized on this project.
- C. Installer: Company specializing in modified bituminous roofing installation with a minimum 5-years' experience and certified by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work and at any time roofing work is in progress. Maintain proper supervision of workmen. Maintain a copy of the specifications in the possession of the Supervisor/Foremen and on the roof at all times.
 - 1. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
 - 1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F. Immediately correct roof leakage during construction. If the Contractor does not respond within twenty-four (24) hours, the Owner has the right to hire a qualified contractor and back charge the original contractor.
- G. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.10 PRE-INSTALLATION CONFERENCE

- A. Pre-Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing which must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities.
- C. Objectives of conference to include:
 - 1. Review foreseeable methods and procedures related to roofing work.
 - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.

3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 4. Review roofing system requirements (drawings, specifications and other contract documents).
 5. Review required submittals both completed and yet to be completed.
 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 7. Review required inspection, testing, certifying and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 10. Review notification procedures for weather or non-working days.
- D. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
- E. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved the satisfaction of the Owner and Architect. This shall not be construed as interference with the progress of Work on the part of the Owner or Architect.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. In accordance with the manufacturer's recommendations, immediately remove the plastic wrapping on the recovery boards and cover with a watertight, ventilated enclosure (i.e. tarpaulins). Prevent the formation of condensation on the boards.
- D. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- E. It is the responsibility of the contractor to secure all material and equipment on the job site. If any material or equipment is stored on the roof, the contractor must make sure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the contractor will be the sole responsibility of the contractor and will be repaired or replaced at his expense.
- F. Asphalt Heating: **Open kettle are not permitted on this project.** The contractor is to use an asphalt roofing kettle equipped with a fume recovery system (FRS). The fume recovery system is to be connected to the asphalt kettle and capable of burning, and/or filtering fumes

minimizing emissions of asphalt fumes and odor. The Contractor is responsible to change the FRS filters at frequent intervals to maintain the effectiveness of the equipment. The filter media shall be as recommended by the FRS equipment manufacturer. The contractor is responsible for maintaining a record on the maintenance of his equipment and filter changes in the event claims are presented by the Owner, adjacent property owners of the Department of Environmental Protection (DEP). Failure by the contractor to maintain his equipment and to produce records of maintenance, which results in a shutdown of the project, may result in claims against the contractor.

1.12 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the roofing system manufacturer will provide the following:
 - 1. Keep the Architect informed as to the progress and quality of the work as observed.
 - 2. Provide job site inspections a minimum of three (3) days a week with reports to the Architect.
 - 3. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.13 PROJECT CONDITIONS

- A. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.14 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other sections to ensure that roof assemblies including roof accessories, flashing, trim and joint sealers are protected against damage from effects of weather, corrosion and adjacent construction activity.
- B. Fully complete the installation of insulation system and base roofing ply assembly, and/or the installation of the modified bituminous membrane roof ply each day. Phase construction between the base roofing ply and modified membrane roof ply (top ply) is acceptable.

1.15 WARRANTY

- A. Upon completion of installation, and acceptance by the Owner and Architect, the manufacturer will supply to the Owner a single-source, thirty (30) year Edge-to-Edge No Dollar Limited (NDL) Warranty covering the roof system. Warranty shall include the modified bitumen roof system, pre-manufactured metal edge fascia system, pre-manufactured metal coping cap system, flashings, and the transition between all systems, and shall be an Edge-to-Edge roof warranty provided by one manufacturer.
- B. Installer will submit a minimum of a three (3) year warranty to the membrane manufacturer

with a copy directly to Owner.

- C. At the request of the Owner, the manufacturer will provide an annual inspection of the roof. These inspection requests can occur for the life of the warranty.

1.16 DESIGN AND PERFORMANCE CRITERIA

A. Uniform Wind Uplift Load Capacity

- 1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
 - a. Design Code: ASCE 7-16, Method 2 for Components and Cladding.
 - b. Category III Building with an Importance Factor of 1.
 - c. Wind Speed: 127 mph
 - d. Exposure Category: C
 - e. Roof Height: 20 feet
 - f. Roof Pitch: 1/4 inches per foot
 - g. Topographic Factor: 1.0

<u>Roof Areas</u>	<u>Design Uplift Pressure:</u>
Zone 1 - Field of roof	42.7 psf
Zone 2 - Perimeter	54.1 psf
Zone 3 - Corners	71.2 psf

Zones 2 & 3 must extend onto the roof area a minimum width of 8 feet.

1.17 SITE CONDITIONS

- A. Field measurements and material quantities:
 - 1. Contractor shall have SOLE responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect work.
- B. Existing Conditions:
 - 1. Building space directly under roof area covered by this specification will be utilized by on-going operations. Do not interrupt Owner operations unless prior written approval is received from Owner.
- C. Waste Disposal:

1. Do not re-use, re-cycle or dispose of materials except in accordance with all applicable regulations. The use of products is responsible for proper use and disposal of product containers.
- D. Safety Requirements:
1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.
 2. Comply with federal, state, local and Owner fire and safety requirements.
 3. Advise Owner whenever work is expected to be hazardous to Owner, employees, and/or operators.
 4. Maintain a crewman as a floor area guard whenever roof decking is being repaired or replaced.
 5. Maintain fire extinguisher within easy access whenever power tools, roofing kettles, fuels, solvents, torches and open flames are being used.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. When a particular trade name or performance standard is specified, it shall be indicative of the minimum standard required. Product names for the materials used in this section shall be based on performance characteristics of the modified bitumen roof system manufactured by The Garland Company, Cleveland, OH, (908) 812-6971) and shall form the basis of the contract documents.
- B. This specification is based on the performance characteristics of the system identified herein. Any proposed alternate systems, specified or not, must meet or exceed the following listed characteristics and be submitted for approval. Additionally, all Warranty Criteria (Section 1.15) and Design and Performance Criteria (Section 1.16) must be met and submitted as well as all items listed in the Disclosure of Materials and Substitutions (Section 1.7).
- C. Any item or materials submitted as a substitution to the basis of design manufacturer specified, must be submitted by the bidding Contractor and must comply in all respects as to the quality and performance of the brand name specified. The Architect shall be the sole judge as to whether or not an item submitted as a substitute is truly equal. Should the Contractor choose to submit a substitute product, he shall assume all monetary or other risk involved, should the Architect find the substitution unacceptable.
- D. Provide primary products, including each type of roofing membrane, base roofing ply, base flashing ply, modified membrane flashing ply, modified membrane roof ply, roof coating and miscellaneous flashing materials from a single source roof manufacturer. Provide secondary products (insulation, mechanical fasteners, etc.) only as recommended by the roof manufacturer of primary products for use with the roof system specified.
- E. The following manufacturers are acceptable, providing they meet these specifications and the minimum standards stated.
 - a. The Garland Company, Inc. (Basis of Design)
 - b. Approved Equal

2.2 DESCRIPTION

MODIFIED BITUMINOUS
MEMBRANE ROOFING – HOT/TORCH APPLIED

PROJECT #4132

07520 - 9
DECEMBER 20, 2023
ADDENDUM NO. 1 JANUARY 5, 2024

- A. Modified bituminous roofing work including but not limited to:
1. Install the specified roof insulation system in accordance with Division 7 Section 07 22 00.
 2. Base Roofing Ply: FLEXBASE 80 **(All Roof Areas U.N.O.)**; One (1) ply of an 80 mil SBS (Styrene-Butadiene-Styrene) fiberglass reinforced modified membrane base roofing ply bonded to the prepared substrate with specified asphalt bitumen.
 3. Hot Bitumen **(All Roof Areas U.N.O.)**: ASTM D312, Type IV special steep asphalt having the following characteristics:
 - a. Softening Point 210°F - 225°F
 - b. Flash Point 500°F
 - c. Penetration @ 77°F 15-25 units
 - d. Ductility @ 77°F 1.5 cm
 4. Base Flashing Ply: TRI-BASE PREMIUM SHEET or approved equal; One (1) ply of a 60 mil SBS (Styrene-Butadiene-Styrene) double-coated Polyester-Fiberglass-Polyester base flashing ply sheet set in specified bitumen adhesive.
 5. Modified Membrane Roofing Ply: STRESSPLY IV PLUS MINERAL **(All Roof Areas U.N.O.)**; One (1) ply of 195 mil thick SBS (Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane with a dual polyester/fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed.
 6. Modified Membrane Flashing Ply: STRESSPLY IV PLUS MINERAL **(All Roof Areas U.N.O.)**; One (1) ply of 195 mil thick SBS (Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane with a fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed.
 7. Roof Coating: SILVER-SHIELD or approved equal; A high solids, fibrated aluminum roof coating system applied to the entire roof area including the exposed flashings **(All Roof Areas U.N.O.)**.

2.3 BITUMINOUS MATERIALS

- A. Asphalt Primer: V.O.C. compliant, ASTM D41. GARLA-PRIME or approved equal
- B. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D2822, Type II.
- C. Base Roofing & Flashing Ply Adhesive: ASTM D312, Type IV Special Steep Asphalt.
- E. Modified Membrane Flashing Adhesive: FLASHING BOND or approved equal
- F. Aluminized Asphalt Roofing Mastic for Vertical Seams of Flashings: SILVER-FLASH or approved equal
- G. Elastomeric Asphaltic Sealant: GARLA-FLEX SEALANT or approved equal.

2.4 SHEET MATERIALS

- A. Hot Applied Vapor Barrier (**Gantner Ave School**); STRESSBASE 80 or approved equal.
1. STRESSBASE 80: ASTM D6163, Type II; A 80 mil SBS modified membrane with fiberglass mat reinforcement with the following minimum performance requirements according to ASTM D5147.

Properties (Finished Membrane):

Tensile Strength (ASTM D5147)

2 in/min. @73.4 +/- 3.6°F MD 50 lbf/in XD 50 lbf/in

Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 90 lbf XD 90 lbf

Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 3.0% XD 3.0%

Thickness

80 mils

- B. Base Roofing Ply: FLEXBASE 80 (**ALL ROOF AREAS U.N.O.**)

1. FLEXBASE 80: ASTM D6163, Type III; A 80 mil SBS modified membrane with woven fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM D5147.

Properties (Finished Membrane):

Tensile Strength (ASTM D5147)

2 in/min. @73.4 +/- 3.6°F MD 225 lbf/in CMD 225 lbf/in

Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 300 lbf CMD 300 lbf

Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 4.0% CMD 4.0%

Low Temperature Flexibility (ASTM D5147):

Passes -30°F

Recycled Content

15% Post-Consumer

Thickness

80 mils

- C. Base Flashing Ply: TRI-BASE PREMIUM SHEET or approved equal

1. TRI-BASE PREMIUM SHEET: Double coated Polyester-Fiberglass-Polyester scrim with the following minimum performance requirements according to ASTM D5147.

Properties (Finished Membrane):

Tensile Strength (ASTM D5147)

2 in/min. @73.4 +/- 3.6°F MD 315 lbf/in CMD 315 lbf/in

Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 550 lbf CMD 550 lbf

Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 5.0% CMD 6.0%

Low Temperature Flexibility (ASTM D5147):

Passes -10°F

Pliability (ASTM D146)	Pass
Mass of Desaturated Polyester/Glass Mat (ASTM D146)	4.0 lb./100 sq. ft.
Surfacing and Stabilizer (ASTM D4601)	Max 50%
Asphalt (ASTM D226)	15 lb./100 sq. ft.
Thickness	60 mils

D. Modified Membrane Roofing Ply (Torch Applied): STRESSPLY IV PLUS MINERAL or approved equal (**ALL ROOF AREAS U.N.O.**)

1. STRESSPLY IV PLUS MINERAL: 195 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane with a dual polyester/fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed. The membrane has the following minimum performance characteristics according to ASTM D 6162 Type III Grade G

Tensile Strength (ASTM D-5147) 2 in/min. @ 73.4 ± 3.6°F	MD 310 lbf/in	XD 310 lbf/in
Tear Strength (ASTM D-5147) 2 in/min. @ 73.4 ± 3.6°F	MD 510 lbf	XD 510 lbf
Elongation at Maximum Tensile (ASTM D-5147) 2 in/min. @ 73.4 ± 3.6°F	MD 9.0%	XD 8.0%
Low Temperature Flexibility (ASTM D-5147)	Passes -40°F (-40°C)	
Thickness :	195 mils	

E. Modified Membrane Flashing Ply (Torch Applied): STRESSPLY IV PLUS MINERAL or approved equal (**ALL ROOF AREAS U.N.O.**)

1. STRESSPLY IV PLUS MINERAL: 195 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane with a dual polyester/fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed. The membrane has the following minimum performance characteristics according to ASTM D 6162 Type III Grade G

Tensile Strength (ASTM D-5147) 2 in/min. @ 73.4 ± 3.6°F	MD 310 lbf/in	XD 310 lbf/in
Tear Strength (ASTM D-5147) 2 in/min. @ 73.4 ± 3.6°F	MD 510 lbf	XD 510 lbf
Elongation at Maximum Tensile (ASTM D-5147) 2 in/min. @ 73.4 ± 3.6°F	MD 9.0%	XD 8.0%
Low Temperature Flexibility (ASTM D-5147)	Passes -40°F (-40°C)	
Thickness :	195 mils	

- E. Reinforcing Mesh for Flashing Seams – GARMESH Styrene-Butadiene-Rubber (SBR) coated, woven, fiberglass scrim.

2.5 SURFACINGS

- A. Mineral Surfaced Membrane: Roofing Granules shall meet requirements of ASTM D-451 and/or be recommended by the membrane manufacturer. Loose granules for bleedout shall match size and color of granulated membrane sheet.
- B. Mineral Surfaced Membrane: If minerals are not applied properly into the bleedout, apply manufacturers' GARLA-BRITE COATING on field seams of modified bitumen roofing ply and broadcast minerals into the coating while it is still wet. Roofing Granules shall meet requirements of ASTM D-451 and/or be recommended by the membrane manufacturer.
- C. SILVER-FLASH – Aluminized asphalt mastic for the three-course application on vertical flashing seams.
- D. Roof & Flashing Coating (**ALL ROOF AREAS U.N.O.**): SILVER-SHIELD or approved equal (**ALL ROOF AREAS U.N.O.**); ASTM D2824 - high solids, fibrated aluminum coating. **Installation of the minerals in the bleedout are still required for the coating application.**

2.6 RELATED MATERIALS

- A. Roof Insulation and Roof Recovery Board: In accordance with Division 7 Section 07 22 00.
- B. Roof Insulation Fasteners: In accordance with Division 7 Section 07 22 00.
- C. Roof Insulation and Roof Recovery Board Adhesive: In accordance with Division 7 Section 07 22 00.
- D. Nails and Fasteners: Non-ferrous metal or hot dipped galvanized fasteners complying with ASTM A153 and connectors complying with ASTM A653, Class G185; Type 304 or Type 316 stainless steel fasteners and connectors shall be used with new generation of pressure-treated wood; except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the wood blocking/nailer material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.
- E. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than twenty-eight (28) gauge and not less than one (1) inch in diameter. Form discs to prevent dishing. Bell or cup shaped caps are not acceptable.
- F. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim".
- G. Lead Flashing Sheet: Meets Federal Specification QQ-L-201, Grade B, four (4) pounds per square foot.
- H. Metal Termination Bars:

1. Shall be heavy flat bar aluminum unless otherwise recommended by membrane manufacturers.
 2. Material shall be .125" x 1" (minimum) aluminum conforming to ASTM B-221, mill finish.
- I. Urethane Sealant: One part, non-sag sealant as provided by or recommended by the membrane manufacturer for moving joints.
- | | |
|--|-----------------|
| 1. Tensile Strength (ASTM D412) | 250 psi |
| 2. Ultimate Elongation (ASTM D412) | 950% |
| 3. Hardness, Shore A (ASTM C920) | 35 |
| 4. Adhesion-in-Peel (ASTM C920) | 25 pli |
| 5. 100% Modulus (ASTM D412) | 50 psi |
| 6. Bond (Durability-Class 25, ASTM C920) | Passes |
| 7. Service Temperature Range | -40°F to +180°F |
| 8. Stain and Color Change (ASTM C920) | Passes |
| 9. Tack Free Time (ASTM C679 (max 72 hrs.)) | 16 hrs. |
| 10. Weep and Sag (ASTM C920 (max 3/16"(4mm))) | Passes |
| 11. Weight loss after heat aging (ASTM C920 (max 10%)) | Passes |
- J. Pitch Pocket Sealer: TUFF-FLASH PLUS LO or approved equal, two (2) part multi-purpose, asphaltic polyurethane based, low-odor, liquid flashing membrane system reinforced with an approved reinforcing scrim as provided by the roof membrane manufacturer.
1. Tensile Strength, ASTM D 412: 650 psi
 2. Tear Strength, ASTM D624: 115 lbf/in
 3. Elongation, ASTM D 412: 325%
 4. Hardness, Shore A ASTM D2240@77°F: 55
 5. Density @77 deg. F 8.3 lb/gal typical
- K. Protection and Walkway Pads: Recycled rubber (97% recycled rubber), anti-skid surface pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, ½ inch thick as noted, minimum.
1. Pad Size: 3'-0" x 4'-0"
- L. Protection and Walkway Pads Adhesive: GREENLOCK STRUCTURAL SEALANT or approved equal.
- M. Non-Shrink Grout: Use an all-weather fast setting chemical action concrete material to fill pitch Pans.
- | | |
|---|--------------------------|
| 1. Flexural Strength (ASTM C-78 (modified)) | 7 days 1100psi |
| 2. High Strength (ASTM C-109 (modified)) | 24 days 8400lbs (3810kg) |
- N. Reinforced Liquid Flashing: TUFF-FLASH PLUS LO or approved equal, two (2) part multi-purpose, asphaltic polyurethane based, low-odor, liquid flashing membrane system reinforced with an approved reinforcing scrim as provided by the roof membrane manufacturer.
1. Tensile Strength, ASTM D 412: 650 psi
 2. Tear Strength, ASTM D624: 115 lbf/in
 3. Elongation, ASTM D 412: 325%

4. Hardness, Shore A ASTM D2240@77°F: 55
 5. Density @77 deg. F 8.3 lb/gal typical
- O. Bellows Expansion Joint System: METALASTIC or approved equal curb to curb, wall to curb assembly, and Straight Metal Flange (SMF) system as per the project details, documents and manufacturer's recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrate surfaces to receive modified bituminous membrane roof system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to the manufacturer.
- B. Prior to installing the finish modified membrane roofing ply, the contractor must notify the roof system manufacturer representative, and Owner's representative, to examine the roof area for high and low spots. It may be necessary to mist the roof with water to identify the problem areas. The contractor will correct all problem areas identified. This examination should take place no less than 24 hours in advance of installing the finished membrane.**
- C. Verify that deck surfaces and project conditions are ready to receive work of this section.
- D. Verify that deck is supported and secured to structural members.
- E. Verify that deck is clean and smooth, free of depressions, projections or ripples, and is properly sloped to drains.
- F. Verify that adjacent roof members do not vary more than 1/4 inch in height.
- G. Verify that deck surfaces are dry, free of snow or ice, not rotten or deteriorated, do not have bacterial growth and are structurally sound. Replace, or repair, in like kind to match existing.
- H. Confirm that moisture content within the wood blocking and nailers does not exceed twelve (12) percent by moisture meter tests.
- I. Verify that openings, curbs, pipes, conduit, sleeves, ducts, and other items which penetrate the roof are set solidly, and that wood cant strips, wood nailing strips and reglets are set in place.
- J. Contractor is responsible to verify existing substrate is sloped, and/or level and plumb, as stated in/on the project documents prior to installation of the insulation system. All defects in roof pitch to be accommodated with tapered insulation to insure a positive pitch to all roof drains.

3.2 PREPARATION – METAL DECK

- A. Clean substrate of debris and other substances detrimental to roofing installation according to the roof system manufacturer's written instructions. Remove sharp objects.

- B. If damaged or unsound decking is present, it shall be removed and replaced using the same materials as the original, unless otherwise specified.
- C. As required, install preformed sound absorbing insulation strips in acoustic deck flutes in accordance with manufacturer's instructions.

3.3 PREPARATION – CONCRETE DECK (**Gantner Ave School**)

- A. Fill honeycombing and small imperfections in deck surface with latex filler.
- B. Where deep concrete repairs may be necessary (1/2" or greater) repair concrete with SIKAQUICK -2500 or approved equal:
 - a. Surface Preparation:
 - i. Remove all deteriorated concrete, dirt, oil, grease and other bond-inhibiting materials from the area to be repaired. Ensure repair is not less than 1/4" in depth.
 - ii. Using a high pressure water blaster, scabber or other appropriate mechanical means obtain an exposed aggregate surface profile.
 - iii. Perform a tensile adhesion strength (pull off) test to ensure effectiveness or decontamination and preparation.
 - iv. Saw cut perimeter edges of concrete are to be repaired at a dovetail angle.
 - v. Saturated Surface Dry (SSD) the substrate with clean water prior to application. No standing water should remain during application.
 - b. Application:
 - i. Mix all necessary contents of the concrete repair materials per the manufacturers recommendations.
 - 1. For repairs greater than 1" in depth add 3/8" course aggregate. Typical addition rate is 25 – 30 lb of aggregate per bag of concrete repair mix. Greater application thickness can be achieved with the addition of up to 50 lbs coarse aggregate. Aggregate must comply with manufacturers recommendations.
 - ii. Once mixed, scrub mortar into mechanically prepared SSD substrate ensuring to work the mix into all pores and voids.
 - iii. Force material against edge of repair working towards the center. Screed off any excess.
 - iv. Allow material to set to desired stiffness, then finish with wood or sponge float for a smooth finish.
 - v. Immediately after finishing, moist cure repair with wet burlap and polyethylene with a fine mist of water.
 - vi. Protect freshly applied mortar from direct sunlight, wind, rain and frost.
 - vii. Wait 20 – 40 minutes to allow applied material to fully set before continuing the installation of the new roof system.
- C. Exposed concrete deck MUST be completely dry before the installation of the new roof system. It is the contractors responsibility to perform proper moisture test to concrete deck to confirm moisture levels before the installation of the new roof system.
- D. Prior to installing the hot applied vapor barrier onto the concrete deck, prime the concrete deck surfaces with asphalt primer at the rate of 1 (one) gallon per one hundred (100) square feet.

3.4 ROOF DRAINS

- A. New drains shall be accordance with project documents. Drains will have new deck clamps,

threaded receivers and cast iron metal strainers. Drains shall be installed prior to or during the roof installation. **Drains shall be set to the proper height above the roof deck to allow for a tapered insulation sump having ½" per foot slope.**

3.5 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of the modified bituminous roofing system.
- D. Coordinate installation of roofing system components so that base sheet, insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets, insulation and base sheet with two (2) plies of #15 organic roofing felt set in full moppings of bitumen and with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work.
- E. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with the Equiviscous Temperature (EVT) Method as recommended by National Roofing Contractors Association (NRCA). Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT (plus 5°F at point of application) more than one (1) hour prior to time of application. Determine flash point, finished blowing temperature, EVT, and fire-safe handling temperature of bitumen either from information by manufacturer or by suitable test. Do not exceed recommended temperature limits during bitumen heating. Do not heat to a temperature higher than twenty-five degrees (25°) below flash point. Discard bitumen that has been held at temperature exceeding Finishing Blowing Temperature (FBT) for more than three (3) hours. Keep kettle lid closed except when adding bitumen.
- F. Base Roof Ply Bitumen Mopping Rate:
 - 1. Base Roofing Ply Mopping: Apply bitumen at the rate of approximately thirty (30) lb. of bitumen per roof square.
- G. Modified membrane roofing ply – torch applied.
- H. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- I. Apply roofing materials as specified by manufacturer's instructions.
 - 1. Keep roofing materials dry before and during application.
 - 2. Begin and apply only as much roofing in one day as can be completed that same day.
- J. Cut-Offs/Envelope Waterstops: At end of each day's roofing installation, protect exposed edge of incomplete work, including roof ply membranes and insulation. Provide temporary covering of an approved coated base sheet. Install waterstop/temporary flashing a minimum of 6 inches under face edge of insulation and wrapped up face and back a minimum of 6 inches from the face in asphalt mastic at ¾ pounds per foot, top dress waterstop with asphalt mastic.

- K A minimum two-hour fire watch is required for each day that torch-applied membranes are installed unless noted otherwise by Owner. Keep an approved rated fire extinguisher every 3,000 square feet maximum on the roof. The fire extinguisher shall be placed in a central location in that area where all workers know where it is and how to operate in properly.

3.6 HOT APPLIED VAPOR BARRIER INSTALLATION (**Gantner Ave School**)

- A. Modified Membrane Base Roofing Ply: Install one (1) reinforced modified base roofing ply membrane in thirty (30) lbs. per 100 square feet of the specified hot asphalt bitumen adhesive. The modified membrane shall be shingled in the direction of the slope of the roof.
- B. The modified membrane roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Exercise care during application to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch side laps and eight (8) inch end laps. Stagger the end laps a minimum of 12 inches.
- E. Apply asphalt no more than five (5) feet ahead of each roll being embedded.
- F. Lightly broom in the base roofing ply to assure complete adhesion.
- G. Extend membrane to the top edge of all cants in full moppings of the specified asphalt as shown on the drawings. Seal top of membrane with asphalt mastic until base flashing ply is installed.

3.7 INSULATION INSTALLATION

- A. Refer to Roof Insulation Specification Division 7 Section 07 22 00 for complete installation requirements.
- B. Deck types: Metal and Concrete
- C. Insulation: Rigid tapered and flat polyisocyanurate insulation with a minimum thickness and compressive strength as specified, plus a ½" thick roof recovery board.
- D. Insulation Attachment (**All ROOF AREAS U.N.O**): Polyisocyanurate insulation shall be mechanically attached to the metal roof decks. Subsequent layers of polyiso shall be installed over the polyisocyanurate insulation system in a full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations, or mechanically attached per the project specifications. The recovery board shall be installed over the polyisocyanurate insulation system in a full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations.
- E. Insulation Attachment (**Gantner Ave School**): Polyisocyanurate insulation shall be fully adhered to the properly installed vapor barrier over the prepared and primed roof substrate in full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations. The recovery board shall be installed over the polyisocyanurate insulation system in a full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations.

3.8 BASE ROOFING PLY INSTALLATION – HOT APPLIED (**ALL ROOF AREAS U.N.O.**)

- A. SBS Modified Membrane Base Roofing Ply: Install one (1) fiberglass reinforced modified base roofing ply membrane in thirty (30) lbs. per 100 square feet of the specified hot asphalt bitumen adhesive. The modified membrane shall be shingled in the direction of the slope of the roof and/or tapered insulation system to shed water.
- B. The modified membrane roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Exercise care during application to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch side laps and eight (8) inch end laps. Stagger the end laps a minimum of 12 inches.
- E. Apply asphalt no more than five (5) feet ahead of each roll being embedded.
- F. Lightly broom in the base roofing ply to assure complete adhesion.
- G. Extend membrane to the top edge of all cants in full moppings of the specified asphalt as shown on the drawings. Seal top of membrane with asphalt mastic until base flashing ply is installed.
- H. Install base flashing ply to all perimeter and projection details in the specified hot asphalt bitumen adhesive.

3.9 MODIFIED MEMBRANE ROOFING PLY TORCH APPLIED INSTALLATION

- A. Install specified Modified Membrane Roofing Ply as described below.
- B. **If more than 45 days have passed since the installation of the modified base sheet, the base sheet is to be primed with the specified asphalt primer (GARLA-PRIME or approved equal) at a rate of 0.5 gallons per 100 square feet prior to installation of the torch applied mineral cap sheet.**
- C. Over the specified Base Roofing Ply, lay out the roll in the course to be followed and unroll six (6) feet. Seams for the top layer of modified membrane will be staggered over the Base Roofing Ply sheet seams. End laps of the specified Modified Membrane Roofing Ply shall be staggered 12 inches minimum with the Base Roofing Ply end laps (**ALL ROOF AREAS U.N.O.**)
- D. Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet while heating and press down with your foot to insure a proper bond.
- E. After the major portion of the roll is bonded, re-roll the first six (6) feet and bond it in a similar fashion.
- F. Repeat this operation with subsequent rolls with side laps of four (4) inches and end laps of eight (8) inches. End laps of the specified Modified Membrane Roofing Ply shall be

staggered 12 inches minimum.

- G. Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal. Ensure a uniform and complete bleed out from the side and end laps. Embed minerals into the bleed out while melted and liquid.
- H. Install modified flashing ply to all perimeter and projection details.
- I. Keep an approved rated fire extinguisher every 3,000 square feet maximum on the roof. The fire extinguisher shall be placed in a central location in that area where all workers know where it is and how to operate in properly
- J. The corners of the underlying membrane at the end laps, and the corner of the selvage edge on the side laps at T-joints should be cut at a 45° angle with the width of the selvage edge (4").
- K. Aesthetics will be a punch list item. The roof must match the owner's standards for appearance. The desired result of heat welding the laps should be a small uniform pencil line bead of compound visible at all the laps.
- L. Install modified flashing ply to all perimeter and projection details via torch methods.

3.10 FLASHING MEMBRANE INSTALLATION

- A. Seal all curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
- B. Prepare all drain leads, walls and edge details to be flashed and where shown on the drawings, with asphalt primer at the rate of .75 to one gallon per square. Allow primer to dry tack free.
- C. All wood blocking must be covered with manufacture's self-adhering modified membrane prior to the installation of any torch applied materials.**
- D. The wall/cant juncture will be examined for air passage. If airflow is present, the joint between the cant and wall will be sealed with a closed cell joint backing and reglet joint sealant.
- E. Use the specified modified roof membrane flashing ply as the top flashing ply membrane and adhere to the underlying base flashing ply. Unless noted otherwise, secure at a minimum of twelve (12) inches from the finished roof surface using a continuous termination bar fastened at a maximum of six (6) inches on center.
- F. Seal all vertical laps of flashing membrane with a three-course application of Silver-Flash aluminized trowel-grade mastic and mesh.
- G. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work as specified in other sections.
- H. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work as specified in other sections.

- I. Flash all penetrations as specified below and per the project documents. If specific detail is not shown in drawings or specified below, flash detail in accordance with the manufacturer's specifications to comply with the specified guaranty.
- J. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
 2. Run complete roof system plies over drain. Cut out plies inside drain bowl.
 3. Set 4lb. lead flashing (thirty (30) inch square minimum) in ¼ inch bed of mastic. Run lead into drain a minimum of two (2) inches. Prime lead at a rate of one hundred (100) square feet per gallon and allow to dry.
 4. Install base flashing ply (forty (40) inch square minimum) via specified asphalt bitumen.
 5. Install modified membrane (forty-eight (48) inch square minimum) via torch methods. Stop both flashings plies short of the clamping ring and seal edge of modified flashing plies with a three-course application of SILVER-FLASH aluminized mastic and reinforcing mesh.
 6. Install clamping ring over lead flashing.
 7. Remove drain plug and install strainer.
- K. Exhaust Fan/Passive Vent/Air Intake:
1. Minimum curb height is eight (8) inches off the finished roof surface. As required, raise existing curbs to the required height. Prime vertical curb surface at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in hot bitumen. Run all plies, including modified membrane, over cant a minimum of two (2) inches.
 3. Install base flashing ply covering curb with six (6) inches on to field of the roof.
 4. Install the modified flashing ply installed over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of Silver-Flash aluminized mastic and mesh at all vertical seams.
 5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation. If the existing fan cover cannot fit over the installed flashing system, stop the flashing system at the top of the curb and fasten with cap nails at eight (8) inches on center. Install an 0.040" aluminum slip flashing under the fan cover and fasten to the curb at eight (8) inches on center with neoprene gasketed screws. The slip flashing shall cover the top of the flashing system three (3) inches minimum. Install new corner pieces on the fan cover as required to ensure the cover is watertight.
- L. Plumbing/Soil Stack:
1. Minimum stack height is twelve (12) inches.
 2. Run roof system over the entire surface of the roof. Seal the base of the stack with mastic
 3. Prime flange of new lead sleeve. Install properly sized lead sleeve set in ¼ inch bed of roof cement.
 4. Install base flashing ply by torch methods.
 5. Install modified membrane by torch methods.
 6. Seal the intersection of the membrane and stack with roof cement.
 7. Turn sleeve a minimum of one (1) inch down inside of stack. For pipes 2 inches or less in diameter, lead top caps will be required.
- M. Pitch Pocket:
1. Run all plies up to the penetration.
 2. Place the pitch pocket over the penetration and prime all flanges.

3. Strip in flange of pitch pocket with one (1) ply of base flashing ply in the specified adhesive. Extend six (6) inches onto field of roof.
 4. Install the modified membrane via torch methods and extend nine (9) inches onto field of the roof.
 5. Fill pitch pocket half full with non-shrink grout. Let this cure and top off with specified two-part pourable sealer.
 6. Caulk joint between roof system and pitch pocket with the specified elastomeric asphaltic sealant.
- N. Wood Sleeper Support:
1. Approved wood of equal thickness to insulation and recovery board will be placed into position where weight of object is over 12 pounds per square foot. Wood will be two (2) inches wider than base of object being supported.
 2. Insulation will be installed up against wood sleeper.
 3. Entire roof system will be installed over wood sleeper.
 4. A rubber protection pad will be installed in approved adhesive under the equipment wood sleeper support and over the roof system.
 5. Treated wood supports for the particular equipment would then be placed on the modified membrane roofing ply. Supports will be a minimum of four (4) inches wide.
- O. Parapet Wall with Pre-Manufactured Metal Coping Cap:
1. Prepare wall as needed and install new approved wood blocking fasten to top of wall with approved tapcon masonry anchors at eighteen (18) inches o.c., staggered pattern. Two (2) fasteners will be located within two (2) inches of the blocking section ends, each side. Width of wood blocking shall equal the width of the existing wall. Top of wood blocking shall be a minimum of twelve (12) inches above top of roof. The joints of the wood blocking MUST be staggered between layers.
 2. As required, install the specified plywood sheathing to the inside face of the wall.
 3. Minimum flashing height is eight (8) inches, and maximum flashing height is twenty-four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 4. Set cant in bitumen. Run all field plies, including modified membrane, to the top edge of cant strip and seal with asphalt mastic to a watertight condition.
 5. Install base flashing ply covering entire wall and wrapped over top of wall and down the outside face of the wood blocking, and with six (6) inches on to field of roof and set in the specified asphalt adhesive. Nail membrane at eight (8) inches o.c. to outside face of nailers on top of the wall.
 6. Install the modified flashing ply via torch methods over the base flashing ply to the outside edge of the parapet wall, and nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash aluminized trowel-grade mastic and mesh at all seams.
 7. Install new metal fascia/extender system with continuous cleat. Fasten to wall structure or wood blocking as specified. Metal fascia extender shall cover the bottom of the wood nailer and top of wall (interface between wood blocking and wall) a minimum of two (2) inches.
 8. Install specified pre-manufactured metal coping cap system.
- P. Pre-manufactured Curb for Equipment Support (**Secured to Roof Deck**):
1. **Secure curb to roof deck.** Minimum curb height above top of roof is eight (8) inches. Install wood blocking on bottom, or top, of curb to achieve this height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in bitumen. Run base roofing ply over cant and to the top edge of the cant. Seal with asphalt mastic.

3. Install base flashing ply in the specified adhesive covering pre-manufactured curb with six (6) inches on to field of the roof.
 4. Install modified membrane over cant and to the top edge of the cant. Seal with asphalt mastic.
 5. Install modified flashing ply via torch methods over the base flashing ply, nine (9) inches on to field of the roof. Install flashing plies on top of the curb, and nail at eight (8) inches o.c. with cap nails. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install pre-manufactured cover. Fasten sides at twenty-four (24) inches o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape/sealant between metal covers.
 7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- Q. Curb Detail/Air Handling Station:
1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in bitumen. Run base roofing ply over cant and up to the top edge of the cant. Seal with asphalt mastic.
 3. Install base flashing ply in specified asphalt adhesive covering curb with six (6) inches on to field of the roof.
 4. Install modified membrane over cant and up to the top edge of the cant. Seal with asphalt mastic.
 5. Install modified flashing ply via torch methods over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install pre-manufactured counterflashing/slip flashing with fasteners and neoprene washers or per manufacturer's recommendations.
 7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- R. Heat Stack:
1. Minimum stack height is twelve (12) inches.
 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric asphaltic sealant or roof cement.
 3. Prime flange of new sleeve. Install properly sized sleeves set in ¼ inch bed of roof cement.
 4. Install base flashing ply in the specified flashing adhesive.
 5. Install modified membrane via torch methods .
 6. Caulk the intersection of the membrane with the specified elastomeric asphaltic sealant.
 7. Install new collar over cape. Weld collar or install stainless steel draw band.
- S. Pre-Manufactured Metal Edge Fascia System:
1. Inspect the nailer to assure proper attachment and configuration prior to installing the roof system. Install new wood nailers as required and/or specified to achieve the proper height of one (1) blocking higher than the thickness of the insulation system and recovery board. **Wood nailers shall be set for one (1) blocking higher than the highest thickness of insulation and roof recovery board, and shall be maintained constant around the perimeter of the roof.**
 2. Install tapered edge/cant strip in adhesive to create a smooth transition from roof system to wood blocking.
 3. Run base roofing ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at eight (8) inches o.c.
 4. Run modified membrane roofing ply to the outside edge of the roof.

5. Install new metal fascia/extender system(s) with continuous cleats. Fasten to wood fascia as specified.
 6. Install two (2) ¼" wide beads of GreenLock Sealant XL on the bottom surface of the anchor bar flange. Install the new extruded anchor bar onto the modified membrane roof ply and over the edge of the roof, and face fasten the anchor bar to the wood blocking/structure through pre-punched slots every 12" o.c. staggered. The anchor bars shall be butted up next to each other leaving a minimum gap. Install the splice plate at each anchor bar joint.
 7. Install compression seals every 40" o.c. in the slots located at the top of the extruded anchor bar.
 8. Install fascia cover over the extruded anchor bar and press downward firmly until "snap" occurs and the cover is engaged along the entire length.
 9. Install a splice plate at each end of the extruded anchor bar.
- T. Reglet Mounted Counterflashing:
1. Remove existing reglet mounted counterflashing system to allow the installation of the new roof flashing and counterflashing system.
 2. Minimum flashing height is eight (8) inches. Maximum flashing height is twenty-four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 3. Set cant in bitumen. Run field plies over the cant and up the wall a minimum of three (3) inches.
 4. Install base flashing ply covering wall set in the specified adhesive with six (6) inches on to field of the roof.
 5. Install modified membrane roofing ply over cant and up the wall a minimum of two (2) inches.
 6. Install modified flashing ply in the specified adhesive over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 7. Install the specified termination bar even with the top of the flashing, and secure the termination bar through flashing and into wall every six (6) inches on center. Seal the top of the termination bar/flashing with a 3-course application of Silver-Flash and Garmesh or elastomeric asphaltic sealant.
 8. Cut reglet in masonry one joint above flashing, and one joint below the new throughwall flashing system.
 9. Install new reglet counterflashing with lead expansion wedges at 12" on center and seal reglet opening with high grade polyurethane sealant. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and fabricated to a watertight condition. The bottom of the cap flashing insert shall project ¼" from the face of the wall with a down turned drip edge (provide a down turned hem in areas subject to human contact). New counterflashing shall cover the termination bar a minimum of four (4) inches.
- U. Roof Hatch:
1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in bitumen. Run all field plies, including modified membrane, over cant a minimum of three (3) inches.
 3. Install base flashing ply covering curb set in specified flashing adhesive with six (6) inches on to field of the roof.
 4. Install a second ply of modified flashing ply via torch methods over the base flashing ply, nine (9) inches on to the field of the roof. Attach top of membrane to top of wood nailer and apply a three-course application of mastic and mesh. Allow to cure and aluminize.

5. Install pre-manufactured lens and fasten flashing sides at eight (8) inches o.c. with fasteners and neoprene washers.
 6. Install 0.040" aluminum counterflashing and fasten at eight (8) inches o.c. with fasteners and neoprene washers.
- V. Base Flashing for Non-Supported Deck (Wall Expansion Joint):
1. Inspect the nailer to assure proper attachment and configuration. The wood cant strip should be mechanically attached to the vertical and horizontal wood nailers.
 2. Install compressible insulation in neoprene cradle between wall and vertical wood nailer.
 3. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 4. Install base flashing ply in the specified hot asphalt bitumen adhesive covering entire wall and wrapped to top of wood nailer with six (6) inches on to field of the roof. Nail membrane at eight (8) inches o.c.
 5. Install modified flashing ply via torch methods over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install specified pre-manufactured bellows type wall to curb expansion joint cover in accordance with the project details. Fasten the expansion joint to the curb with neoprene gasketed screws at twelve (12) inches o.c. with fasteners and neoprene washers. Fasten the copper expansion joint to the masonry wall with approved fasteners at eight (8) inches o.c. Furnish continuous prefabricated transitions for all 90 degree junctures/corners. Terminate the end of the expansion joint in accordance with the manufacturer's recommendations.
- W. Throughwall Counterflashing:
1. Ensure the new throughwall flashing and receiver of the two-piece counterflashing is set at the proper height above the roof deck.
 2. Minimum flashing height is eight (8) inches. Maximum flashing height is twenty-four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 3. Set cant in bitumen adhesive. Run all field plies, including modified membrane, to the top edge of cant strip and seal with asphalt mastic to a watertight condition.
 4. Install base flashing ply covering wall set in the specified hot asphalt bitumen adhesive with six (6) inches on to field of the roof.
 5. Install a second ply of modified flashing ply via torch methods over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install the specified termination bar even with the top of the flashing, and secure the termination bar through flashing and into wall every six (6) inches on center. Seal top of termination bar and flashing system with a sealant or a three-course application of mastic and mesh.
 7. Install the new slip counterflashing within the in-wall receiver. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and welded to a watertight condition. The bottom of the cap flashing insert shall project ¼" from the face of the wall with a down turned drip edge (provide a down turned hem in areas subject to human contact). The new slip counterflashing shall cover the roof flashing system a minimum of four (4) inches.

3.11 APPLICATION OF SURFACING

- A. Prior to installation of surfacing, the completed roof system must be inspected and approved

by the Architect and Manufacturer. All repairs must be made by the Contractor prior to the application of the surfacing system. All bitumen materials have properly cured per the manufacturer's recommendations prior to applying the coating system.

- B. Mineral Surfaced Membrane System: While bleed out from the side and end laps are still hot, hand broadcast minerals into asphalt bleed out for a monolithic appearance. If minerals are not properly installed in the bleedout, apply manufacturers approved aluminum coating on all field seams of the modified membrane roofing ply at a rate of two (2) gallons per square, and immediately broadcast loose minerals into the coating while it is still wet.
- C. Roof Coating - Fibered Aluminum Roof Paint, SILVER-SHIELD or approved equal (**ALL ROOF AREAS U.N.O.**):
 - 1. Allow all cold applied mastics and roofing to properly dry and cure per manufacturer's recommendations before installing the aluminum coating. The aluminum coating system shall be applied in one (1) coat. **Installation of the minerals in the bleedout are still required for the coating application.**
 - 2. Application: Brush or roller apply one (1) coat of the specified aluminum roof coating at a minimum rate of two (2) gallons per one hundred (100) square feet.

3.12 FIELD QUALITY CONTROL

- A. Perform field inspection and testing as required by this specification and under provisions of Section 1.
- B. Correct defects or irregularities discovered during field inspection.
- C. Require attendance of roofing materials manufacturers' representative(s) at site during installation of the roofing system as specified in Section 1.9 above.

3.13 CLEANING

- A. Remove bitumen adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

3.14 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The Owner, Architect and/or roof system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet

materials have been installed. The thermographic scan shall be provided by the Roofing Contractor at a negotiated price.

- D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. Notify the Architect, Owner and roofing system manufacturer upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END OF SECTION 07 52 00

SECTION 07521

MODIFIED BITUMINOUS MEMBRANE ROOFING – HOT/COLD APPLIED (ALTERNATE)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

1.2 SUMMARY-

- A. Hot/Cold applied asphalt modified bituminous membrane roofing over prepared substrate and insulation system.
 1. Prepare the substrate for the installation of the roof insulation system and modified bituminous membrane roof system.
 2. Install the specified roof insulation system and roof recovery board in accordance with Division 7 Section “Roof Insulation”
 3. Adhere one (1) ply of the specified field base roofing ply in the hot asphalt bitumen over the recovery board **(All Roof Areas U.N. O.)**.
 4. Adhere one (1) ply of the specified base flashing ply in the hot asphalt bitumen **(All Roof Areas U.N. O.)**.
 5. Adhere one (1) ply of the specified polyurethane reacted; modified asphalt reinforced membrane roofing ply in the specified cold applied adhesive. Heat-weld all seams of the modified membrane roof ply **(All Roof Areas U.N. O.)**.
 6. Install one (1) ply of the specified polyurethane reacted; modified asphalt membrane top flashing ply in cold applied flashing adhesive. Heat-weld all seams of the modified membrane roof ply **(All Roof Areas U.N. O.)**.
 7. Apply specified aluminum coating system to the entire roof area and flashings **(All Roof Areas U.N. O.)**.

1.3 SECTION INCLUDES

- A. This portion of the specification sets forth the general requirements and describes materials and workmanship for installing the modified bituminous membrane roof system over prepared substrates.
- B. Roofing contractor shall furnish and install all materials described herein unless specifically noted otherwise.
- C. This section is for work on all roofs except where indicated on the drawings as otherwise.

1.4 RELATED SECTIONS

- A. Division 6 Section “Rough Carpentry” for wood nailers, cants, curbs, and blocking and for wood-based, structural-use roof deck panels.
- B. Division 7 Section “Roof Insulation”
- C. Division 7 Section “Sheet Metal Flashing and Trim”
- D. Division 7 Section “Modified Bituminous Roofing – Hot/Torch Applied”

1.5 REFERENCES

- A. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7-10, Minimum Design Loads for Buildings and Other Structures.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D41, Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.
 - 2. ASTM D312, Specification for Asphalt Used in Roofing.
 - 3. ASTM D451, Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
 - 4. ASTM D1079, Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
 - 5. ASTM D1863, Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
 - 6. ASTM D2178, Specification for Asphalt Glass Felt Used as a Protective Coating for Roofing.
 - 7. ASTM D2822, Specification for Asphalt Roof Cement.
 - 8. ASTM D2824, Specification for Aluminum-Pigmented Asphalt Roof Coating.
 - 9. ASTM D4601, Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
 - 10. ASTM D5147, Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
 - 11. ASTM D6162, Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
 - 12. ASTM D6163, Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
 - 13. ASTM E108, Test Methods for Fire Test of Roof Coverings.
- C. Factory Mutual Research (FM):
 - 1. Roof Assembly Classifications.
- D. National Roofing Contractors Association (NRCA):
 - 1. Roofing and Waterproofing Manual.
- E. Underwriters Laboratories, Inc. (UL):
 - 1. Fire Hazard Classifications.
- F. Warnock Hersey (WH):
 - 1. Fire Hazard Classifications.

1.6 SYSTEM DESCRIPTION

- A. It is the intent of this specification to install a long-term, quality roof system that meets or exceeds all current NRCA guidelines as stated in the most recent edition of the NRCA Roofing and Waterproofing Manual. Please discuss any concerns with the Architect and Roofing System Manufacturer.

1.7 DISCLOSURE OF MATERIALS AND SUBSTITUTIONS

- A. The materials outlined herein are the type of materials that should be used in this project. When a particular make or trade name is specified, it shall be indicative of the minimum standard required.

- i. If an alternate material is bid, the material must be equal or exceed the specifications, and submitted by the bidding Roofing Contractor to the Architect for approval and include the following:
 1. Written application with explanation of why it should be considered.
 2. Material product data sheets.
 3. A certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those materials denoted as pre-approved systems or the characteristics noted in the material specification section, including but not limited to the following:
 - a. Modified roofing membrane(s) and flashings substantiating Flexibility, Tensile Strength and Tear Strength. Test results must be dated, notarized and be on testing laboratory stationary. Testing for SBS membrane must follow standard ASTM D 5147 test methods. Testing shall be performed at 77°F. Tests at 0°F shall not be considered.
 4. The manufacturer must also have current ISO 9001:2008 certification for the manufacturing of the products to be utilized on this project.
 5. The materials installed for the waterproofing membrane must be guaranteed by the material supplier.
 6. A sample warranty by the manufacturer of the modified bitumen membrane roofing system. The manufacturer must be the organization that guarantees the modified roofing membrane, pre-manufactured metal edge system and pre-manufactured metal coping cap system.
 7. All products must be in accordance with the Health, Safety and Environmental Control (H, S & E) Regulations, e.g., No asbestos materials, no harmful solvent release materials, etc.
 8. In making a request for submission, Bidder/Contractor represents:
 - a. He/she has personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
 - b. He/she will provide the same guarantee for substitution as for the product and method specified.
 - c. He/she will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
 - d. He/she waives all claims for additional cost related to substitution, which consequently become apparent.
 - e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.

- f. He will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitute.
- ii. The Architect reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
- iii. Alternate material submissions shall be sent to the Architect by the bidding Roofing Contractor. Only substitutes approved in writing by the Architect will be considered.

1.8 SUBMITTALS

- A. Submit under provisions of Contract Documents, Division 1 requirements and this section.
- B. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- C. Samples: Submit two (2) samples of each product specified.
- D. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- E. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
- F. Manufacturer's Wind Uplift Certificate: The manufacturer supplying the warranty of the modified bitumen membrane must provide certification that the proposed roof system will be secured properly to the structure to meet or exceed the specific project wind uplift requirements per Section 1.16 Design and Performance Criteria.
- G. Manufacturer's Manufacturing Certificate: Certify that modified membrane materials to be used on this project are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- H. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001:2008 compliance certificate.
- I. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77°F. Tests at 0°F will not be considered.
- J. Submit a copy of an unexecuted manufacturer's warranty for review.
- K. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- L. Provide a sample of each insulation type.
- M. Shop Drawings:

1. Submit four (4) copies of manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, gutter location, sumps, roof slopes, thicknesses, tapered crickets and saddles.
 2. Shop drawing shall include: Outline of roof, location of drains, location of gutter, sumps, complete board layout of tapered insulation components, thickness and the minimum and average "R" value for the completed insulation system.
- O. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-10, Method 2 for Components and Cladding, prepared by an engineer employed by the system manufacturer as a full-time staff engineer. In no case, shall the design loads be taken to be less than those detailed in article 1.16 of this specification.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 12 years documented experience and has ISO 9001:2008 certification.
- B. Manufacturer: The manufacturer must also have current ISO 9001:2008 certification for the manufacturing of the products to be utilized on this project.
- C. Installer: Company specializing in modified bituminous roofing installation with a minimum 5-years' experience and certified by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work and at any time roofing work is in progress. Maintain proper supervision of workmen. Maintain a copy of the specifications in the possession of the Supervisor/Foremen and on the roof at all times.
 1. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
 1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F. Immediately correct roof leakage during construction. If the Contractor does not respond within twenty-four (24) hours, the Owner has the right to hire a qualified contractor and back charge the original contractor.
- G. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.10 PRE-INSTALLATION CONFERENCE

- A. Pre-Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and

associated work.

- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing which must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities.
- C. Objectives of conference to include:
 - 1. Review foreseeable methods and procedures related to roofing work.
 - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4. Review roofing system requirements (drawings, specifications and other contract documents).
 - 5. Review required submittals both completed and yet to be completed.
 - 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 7. Review required inspection, testing, certifying and material usage accounting procedures.
 - 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 - 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 - 10. Review notification procedures for weather or non-working days.
- D. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
- E. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner and Architect. This shall not be construed as interference with the progress of Work on the part of the Owner or Architect.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

- C. In accordance with the manufacturer's recommendations, immediately remove the plastic wrapping on the recovery boards and cover with a watertight, ventilated enclosure (i.e. tarpaulins). Prevent the formation of condensation on the boards.
- D. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- E. It is the responsibility of the contractor to secure all material and equipment on the job site. If any material or equipment is stored on the roof, the contractor must make sure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the contractor will be the sole responsibility of the contractor and will be repaired or replaced at his expense.
- F. Asphalt Heating: **Open kettle are not permitted on this project.** The contractor is to use an asphalt roofing kettle equipped with a fume recovery system (FRS). The fume recovery system is to be connected to the asphalt kettle and capable of burning, and/or filtering fumes minimizing emissions of asphalt fumes and odor. The Contractor is responsible to change the FRS filters at frequent intervals to maintain the effectiveness of the equipment. The filter media shall be as recommended by the FRS equipment manufacturer. The contractor is responsible for maintaining a record on the maintenance of his equipment and filter changes in the event claims are presented by the Owner, adjacent property owners of the Department of Environmental Protection (DEP). Failure by the contractor to maintain his equipment and to produce records of maintenance, which results in a shutdown of the project, may result in claims against the contractor.

1.12 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the roofing system manufacturer will provide the following:
 1. Keep the Architect informed as to the progress and quality of the work as observed.
 2. **Provide job site inspections a minimum of three (3) days a week with reports to the Architect.**
 3. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.13 PROJECT CONDITIONS

- A. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.14 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other sections to ensure that roof assemblies including roof accessories, flashing, trim and

joint sealers are protected against damage from effects of weather, corrosion and adjacent construction activity.

- B. Fully complete the installation of insulation system and base roofing ply assembly, and/or the installation of the modified bituminous membrane roof ply each day. Phase construction between the base roofing ply and modified membrane roof ply (top ply) is acceptable.

1.15 WARRANTY

- A. Upon completion of installation, and acceptance by the Owner and Architect, the manufacturer will supply to the Owner a single-source, forty (40) year Edge-to-Edge No Dollar Limited (NDL) Warranty covering the roof system. Warranty shall include the modified bitumen roof system, pre-manufactured metal edge fascia system, pre-manufactured metal coping cap system, flashings, and the transition between all systems, and shall be an Edge-to-Edge roof warranty provided by one manufacturer.
- B. Installer will submit a minimum of a three (3) year warranty to the membrane manufacturer with a copy directly to Owner.
- C. At the request of the Owner, the manufacturer will provide an annual inspection of the roof. These inspection requests can occur for the life of the warranty.

1.16 DESIGN AND PERFORMANCE CRITERIA

A. Uniform Wind Uplift Load Capacity

- 1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
 - a. Design Code: ASCE 7-16, Method 2 for Components and Cladding.
 - b. Category III Building with an Importance Factor of 1.
 - c. Wind Speed: 127 mph
 - d. Exposure Category: C
 - e. Roof Height: 20 feet
 - f. Roof Pitch: 1/4 inches per foot
 - g. Topographic Factor: 1.0

<u>Roof Areas</u>	<u>Design Uplift Pressure:</u>
Zone 1 - Field of roof	42.7 psf
Zone 2 - Perimeter	54.1 psf
Zone 3 - Corners	71.2 psf

Zones 2 & 3 must extend onto the roof area a minimum width of 8 feet.

1.17 SITE CONDITIONS

- A. Field measurements and material quantities:
 - 1. Contractor shall have SOLE responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect work.
- B. Existing Conditions:
 - 1. Building space directly under roof area covered by this specification will be utilized by on-going operations. Do not interrupt Owner operations unless prior written approval is received from Owner.
- C. Waste Disposal:
 - 1. Do not re-use, re-cycle or dispose of materials except in accordance with all applicable regulations. The use of products is responsible for proper use and disposal of product containers.
- D. Safety Requirements:
 - 1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.
 - 2. Comply with federal, state, local and Owner fire and safety requirements.
 - 3. Advise Owner whenever work is expected to be hazardous to Owner, employees, and/or operators.
 - 4. Maintain a crewman as a floor area guard whenever roof decking is being repaired or replaced.
 - 5. Maintain fire extinguisher within easy access whenever power tools, roofing kettles, fuels, solvents, torches and open flames are being used.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. When a particular trade name or performance standard is specified it shall be indicative of the minimum standard required. Product names for the materials used in this section shall be based on performance characteristics of the modified bitumen roof system manufactured by The Garland Company, Cleveland, OH, ((908) 812-6971) and shall form the basis of the contract documents.
- B. This specification is based on the performance characteristics of the system identified herein. Any proposed alternate systems, specified or not, must meet or exceed the following listed characteristics and be submitted for approval. Additionally, all Warranty Criteria (Section 1.15) and Design and Performance Criteria (Section 1.16) must be met and submitted as well as all items listed in the Disclosure of Materials and Substitutions (Section 1.7).
- C. Any item or materials submitted as a substitution to the basis of design manufacturer specified, must be submitted by the bidding Contractor and must comply in all respects as to the quality and performance of the brand name specified. The Architect shall be the sole judge as to whether or not an item submitted as a substitute is truly equal. Should the

Contractor choose to submit a substitute product, he shall assume all monetary or other risk involved, should the Architect find the substitution unacceptable.

- D. Provide primary products, including each type of roofing membrane, base roofing ply, base flashing ply, modified membrane flashing ply, modified membrane roof ply, roof coating and miscellaneous flashing materials from a single source roof manufacturer. Provide secondary products (insulation, mechanical fasteners, etc.) only as recommended by the roof manufacturer of primary products for use with the roof system specified.
- E. The following manufacturers are acceptable, providing they meet these specifications and the minimum standards stated.
 - a. The Garland Company, Inc. (Basis of Design)
 - b. Approved Equal

2.2 DESCRIPTION

- A. Modified bituminous roofing work including but not limited to:
 - 1. Install the specified roof insulation system in accordance with Division 7 Section 07 22 00.
 - 2. Base Roofing Ply: FLEXBASE PLUS 80 (**All Roof Areas U.N.O.**); One (1) ply of an 80 mil SBS (Styrene-Butadiene-Styrene) fiberglass/polyester reinforced modified membrane base roofing ply bonded to the prepared substrate with specified asphalt bitumen.
 - 3. Hot Bitumen (**All Roof Areas U.N.O.**): ASTM D312, Type IV special steep asphalt having the following characteristics:
 - a. Softening Point 210°F - 225°F
 - b. Flash Point 500°F
 - c. Penetration @ 77°F 15-25 units
 - d. Ductility @ 77°F 1.5 cm
 - 4. Base Flashing Ply: TRI-BASE PREMIUM SHEET (**All Roof Areas U.N.O.**); One (1) ply of a 60 mil SBS (Styrene-Butadiene-Styrene) double-coated Polyester-Fiberglass-Polyester base flashing ply sheet covered by an additional layer of OPTIMAX FR mineral modified bitumen membrane flashing ply and set in specified flashing adhesive.
 - 5. Modified Membrane Flashing Ply: OPTIMAX FR MINERAL (**All Roof Areas U.N.O.**): ; 145 mil polyurethane reacted, asphalt based mineral surfaced, modified roofing membrane with dual fiberglass reinforced scrim set in cold applied flashing adhesive.
 - 6. Modified Membrane Roofing Ply: OPTIMAX FR MINERAL (**All Roof Areas U.N.O.**): 145 mil polyurethane reacted, asphalt based mineral surfaced, modified roofing membrane with dual fiberglass reinforced scrim set in cold applied flashing adhesive.
 - 7. Cold Applied Modified Mineral Membrane Roofing Ply Adhesive: The cold-applied bitumen adhesive shall be WEATHERKING or approve equal consisting of a V.O.C. compliant, non-asbestos containing cold applied adhesive for roof slopes up to 3:12.
 - 8. Roof Coating: SILVER-SHIELD or approved equal; A high solids, fibrated aluminum roof coating system applied to the entire roof area including the exposed flashings (**All Roof Areas U.N.O.**).

2.3 BITUMINOUS MATERIALS

- A. Asphalt Primer: V.O.C. compliant, ASTM D41. GARLA-PRIME or approved equal
- B. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D2822, Type II.
- C. Base Roofing & Flashing Ply Adhesive: ASTM D312, Type IV Special Steep Asphalt.
- D. Modified Membrane Roofing Ply Adhesive: WEATHERKING cold applied adhesive.
- E. Modified Membrane Top Flashing Ply Cold-Applied Adhesive: FLASHING BOND
- F. Aluminized Asphalt Roofing Mastic for Vertical Seams of Flashings: SILVER-FLASH.
- G. Elastomeric Asphaltic Sealant: GARLA-FLEX SEALANT or approved equal.

2.4 SHEET MATERIALS

- A. Hot Applied Vapor Barrier (**Gantner Ave School**); STRESSBASE 80 or approved equal.
 - 1. STRESSBASE 80: ASTM D6163, Type II; A 80 mil SBS modified membrane with fiberglass mat reinforcement with the following minimum performance requirements according to ASTM D5147.

Properties (Finished Membrane):

Tensile Strength (ASTM D5147)

2 in/min. @73.4 +/- 3.6°F MD 50 lbf/in XD 50 lbf/in

Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 90 lbf XD 90 lbf

Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 3.0% XD 3.0%

Thickness

80 mils

- B. Base Roofing Ply: FLEXBASE PLUS 80 (**All Roof Areas U.N.O**):
 - 1. FLEXBASE 80: ASTM D6163, Type III; A 80 mil SBS modified membrane with woven dual polyester/fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM D5147.

Properties (Finished Membrane):

Tensile Strength (ASTM D5147)

2 in/min. @73.4 +/- 3.6°F MD 310 lbf/in CMD 310 lbf/in

Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 650 lbf CMD 650 lbf

Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F MD 8.0% CMD 8.0%

Low Temperature Flexibility (ASTM D5147):

Passes -30°F

Recycled Content	15% Post-Consumer
Thickness	80 mils

C. Base Flashing Ply: TRI-BASE PREMIUM SHEET or approved equal (**All Roof Areas U.N.O**):

1. TRI-BASE PREMIUM SHEET: Double coated Polyester-Fiberglass-Polyester scrim with the following minimum performance requirements according to ASTM D5147.

Properties (Finished Membrane):

Tensile Strength (ASTM D5147)

2 in/min. @73.4 +/- 3.6°F	MD 315 lbf/in	CMD 315 lbf/in
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Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F	MD 550 lbf	CMD 550 lbf
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Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F	MD 5.0%	CMD 6.0%
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Low Temperature Flexibility (ASTM D5147):

Passes -10°F

Pliability (ASTM D146)

Pass

Mass of Desaturated Polyester/Glass Mat (ASTM D146)

4.0 lb./100 sq. ft.

Surfacing and Stabilizer (ASTM D4601)

Max 50%

Asphalt (ASTM D226)

15 lb./100 sq. ft.

Thickness

60 mils

Recycled Content

31% Post-Consumer

Thickness

60 mils

D. Modified Membrane Roofing Ply: OPTIMAX FR MINERAL (**All Roof Areas U.N.O**):

1. OPTIMAX FR MINERAL; ASTM D6163, Type III Grade G

Tensile Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F	MD 205 lbf/in	CMD 215 lbf/in
50 mm/min. @ 23 +/- 2°C	MD 36 kN/m	CMD 38 kNm

Tear Strength (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F	MD 300 lbf	CMD 300 lbf
50 mm/min. @ 23 +/- 2°C	MD 1334 N	CMD 1334 N

Elongation at Maximum Tensile (ASTM D5147)

2 in/min. @ 73.4 +/- 3.6°F	MD 4.7%	CMD 5.0%
50 mm/min. @ 23 +/- 3°C		

Low Temperature Flexibility (ASTM D5147): Passes 0°F (-18°C)

Granule Embedment (ASTM D4977):	< 0.5 grams loss
Recycled Content	5% Post-Consumer
Thickness	145 mils

E. Modified Membrane Flashing Ply: OPTIMAX FR MINERAL **(All Roof Areas U.N.O):**

1. OPTIMAX FR MINERAL; ASTM D6163, Type III Grade G

Tensile Strength (ASTM D5147)		
2 in/min. @ 73.4 +/- 3.6°F	MD 205 lbf/in	CMD 215 lbf/in
50 mm/min. @ 23 +/- 2°C	MD 36 kN/m	CMD 38 kNm

Tear Strength (ASTM D5147)		
2 in/min. @ 73.4 +/- 3.6°F	MD 300 lbf	CMD 300 lbf
50 mm/min. @ 23 +/- 2°C	MD 1334 N	CMD 1334 N

Elongation at Maximum Tensile (ASTM D5147)		
2 in/min. @ 73.4 +/- 3.6°F	MD 4.7%	CMD 5.0%
50 mm/min. @ 23 +/- 3°C		

Low Temperature Flexibility (ASTM D5147): Passes 0°F (-18°C)

Granule Embedment (ASTM D4977):	< 0.5 grams loss
Recycled Content	5% Post-Consumer
Thickness	145 mils

H. Reinforcing Mesh for Flashing Seams – GARMESH Styrene-Butadiene-Rubber (SBR) coated, woven, fiberglass scrim.

2.5 SURFACINGS

- A. Mineral Surfaced Membrane: Roofing Granules shall meet requirements of ASTM D-451 and/or be recommended by the membrane manufacturer. Loose granules for bleedout shall match size and color of granulated membrane sheet.
- B. Mineral Surfaced Membrane: If minerals are not applied properly into the bleedout, apply manufacturers' SILVER-SHIELD on field seams of modified bitumen roofing ply and broadcast minerals into the coating while it is still wet. Roofing Granules shall meet requirements of ASTM D-451 and/or be recommended by the membrane manufacturer.
- C. SILVER-FLASH – Aluminized asphalt mastic for the three-course application on vertical flashing seams.
- D. Roof & Flashing Coating: SILVER_SHIELD **(ALL ROOF AREAS U.N.O.)**; ASTM D2824 fibered aluminum coating. **Installation of the minerals in the bleedout are still required for the coating application.**

2.6 RELATED MATERIALS

- A. Roof Insulation and Roof Recovery Board: In accordance with Division 7 Section 07 22 00.

- B. Roof Insulation Fasteners: In accordance with Division 7 Section 07 22 00.
- C. Roof Insulation and Roof Recovery Board Adhesive: In accordance with Division 7 Section 07 22 00.
- D. Nails and Fasteners: Non-ferrous metal or hot dipped galvanized fasteners complying with ASTM A153 and connectors complying with ASTM A653, Class G185; Type 304 or Type 316 stainless steel fasteners and connectors shall be used with new generation of pressure-treated wood; except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the wood blocking/nailer material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.
- E. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than twenty-eight (28) gauge and not less than one (1) inch in diameter. Form discs to prevent dishing. Bell or cup shaped caps are not acceptable.
- F. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim".
- G. Lead Flashing Sheet: Meets Federal Specification QQ-L-201, Grade B, four (4) pounds per square foot.
- H. Metal Termination Bars:
 - 1. Shall be heavy flat bar aluminum unless otherwise recommended by membrane manufacturers.
 - 2. Material shall be .125" x 1" (minimum) aluminum conforming to ASTM B-221, mill finish.
- I. Urethane Sealant: One part, non-sag sealant as provided by or recommended by the membrane manufacturer for moving joints.

1. Tensile Strength (ASTM D412)	250 psi
2. Ultimate Elongation (ASTM D412)	950%
3. Hardness, Shore A (ASTM C920)	35
4. Adhesion-in-Peel (ASTM C920)	25 pli
5. 100% Modulus (ASTM D412)	50 psi
6. Bond (Durability-Class 25, ASTM C920)	Passes
7. Service Temperature Range	-40°F to +180°F
8. Stain and Color Change (ASTM C920)	Passes
9. Tack Free Time (ASTM C679 (max 72 hrs.))	16 hrs.
10. Weep and Sag (ASTM C920 (max 3/16"(4mm)))	Passes
11. Weight loss after heat aging (ASTM C920 (max 10%))	Passes
- J. Pitch Pocket Sealer: TUFF-FLASH PLUS LO or approved equal, two (2) part multi-purpose, asphaltic polyurethane based, low-odor, liquid flashing membrane system reinforced with an approved reinforcing scrim as provided by the roof membrane manufacturer.

1. Tensile Strength, ASTM D 412: 650 psi
 2. Tear Strength, ASTM D624: 115 lbf/in
 3. Elongation, ASTM D 412: 325%
 4. Hardness, Shore A ASTM D2240@77°F: 55
 5. Density @77 deg. F 8.3 lb/gal typical
- K. Protection and Walkway Pads: Recycled rubber (97% recycled rubber), anti-skid surface pads, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, ½ inch thick as noted, minimum.
1. Pad Size: 3'-0" x 4'-0"
- L. Protection and Walkway Pads Adhesive: GREENLOCK STRUCTURAL SEALANT.
- M. Non-Shrink Grout: Use an all-weather fast setting chemical action concrete material to fill pitch Pans.
1. Flexural Strength (ASTM C-78 (modified)) 7 days 1100psi
 2. High Strength (ASTM C-109 (modified)) 24 days 8400lbs (3810kg)
- N. Reinforced Liquid Flashing: TUFF-FLASH PLUS LO or approved equal, two (2) part multi-purpose, asphaltic polyurethane based, low-odor, liquid flashing membrane system reinforced with an approved reinforcing scrim as provided by the roof membrane manufacturer.
1. Tensile Strength, ASTM D 412: 650 psi
 2. Tear Strength, ASTM D624: 115 lbf/in
 3. Elongation, ASTM D 412: 325%
 4. Hardness, Shore A ASTM D2240@77°F: 55
 5. Density @77 deg. F 8.3 lb/gal typical
- O. Bellows Expansion Joint System: METALASTIC or approved equal curb to curb, wall to curb assembly, and Straight Metal Flange (SMF) system as per the project details, documents and manufacturer's recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrate surfaces to receive modified bituminous membrane roof system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to the manufacturer.
- B. Prior to installing the finish modified membrane roofing ply, the contractor must notify the roof system manufacturer representative, and Owner's representative, to examine the roof area for high and low spots. It may be necessary to mist the roof with water to identify the problem areas. The contractor will correct all problem areas identified. This examination should take place no less than 24 hours in advance of installing the finished membrane.**
- C. Verify that deck surfaces and project conditions are ready to receive work of this section.

- D. Verify that deck is supported and secured to structural members.
- E. Verify that deck is clean and smooth, free of depressions, projections or ripples, and is properly sloped to drains.
- F. Verify that adjacent roof members do not vary more than 1/4 inch in height.
- G. Verify that deck surfaces are dry, free of snow or ice, not rotten or deteriorated, do not have bacterial growth and are structurally sound. Replace, or repair, in like kind to match existing.
- H. Confirm that moisture content within the wood blocking and nailers does not exceed twelve (12) percent by moisture meter tests.
- I. Verify that openings, curbs, pipes, conduit, sleeves, ducts, and other items which penetrate the roof are set solidly, and that wood cant strips, wood nailing strips and reglets are set in place.
- J. Contractor is responsible to verify existing substrate is sloped, and/or level and plumb, as stated in/on the project documents prior to installation of the insulation system. All defects in roof pitch to be accommodated with tapered insulation to insure a positive pitch to all roof drains.

3.2 PREPARATION – METAL DECK

- A. Clean substrate of debris and other substances detrimental to roofing installation according to the roof system manufacturer's written instructions. Remove sharp objects.
- B. If damaged or unsound decking is present, it shall be removed and replaced using the same materials as the original, unless otherwise specified.
- C. As required, install preformed sound absorbing insulation strips in acoustic deck flutes in accordance with manufacturer's instructions.

3.3 PREPARATION – CONCRETE DECK (**Gantner Ave School**)

- A. Fill honeycombing and small imperfections in deck surface with latex filler.
- B. Where deep concrete repairs may be necessary (1/2" or greater) repair concrete with SIKAQUICK -2500 or approved equal:
 - a. Surface Preparation:
 - i. Remove all deteriorated concrete, dirt, oil, grease and other bond-inhibiting materials from the area to be repaired. Ensure repair is not less than ¼" in depth.
 - ii. Using a high pressure water blaster, scabbler or other appropriate mechanical means obtain an exposed aggregate surface profile.
 - iii. Perform a tensile adhesion strength (pull off) test to ensure effectiveness or decontamination and preparation.
 - iv. Saw cut perimeter edges of concrete are to be repaired at a dovetail angle.
 - v. Saturated Surface Dry (SSD) the substrate with clean water prior to application. No standing water should remain during application.
 - b. Application:
 - i. Mix all necessary contents of the concrete repair materials per the manufacturers recommendations.

1. For repairs greater than 1" in depth add 3/8" coarse aggregate. Typical addition rate is 25 – 30 lb of aggregate per bag of concrete repair mix. Greater application thickness can be achieved with the addition of up to 50 lbs coarse aggregate. Aggregate must comply with manufacturers recommendations.
 - ii. Once mixed, scrub mortar into mechanically prepared SSD substrate ensuring to work the mix into all pores and voids.
 - iii. Force material against edge of repair working towards the center. Screed off any excess.
 - iv. Allow material to set to desired stiffness, then finish with wood or sponge float for a smooth finish.
 - v. Immediately after finishing, moist cure repair with wet burlap and polyethylene with a fine mist of water.
 - vi. Protect freshly applied mortar from direct sunlight, wind, rain and frost.
 - vii. Wait 20 – 40 minutes to allow applied material to fully set before continuing the installation of the new roof system.
- C. Exposed concrete deck MUST be completely dry before the installation of the new roof system. It is the contractors responsibility to perform proper moisture test to concrete deck to confirm moisture levels before the installation of the new roof system.
- D. Prior to installing the hot applied vapor barrier onto the concrete deck, prime the concrete deck surfaces with asphalt primer at the rate of 1 (one) gallon per one hundred (100) square feet.

3.4 ROOF DRAINS

- A. New drains shall be accordance with project documents. Drains will have new deck clamps, threaded receivers and cast iron metal strainers. Drains shall be installed prior to or during the roof installation. **Drains shall be set to the proper height above the roof deck to allow for a tapered insulation sump having 1/2" per foot slope.**

3.5 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of the modified bituminous roofing system.
- D. Coordinate installation of roofing system components so that base sheet, insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets, insulation and base sheet with two (2) plies of #15 organic roofing felt set in full moppings of bitumen and with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work.
- E. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with the Equiviscous Temperature (EVT) Method as recommended by National Roofing Contractors Association (NRCA). Do not raise temperature above minimum normal fluid-holding temperature

necessary to attain EVT (plus 5°F at point of application) more than one (1) hour prior to time of application. Determine flash point, finished blowing temperature, EVT, and fire-safe handling temperature of bitumen either from information by manufacturer or by suitable test. Do not exceed recommended temperature limits during bitumen heating. Do not heat to a temperature higher than twenty-five degrees (25°) below flash point. Discard bitumen that has been held at temperature exceeding Finishing Blowing Temperature (FBT) for more than three (3) hours. Keep kettle lid closed except when adding bitumen.

- F. Base Roof Ply Bitumen Mopping Rate (**All ROOF AREAS U.N.O.**):
 - 1. Base Roofing Ply Mopping: Apply bitumen at the rate of approximately thirty (30) lb. of bitumen per roof square.
- G. Modified membrane roofing ply cold applied adhesive coverage rate:
 - 1. Modified Membrane Roof Ply – application rate is two and one half (2 ½) gallons per one hundred (100) square feet.
- H. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- I. Apply roofing materials as specified by manufacturer's instructions.
 - 1. Keep roofing materials dry before and during application.
 - 2. Begin and apply only as much roofing in one day as can be completed that same day.
- J. Cut-Offs/Envelope Waterstops: At end of each day's roofing installation, protect exposed edge of incomplete work, including roof ply membranes and insulation. Provide temporary covering of an approved coated base sheet. Install waterstop/temporary flashing a minimum of 6 inches under face edge of insulation and wrapped up face and back a minimum of 6 inches from the face in asphalt mastic at ¾ pounds per foot, top dress waterstop with asphalt mastic.
- K. A minimum two-hour fire watch is required for each day that torch-applied membranes are installed unless noted otherwise by Owner. Keep an approved rated fire extinguisher every 3,000 square feet maximum on the roof. The fire extinguisher shall be placed in a central location in that area where all workers know where it is and how to operate in properly.

3.6 HOT APPLIED VAPOR BARRIER INSTALLATION (**Gantner Ave School**)

- A. Modified Membrane Base Roofing Ply: Install one (1) reinforced modified base roofing ply membrane in thirty (30) lbs. per 100 square feet of the specified hot asphalt bitumen adhesive. The modified membrane shall be shingled in the direction of the slope of the roof.
- B. The modified membrane roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Exercise care during application to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch side laps and eight (8) inch end laps. Stagger the end laps a minimum of 12 inches.
- E. Apply asphalt no more than five (5) feet ahead of each roll being embedded.

- F. Lightly broom in the base roofing ply to assure complete adhesion.
- G. Extend membrane to the top edge of all cants in full moppings of the specified asphalt as shown on the drawings. Seal top of membrane with asphalt mastic until base flashing ply is installed.

3.7 INSULATION INSTALLATION

- A. Refer to Roof Insulation Specification Division 7 Section 07 22 00 for complete installation requirements.
- B. Deck types: Metal and Concrete
- C. Insulation: Rigid tapered and flat polyisocyanurate insulation with a minimum thickness and compressive strength as specified, plus a 1/2" thick roof recovery board.
- D. Insulation Attachment (**All ROOF AREAS U.N.O.**): Polyisocyanurate insulation shall be mechanically attached to the metal roof decks. Subsequent layers of polyiso shall be installed over the polyisocyanurate insulation system in a full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations, or mechanically attached per the project specifications. The recovery board shall be installed over the polyisocyanurate insulation system in a full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations.
- E. Insulation Attachment (**Gantner Ave School**): Polyisocyanurate insulation shall be fully adhered to the properly installed vapor barrier over the prepared and primed roof substrate in full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations. The recovery board shall be installed over the polyisocyanurate insulation system in a full mopping of the specified hot asphalt bitumen in accordance with manufacturer's recommendations.

3.8 BASE ROOFING PLY INSTALLATION – HOT APPLIED (**ALL ROOF AREAS U.N.O.**)

- A. SBS Modified Membrane Base Roofing Ply: Install one (1) fiberglass reinforced modified base roofing ply membrane in thirty (30) lbs. per 100 square feet of the specified hot asphalt bitumen adhesive. The modified membrane shall be shingled in the direction of the slope of the roof and/or tapered insulation system to shed water.
- B. The modified membrane roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Exercise care during application to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch side laps and eight (8) inch end laps. Stagger the end laps a minimum of 12 inches.
- E. Apply asphalt no more than five (5) feet ahead of each roll being embedded.
- F. Lightly broom in the base roofing ply to assure complete adhesion.
- G. Extend membrane to the top edge of all cants in full moppings of the specified asphalt as

shown on the drawings. Seal top of membrane with asphalt mastic until base flashing ply is installed.

- H. Install base flashing ply to all perimeter and projection details in the specified hot asphalt bitumen adhesive.

3.9 MODIFIED MEMBRANE ROOFING PLY COLD APPLIED INSTALLATION

- A. Install specified Modified Membrane Roofing Ply as described below.
- B. Prior to installing the modified membrane roofing ply, the contractor must notify the roof system manufacturer representative, and Owner's representative, to examine the roof area for high and low spots. It may be necessary to mist the roof with water to identify the problem areas. The contractor will correct all problem areas identified. This examination should take place no less than 24 hours in advance of installing the finished membrane.**
- C. Prior to installing the modified membrane cap sheet, clean the base roofing ply of debris and other substances detrimental to roofing installation according to the roof system manufacturer's written instructions. Remove sharp objects. If base sheet has been left exposed for more than 60 days, the base sheet shall be primed with specified asphalt primer (Garla-Prime or approved equal) at a rate of one half (1/2) gallon per 100 square feet. Allow to dry prior to installing mineral cap sheet.
- D. SBS Modified Membrane Roof Ply: Solidly bonded to the base roof ply with specified cold adhesive at the rate of two and one-half (2.5) gallons per one hundred (100) square feet of the specified cold-applied membrane adhesive, shingled uniformly over the prepared substrate. Shingle in proper direction to shed water on each area of roofing. **Prior to installation, cut the modified membrane into maximum 18' lengths and allow to properly relax.**
- E. The roll must push a puddle of adhesive in front of it with adhesive held back 4" from the side laps and 8" from end laps. Care should be taken to eliminate air entrapment under the membrane.
- F. Subsequent rolls of modified shall be installed across the roof as above with a minimum of four (4) inch side laps and eight (8) inch end laps. The end laps shall be staggered twelve (12) inches minimum. The modified membrane shall be laid in the same direction as the base plies but the laps shall not coincide with the laps of the base plies.
- G. For best results, immediately after installing the specified cold applied adhesive install the top layer of modified membrane roofing ply. The applied amount of the cold applied adhesive will be dependent upon substrate, material and ambient temperature conditions, but no further than will allow the cold applied adhesive to skin over prior to the application of the modified membrane ply.
- H. Broom, squeegee and/or roll modified membrane roofing ply into the adhesive to ensure all air pockets are removed.
- I. Extend membrane to the top edge of all cants in full applications of the specified cold applied adhesives as shown on the drawings. Seal top of membrane with the specified cold applied flashing adhesive until modified membrane flashing ply is installed.

- J. All excessive adhesive must be removed from the top edge of the selvage lap or underlying end lap prior to heat welding the laps.
- K. Where no compound is visible at edge of side lap or end lap, laps should be checked by probing the lap with a trowel after the membrane has cooled.
- L. Avoid stepping on side laps before they have been heat welded and rolled. Stepping on the lap can make it stick and tear when the lap is lifted for heat welding.
- M. The corners of the underlying membrane at the end laps, and the corner of the selvage edge on the side laps at T-joints should be cut at a 45° angle with the width of the selvage edge (4").
- N. **Heat weld** all seams with a Leister Variant or approved modified bitumen heat welding machine. Torching is not permitted. Hand weld T joints and hard to reach areas. Membrane without selvedge edge are to be butted together and sealed with a heat welded utility roll.
- O. Aesthetics will be a punch list item. The roof must match the owner's standards for appearance. The desired result of heat welding the laps should be a small uniform pencil line bead of compound visible at all the laps.
- P. Install modified flashing ply to all perimeter and projection details in the specified cold applied flashing adhesive. Heat weld all seams in the same manner.

3.10 FLASHING MEMBRANE INSTALLATION

- A. Seal all curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
- B. Prepare all walls, penetrations, expansion joints and where shown on the drawings to be flashed with asphalt primer at the rate of one hundred (100) square feet per gallon. Allow primer to dry tack free.
- C. The wall/cant juncture will be examined for air passage. If airflow is present, the joint between the cant and wall will be sealed with a closed cell joint backing and reglet joint sealant.
- D. Use the specified modified roof membrane flashing ply as the top flashing ply membrane and adhere to the underlying base flashing ply. Unless noted otherwise, secure at a minimum of eight (8) inches from the finished roof surface using a continuous termination bar fastened at a maximum of six (6) inches on center.
- E. Solidly adhere the entire sheet of flashing membrane to the base flashing ply and substrate with the specified cold-applied flashing adhesive. The adhesive shall be held back 4" from the side laps and 8" from end laps. Care should be taken to eliminate air entrapment under the membrane.
- F. **Heat weld** all seams with a Leister Variant or approved modified bitumen heat welding machine. Torching is not permitted. Hand weld T joints and hard to reach areas. Membrane without selvedge edge are to be butted together and sealed with a heat welded utility roll.

- G. Aesthetics will be a punch list item. The roof must match the owner's standards for appearance. The desired result of heat welding the laps should be a small uniform pencil line bead of compound visible at all the laps.
- H. Seal all vertical laps of flashing membrane with a three-course application of **Silver-Flash aluminized trowel-grade mastic and mesh**.
- I. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work as specified in other sections.
- J. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work as specified in other sections.
- K. Flash all penetrations as specified below and per the project documents. If specific detail is not shown in drawings or specified below, flash detail in accordance with the manufacturer's specifications to comply with the specified guaranty.
- L. Exhaust Fan/Passive Vent/Air Intake:
 1. Minimum curb height is twelve (12) inches off the finished roof surface. Prime vertical curb surface at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in bitumen. Run all plies, including modified membrane, over cant and up to the top edge of the cant. Seal with asphalt mastic.
 3. Install base flashing ply the specified cold applied flashing adhesive covering curb with six (6) inches on to field of the roof.
 4. Install a second ply of modified flashing ply installed the specified cold applied flashing adhesive over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation. If the existing fan's cover cannot fit over the installed flashing system, stop the flashing system at the top of the curb and fasten with cap nails at eight (8) inches on center. Install an 0.040" aluminum slip flashing under the fan cover and fasten to the curb at eight (8) inches on center with neoprene gasketed screws. The slip flashing shall cover the top of the flashing system three (3) inches minimum. Install new corner pieces on the fan cover.
- M. Plumbing/Soil Stack:
 1. Minimum stack height is twelve (12) inches.
 2. Run roof system over the entire surface of the roof. Seal the base of the stack with mastic
 3. Prime flange of new lead sleeve. Install properly sized lead sleeve set in ¼ inch bed of roof cement.
 4. Install base flashing ply in bitumen or the specified cold-applied flashing adhesive.
 5. Install modified membrane in bitumen or the specified cold-applied flashing adhesive.
 6. Seal the intersection of the membrane and stack with the specified elastomeric asphaltic sealant.
 7. Turn sleeve a minimum of one (1) inch down inside of stack. For pipes 2 inches or less in diameter, lead top caps will be required.
- N. Pitch Pocket:
 1. Run all plies up to the penetration.
 2. Place the pitch pocket over the penetration and prime all flanges.
 3. Strip in flange of pitch pocket with one (1) ply of base flashing ply in the specified cold-

- applied flashing adhesive. Extend six (6) inches onto field of roof.
4. Install the modified membrane in the specified cold-applied flashing adhesive and extend nine (9) inches onto field of the roof.
 5. Fill pitch pocket half full with non-shrink grout. Let this cure and top off with specified two-part pourable sealer.
 6. Caulk joint between roof system and pitch pocket with the specified elastomeric asphaltic sealant.
- O. Wood Sleeper Support:
1. Approved wood of equal thickness to insulation and recovery board will be placed into position where weight of object is over 12 pounds per square foot. Wood will be two (2) inches wider than base of object being supported.
 2. Insulation will be installed up against wood sleeper.
 3. Entire roof system will be installed over wood sleeper.
 4. A walkpad will be installed in approved adhesive under the wood sleeper support.
 5. Treated wood supports for the particular equipment would then be placed on the modified membrane roofing ply. Supports will be a minimum of four (4) inches wide.
- P. Parapet Wall with Pre-Manufactured Metal Coping Cap:
1. Prepare wall and install new approved wood blocking fasten to top of wall with approved tapcon masonry anchors at eighteen (18) inches o.c., staggered pattern. Two (2) fasteners will be located within two (2) inches of the blocking section ends, each side. Width of wood blocking shall equal the width of the existing wall. Top of wood blocking shall be a minimum of twelve (12) inches above top of roof. The joints of the wood blocking MUST be staggered between layers.
 2. As required, install the specified plywood sheathing to the inside face of the wall.
 3. Minimum flashing height is eight (8) inches, and maximum flashing height is twenty-four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 4. Set cant in bitumen. Run all field plies, including modified membrane, to the top edge of cant strip and seal with asphalt mastic to a watertight condition.
 5. Install base flashing ply covering entire wall and wrapped over top of wall and down the outside face of the wood blocking, and with six (6) inches on to field of roof and set in the specified asphalt flashing adhesive. Nail membrane at eight (8) inches o.c. to outside face of nailers on top of the wall.
 6. Install the modified flashing ply in the specified asphalt flashing adhesive over the base flashing ply to the outside edge of the parapet wall, and nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash aluminized trowel-grade mastic and mesh at all seams.
 7. Install new metal fascia/extender system with continuous cleat. Fasten to wall structure or wood blocking as specified. Metal fascia extender shall cover the bottom of the wood nailer and top of wall (interface between wood blocking and wall) a minimum of two (2) inches.
 8. Install specified pre-manufactured metal coping cap system.
- Q. Pre-Manufactured Metal Edge Fascia System:
1. Inspect the nailer to assure proper attachment and configuration prior to installing the roof system. Install new wood nailers as required and/or specified to achieve the proper height of one (1) blocking higher than the thickness of the insulation system and recovery board. **Wood nailers shall be set for one (1) blocking higher than the highest thickness of insulation and roof recovery board, and shall be maintained constant around the perimeter of the roof.**
 2. Install tapered edge/cant strip in adhesive to create a smooth transition from roof system

- to wood blocking.
3. Run base roofing ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at eight (8) inches o.c.
 4. Run modified membrane roofing ply to the outside edge of the roof.
 5. Install new metal fascia/extender system(s) with continuous cleats. Fasten to wood fascia as specified.
 6. Install two (2) ¼" wide beads of GreenLock Sealant XL on the bottom surface of the anchor bar flange. Install the new extruded anchor bar onto the modified membrane roof ply and over the edge of the roof, and face fasten the anchor bar to the wood blocking/structure through pre-punched slots every 12" o.c. staggered. The anchor bars shall be butted up next to each other leaving a minimum gap. Install the splice plate at each anchor bar joint.
 7. Install compression seals every 40" o.c. in the slots located at the top of the extruded anchor bar.
 8. Install fascia cover over the extruded anchor bar and press downward firmly until "snap" occurs and the cover is engaged along the entire length.
 9. Install a splice plate at each end of the extruded anchor bar.
- R. Pre-manufactured Curb for Equipment Support (**Secured to Roof Deck**):
1. **Secure curb to roof deck.** Minimum curb height above top of roof is eight (8) inches. Install wood blocking on bottom, or top, of curb to achieve this height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in bitumen. Run base roofing ply over cant and to the top edge of the cant. Seal with asphalt mastic.
 3. Install base flashing ply in the specified cold applied flashing adhesive covering pre-manufactured curb with six (6) inches on to field of the roof.
 4. Install modified membrane over cant and to the top edge of the cant. Seal with asphalt mastic.
 5. Install modified flashing ply in the specified cold applied flashing adhesive over the base flashing ply, nine (9) inches on to field of the roof. Install flashing plies on top of the curb, and nail at eight (8) inches o.c. with cap nails. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install pre-manufactured cover. Fasten sides at twenty-four (24) inches o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape/sealant between metal covers.
 7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- S. Curb Detail/Air Handling Station:
1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
 2. Set cant in bitumen. Run base roofing ply over cant and up to the top edge of the cant. Seal with asphalt mastic.
 3. Install base flashing ply in specified cold applied flashing adhesive covering curb with six (6) inches on to field of the roof.
 4. Install modified membrane over cant and up to the top edge of the cant. Seal with asphalt mastic.
 5. Install modified flashing ply in the specified cold applied flashing adhesive over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches o.c. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install pre-manufactured counterflashing/slip flashing with fasteners and neoprene washers or per manufacturer's recommendations.
 7. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

T. Heat Stack:

1. Minimum stack height is twelve (12) inches.
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric asphaltic sealant or roof cement.
3. Prime flange of new sleeve. Install properly sized sleeves set in ¼ inch bed of roof cement.
4. Install base flashing ply in the specified flashing adhesive.
5. Install modified membrane in the specified flashing adhesive.
6. Caulk the intersection of the membrane with the specified elastomeric asphaltic sealant.
7. Install new collar over cape. Weld collar or install stainless steel draw brand.

U. Reglet Mounted Counterflashing:

1. Remove existing reglet mounted counterflashing system to allow the installation of the new roof flashing and counterflashing system.
2. Minimum flashing height is eight (8) inches. Maximum flashing height is twenty-four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
3. Set cant in bitumen. Run field plies over the cant and up the wall a minimum of three (3) inches.
4. Install base flashing ply covering wall set in the specified adhesive with six (6) inches on to field of the roof.
5. Install modified membrane roofing ply over cant and up the wall a minimum of two (2) inches.
6. Install modified flashing ply in the specified adhesive over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
7. Install the specified termination bar even with the top of the flashing, and secure the termination bar through flashing and into wall every six (6) inches on center. Seal the top of the termination bar/flashing with a 3-course application of Silver-Flash and Garmesh or elastomeric asphaltic sealant.
8. Cut reglet in masonry one joint above flashing, and one joint below the new throughwall flashing system.
9. Install new reglet counterflashing with lead expansion wedges at 12" on center and seal reglet opening with high grade polyurethane sealant. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and fabricated to a watertight condition. The bottom of the cap flashing insert shall project ¼" from the face of the wall with a down turned drip edge (provide a down turned hem in areas subject to human contact). New counterflashing shall cover the termination bar a minimum of four (4) inches.

V. Roof Hatch:

1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies, including modified membrane, over cant a minimum of three (3) inches.
3. Install base flashing ply covering curb set in specified flashing adhesive with six (6) inches on to field of the roof.
4. Install a second ply of modified flashing ply in specified flashing adhesive over the base flashing ply, nine (9) inches on to the field of the roof. Attach top of membrane to top of wood nailer and apply a three-course application of mastic and mesh. Allow to cure and aluminize.
5. Install pre-manufactured lens and fasten flashing sides at eight (8) inches o.c. with

- fasteners and neoprene washers.
6. Install 0.040" aluminum counterflashing and fasten at eight (8) inches o.c. with fasteners and neoprene washers.
- W. Base Flashing for Non-Supported Deck (Wall Expansion Joint):
1. Inspect the nailer to assure proper attachment and configuration. The wood cant strip should be mechanically attached to the vertical and horizontal wood nailers.
 2. Install compressible insulation in neoprene cradle between wall and vertical wood nailer.
 3. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 4. Install base flashing ply in the specified hot asphalt bitumen adhesive covering entire wall and wrapped to top of wood nailer with six (6) inches on to field of the roof. Nail membrane at eight (8) inches o.c.
 5. Install modified flashing ply in the specified cold applied modified asphalt adhesive over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course application of Silver-Flash mastic and mesh at all vertical seams.
 6. Install specified pre-manufactured bellows type wall to curb expansion joint cover in accordance with the project details. Fasten the expansion joint to the curb with neoprene gasketed screws at twelve (12) inches o.c. with fasteners and neoprene washers. Fasten the copper expansion joint to the masonry wall with approved fasteners at eight (8) inches o.c. Furnish continuous prefabricated transitions for all 90 degree junctures/corners. Terminate the end of the expansion joint in accordance with the manufacturer's recommendations.
- X. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
 2. Run complete roof system plies over drain. Cut out plies inside drain bowl.
 3. Set 4lb. lead flashing (thirty (30) inch square minimum) in ¼ inch bed of mastic. Run lead into drain a minimum of two (2) inches. Prime lead at a rate of one hundred (100) square feet per gallon and allow to dry.
 4. Install base flashing ply (forty (40) inch square minimum) in the specified cold applied flashing adhesive.
 5. Install modified membrane (forty-eight (48) inch square minimum) in the specified cold applied flashing adhesive. Stop both flashings plies short of the clamping ring and seal edge of modified flashing plies with a three-course application of SILVER-FLASH aluminized mastic and reinforcing mesh.
 6. Install clamping ring over lead flashing.
 7. Remove drain plug, and install strainer and perforated gravel guard,
- Y. Throughwall Counterflashing:
1. Ensure the new throughwall flashing and receiver of the two-piece counterflashing is set at the proper height above the roof deck.
 2. Minimum flashing height is eight (8) inches. Maximum flashing height is twenty-four (24) inches. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
 3. Set cant in bitumen or cold applied insulation adhesive. Run all field plies, including modified membrane, to the top edge of cant strip and seal with asphalt mastic to a watertight condition.
 4. Install base flashing ply covering wall set in the specified cold applied adhesive with six (6) inches on to field of the roof.
 5. Install a second ply of modified flashing ply in the specified cold applied adhesive over the base flashing ply, nine (9) inches on to the field of the roof. Apply a three-course

application of Silver-Flash mastic and mesh at all vertical seams.

6. Install the specified termination bar even with the top of the flashing, and secure the termination bar through flashing and into wall every six (6) inches on center. Seal top of termination bar and flashing system with a sealant or a three-course application of mastic and mesh.
7. Install the new slip counterflashing within the in-wall receiver. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and welded to a watertight condition. The bottom of the cap flashing insert shall project ¼" from the face of the wall with a down turned drip edge (provide a down turned hem in areas subject to human contact). The new slip counterflashing shall cover the roof flashing system a minimum of four (4) inches.

3.11 APPLICATION OF SURFACING

- A. Prior to installation of surfacing, the completed roof system must be inspected and approved by the Architect and Manufacturer. All repairs must be made by the Contractor prior to the application of the surfacing system. All bitumen materials have properly cured per the manufacturer's recommendations prior to applying the coating system.
- B. Mineral Surfaced Membrane System: While bleed out from the side and end laps are still hot, hand broadcast minerals into asphalt bleed out for a monolithic appearance. If minerals are not properly installed in the bleedout, apply manufacturers approved aluminum coating on all field seams of the modified membrane roofing ply at a rate of two (2) gallons per square, and immediately broadcast loose minerals into the coating while it is still wet.
- C. Roof Coating - Fibered Aluminum Roof Paint, SILVER-SHIELD or approved equal (**ALL ROOF AREAS U.N.O.**):
 1. Allow all cold applied mastics and roofing to properly dry and cure per manufacturer's recommendations before installing the aluminum coating. The aluminum coating system shall be applied in one (1) coat. **Installation of the minerals in the bleedout are still required for the coating application.**
 2. Application: Brush or roller apply one (1) coat of the specified aluminum roof coating at a minimum rate of two (2) gallons per one hundred (100) square feet.

3.12 FIELD QUALITY CONTROL

- A. Perform field inspection and testing as required by this specification and under provisions of Section 1.
- B. Correct defects or irregularities discovered during field inspection.
- C. Require attendance of roofing materials manufacturers' representative(s) at site during installation of the roofing system as specified in Section 1.9 above.

3.13 CLEANING

- A. Remove bitumen adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.

C. Repair or replace defaced or disfigured finishes caused by work of this section.

3.14 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The Owner, Architect and/or roof system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor at a negotiated price.
- D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. Notify the Architect, Owner and roofing system manufacturer upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END OF SECTION 07 52 10

SECTION 07600 SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. Provide all labor, equipment, and materials fabricate and install the following.
 - 1. Pre-manufactured metal edge fascia system, metal fascia extenders and trim.
 - 2. Pre-manufactured metal coping cap system, metal fascia extenders and trim.
 - 3. Expansion Joints.
 - 4. Reglet mounted counterflashings over bituminous base flashing.
 - 5. Surface mounted wall counterflashings over bituminous base flashing.
 - 6. Counterflashings over bituminous base flashing.
 - 7. Counterflashings at roof mounted equipment and vent stacks.
 - 8. Counterflashings for roof accessories.
 - 9. Counterflashings at walls and penetrations.
 - 10. Lead flashing for bituminous membranes.
 - 11. Other components.

1.2 RELATED SECTIONS

- A. Division 6 Section "Rough Carpentry" for wood nailers, cants, curbs, and blocking and for wood-based, structural-use roof deck panels and walls.
- B. Division 7 Section "Roof Insulation"
- C. Division 7 Section "Modified Bituminous Membrane Roofing – Hot/Torch Applied"
- D. Division 7 Section "Modified Bituminous Membrane Roofing – Hot/Cold Applied (Alternate)"
- E. Division 7 Section "Joint Sealers"
- F. Division 7 Section "Manufactured Roof Specialties"

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.
 - 2. ASTM A792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
 - 3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 5. ASTM D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
 - 6. ASTM B32 Solder Metal
 - 7. ASTM B486 Paste Solder

- 8. ASTM D226 Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- 9. ASTM D486 Asphalt Roof Cement, Asbestos-free
- B. American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI)
 - 1. ANSI/SPRI ES-1 Testing and Certification Listing of Pre-Manufactured Fabricated Edge Metal and Pre-Manufactured Metal Coping Cap System.
- C. Warnock Hersey International, Inc., Middleton, WI (WH)
- D. Factory Mutual Research Corporation (FMRC)
- E. Underwriters Laboratories (UL)
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - 1. 1993 Edition Architectural Sheet Metal Manual
- G. National Roofing Contractors Association (NRCA)
 - 1. Roofing and Waterproofing Manual
- H. American Society of Civil Engineers (ASCE)
 - 1. ASCE 7-05 Minimum Design Loads for Buildings and Other Structures.
- I. FS QQ-L-201 - Specification for Lead Sheet
- J. FS O-F-506 - Flux, Soldering, Paste and Liquid

1.4 SUBMITTALS

- A. Submit under provisions of this specification.
- B. Product Data: Provide manufacturer's specification data sheets for each product.
- C. Submit two samples, 12 x 12 inch in size illustrating typical external corner, internal corner, valley, junction to vertical dissimilar surface, material and finish.
- D. Shop Drawings
 - 1. For manufactured and ANSI/SPRI approved pre-manufactured metal edge fascia, metal coping caps and metal fascia extenders, and all other sheet metal fabrications.
 - 2. Shop drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashing, termination's, and installation details.
 - 3. Indicate type, gauge and finish of metal.
- E. Sample Warranty

1. Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner. Warranty shall be provided from one manufacturer and part of a total Edge-to-Edge roof warranty that includes the modified bitumen membrane roof system, pre-manufactured metal edge system, pre-manufactured metal coping cap system, and flashing systems.

F. Certification

1. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.

G. Manufacturer's Product Data

1. Metal material characteristics and installation recommendations.
2. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specified can be approved.

H. ANSI/SPRI ES-1 (Pre-manufactured Metal Edge Fascia System and Pre-manufactured Metal Coping Cap System)

1. Test report must be submitted for specific project wind uplift requirements per Section 1.16 Design and Performance Criteria within "Modified Bituminous Membrane Roofing - Hot Applied" specification.

1.5 QUALITY ASSURANCE

A. Reference Standards

1. Comply with details and recommendations of SMACNA Manual for workmanship, methods of joining, anchorage, provisions for expansion, etc.

B. If required, fabricator/installer shall submit work experience and evidence of adequate financial Responsibility. The owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

C. Successful contractor must obtain all components of roof system from a single manufacturer including any roll good materials if required. Any secondary products that are required, which cannot be supplied by the specified manufacturer, must be recommended and approved in writing by primary manufacturer prior to bid submittal.

D. Manufacturer shall have in place a documented, standardized method for maintaining quality control such as ISO-9001 approval.

E. The roof material manufacturer shall conduct all required periodic inspections of work in progress as described herein and shall furnish written documentation of all such inspections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.

- B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

1.7 JOB CONDITIONS

- A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal roofing system.
- B. Protection:
 - 1. Provide protection or avoid traffic on completed roof surfaces.
 - 2. Do not overload roof with stored materials.
 - 3. Support no roof-mounted equipment directly on the roofing system.
- C. Ascertain that work of other trades which penetrates the roof or is to be made watertight by the roof, is in place and approved prior to installation of roofing.

1.8 DESIGN AND PERFORMANCE CRITERIA

- A. ANSI/SPRI ES-1 (Pre-manufactured Metal Edge Fascia System and Pre-manufactured Metal Coping Cap System)
 - 1. ANSI/SPRI ES-1 test reports must be submitted for specific project wind uplift requirements per Section 1.16 Design and Performance Criteria within "Modified Bituminous Membrane Roofing - Hot Applied" specification.
- B. Thermal expansion and contraction:**
 - 1. Completed metal edge fascia and cant dam system shall be capable of withstanding unlimited thermal expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.**

1.9 WARRANTIES

- A. Material Manufacturer's Warranty
 - 1. Pre-finished metal material shall require a written 20-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D-2244 or chalking excess of 8 units per ASTM D-659. If either occurs material shall be replaced per warranty, at no cost to the Owner.
 - 2. Warranty shall be an Edge-to-Edge roof warranty provided by ONE manufacturer, and shall include the modified bitumen roof system, pre-manufactured metal edge fascia system, pre-manufactured metal coping cap system, flashings, and the transition between all systems.

3. Provide a manufacturer's Edge-to-Edge roof warranty. The manufacturer will also furnish their standard decorative finish warranty.
 4. At the request of the Owner, the Manufacturer will provide an annual inspection. The request for annual inspections shall be applicable for the life of the warranty.
- B. Contractor's Warranty
1. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of three (3) years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal systems (metal fascia extenders, reglet mounted counterflashings, surface mounted counterflashings, slip flashings, etc.), are to be comprised of Aluminum, coated on both sides with an epoxy primer and on the weathering surface with a polyvinylidene fluoride (Kynar) coated finish. Equipment counterflashings, expansion joints, area dividers and slip flashings shall be mill finish. Pitch pockets shall be 20 oz. copper, and have all corners welded or soldered, and a continuous 4" wide deck flange at corners.
1. Materials
 - a. Aluminum

Aluminum, ASTM B209, alloy 3105-H14, in thickness of 0.050" nominal for all metal fascia extenders, expansion joints, reglet mounted counterflashings, and surface mounted counterflashings. All equipment counterflashings, area dividers, and slip flashings shall have a thickness of 0.040".

 1. Minimum thickness of Aluminum to be specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations.
 - b. Color shall be selected by Architect from manufactures standard color range. Counterflashings, expansion joint covers and slip flashings shall be mill finish.
- B. Pre-Manufactured Metal Edge Snap on Fascia System: The Garland Company, Inc ((908) 812-6971) R-Mer Edge Snap-On Fascia System (Basis of Design) or Approved Equal.
1. Metal shall be aluminum, ASTM B209, alloy 3105-H14, in thickness of 0.050" nominal with Kynar 500 or approved equal. Color to be selected by Owner from Manufacturer's standard color chart.

2. Cant Dam shall be 22 ga. galvanized and continuous for the entire roof edge.
 3. All submittals for approved equals shall conform to Sections 1.5 Quality Assurance and 1.8 Design & Performance Criteria.
 4. Provide a manufacturer's Edge-to-Edge roof warranty. Warranted materials shall be free of defects in material and workmanship for five years after shipment. The manufacturer will also furnish their standard decorative finish warranty.
 5. Extenders shall be fabricated from 0.050" aluminum with Kynar 500 or approved equal. Color to match metal edge snap on fascia system.
- C. Pre-manufactured Metal Coping Cap System: The Garland Company, Inc ((908) 812-6971) R-Mer Edge Snap-On Coping System (Basis of Design) or Approved Equal.
1. All components including corrosion resistant fasteners to be used in the copings shall be furnished by manufacturer. Metal shall be aluminum, ASTM B209, alloy 3105-H14, in thickness of 0.050" nominal with Kynar 500 or approved equal. Color to be selected by Owner from Manufacturer's standard color chart.
 2. Anchor chairs shall be 16 ga. galvanized x 16" long, and spaced as required per the manufacturer to meet the ANSI SPRI ES-1 testing.
 3. All submittals for approved equals shall conform to Sections 1.5 Quality Assurance and 1.8 Design & Performance Criteria.
 4. Provide a manufacturer's Edge-to-Edge warranty: Warranted materials shall be free of defects in material and workmanship for five years after shipment. The manufacturer will also furnish their standard decorative finish warranty.
 5. The coping cap corners/miters, butt joints and transitions shall have a continuous factory welded seams.
 6. Extenders shall be fabricated from 0.050" aluminum with Kynar 500 or approved equal. Color to match coping cover.
- D. New Reglet Mounted Wall Counterflashing system shall be 0.050" aluminum or 20 oz. copper counterflashing system. Flashings shall be formed to be secured with lead plugs on 12" on center, with a continuous bead of specified polyurethane sealant.
- E. Pitch pockets shall be 20 oz. copper, and have all corners soldered or welded, and a continuous deck flange at corners.
- F. Two Piece counterflashing systems shall be the two-piece type factory formed system and shall consist of a two-piece Type 300 Series chrome-nickel soft temper stainless steel. Units and type, material, and profile indicated, formed to provide secure interlocking of separate receiver and counterflashing pieces, and compatible with flashing indicated:
1. Material: Stainless steel, 0.0187 inch thick.
 2. Surface Mounted Type: Provide with 45-degree caulk cup above fastening flange.
 3. Stucco Type: Provide with upturned fastening flange of 4" minimum, and extension leg of length to match thickness of applied finish materials or a minimum of 4".
 4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.

Receiver shall have a special vertical locking slot that requires no malleting or bending to the cap insert member in place.

Cap insert members shall be Type 300 Series soft temper austenitic stainless steel 0.018" thick, factory formed to snap lock into vertical locking slot on the receiver portion and provide spring action against the roof flashing system.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Keystone Flashing Company
2. Fry Reglet Corporation
3. Cheney Flashing Company

G. Miscellaneous Metals and Flashings:

1. Curb to Wall Metal Expansion Joints: Mill finished Aluminum; 0.050 inch thick.
2. Surface Mounted Counterflashings: Kynar finished Aluminum, 0.050 inch thick.
3. Equipment Slip Flashing: Mill finished Aluminum, 0.040 inch thick.
4. Equipment Support Flashing: Mill finished Aluminum, 0.040 inch thick.
5. Solder for Stainless Steel: ASTM B 32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.
6. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
7. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened. Exposed fasteners shall have a neoprene or other suitable weatherproofing washer.
8. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
9. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
10. Sealing Tape: Pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

11. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
12. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
13. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.
14. Zinc-Coated Steel Sheet: ASTM A526, 0.20% copper, 26 guage (0.0179"); designation G90 hot-dip galvanized, mill phosphatized.
15. Stainless Steel Sheet: Type 302/304, ASTM A167, 26 guage, (0.0217"), annealed except dead soft where fully concealed by other work, 2D (dull) finish.
16. Copper Sheet: ASTM B370, 20 oz., temper H00 (cold-rolled).
17. Lead-Coated Copper Sheet: ASTM B101. Type I, Class A (12-15 1 lb. of lead coating per 100 sq. ft.), 17.1 oz. (0.022").
18. Zinc Alloy Sheet: Zinc with 0.6% copper and 0.14% titanium; 0.27" thick (21 gauge); standard (soft) temper, mil finish.

2.2 RELATED MATERIALS

- A. Metal Primer: Zinc chromate type.
- B. Plastic Cement: ASTM D 4586
- C. Sealant: As required by material manufacturer.
- D. Lead: Meets Federal Specification QQ-L-201, Grade B, four (4) pounds per square foot.
- E. Solder: ANSI/ASTM B32; 95/05 type.
- F. Flux: FS O-F-506.
- G. Underlayment: Ply of specified base flashing modified membrane, or one ply of R-Mer Seal, a 45 mil self-adhering, high-temperature underlayment consisting of a durable, non-slip, cross-laminated polymer film laminated to a high-temperature rubberized asphalt adhesive or approved equal. Install in accordance with manufacturer's recommendations.
- H. Fasteners:
 1. Nails and Fasteners: Non-ferrous metal or hot dipped galvanized fasteners complying with ASTM A153 and connectors complying with ASTM A653, Class G185; Type 304 or Type 316 stainless steel fasteners and connectors shall be used with new generation of pressure-treated wood; except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel.

Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the wood blocking/nailer material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.

2. Fastening shall conform to ANSI/SPRI ES-1 and/or Factory Mutual 1-90 requirements or as stated on section details, whichever is more stringent and per the manufacturer's requirements.
 - I. Metal Termination Bars:
 1. Shall be heavy flat bar aluminum unless otherwise recommended by membrane manufacturers.
 2. Material shall be .125" x 1" (minimum) aluminum conforming to ASTM B-221, mill finish. Bars shall have holes for fasteners at 6" o.c. maximum.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Isolate contact areas of dissimilar metals with heavy asphalt or other approved coating, specifically made to stop electrolytic action.

3.2 GENERAL

- A. Install work watertight, without waves, warps, buckles, fastening stress, or distortion, allowing for expansion and contraction.
- B. Fastening of metal to walls and wood blocking shall comply with ANSI-SPRI ES-1, SMACNA Architectural Sheet Metal Manual and/or manufacturer's recommendations whichever is of the highest standard.
- C. All accessories or other items essential to the completeness of sheet metal installation, whether specifically indicated or not, shall be provided and of the same material as item to which applied.
- D. Pre-manufactured metal edge fascia system's continuous cant dam shall be secured to the top and side of the wood blocking or wall.
- E. Pre-manufactured metal coping caps shall be secured with the specified anchor chair system at the specified spacing. The anchor chair shall be secured to the top and side of the wood blocking or wall with approved and provided screws in accordance with the manufacturer's requirements/recommendations.
- F. Metal fascia extenders shall be secured to wall or wood blocking at the bottom edge with a continuous cleat. Cleats shall be at least one gauge heavier than the metal it secures. Both pieces shall be secured at 6" on center.

3.3 INSPECTION

- A. Verify metal wall panels, roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets are in place, and nailing strips located.
- B. Verify membrane termination and base flashings are in place, sealed, and secure.
- C. Beginning of installation means acceptance of existing conditions.
- D. Field measure site conditions prior to fabricating work.

3.4 SHOP FABRICATED SHEET METAL

- A. Installing Contractor shall be responsible for determining if the sheet metal systems are in general conformance with roof manufacturer's recommendations.
- B. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices.
- C. Hem exposed edges.
- D. Angle bottom edges of exposed vertical surfaces to form drip.
- E. All corners for sheet metal shall be lapped with adjoining pieces fastened and set in sealant.
- F. Joints for pre-manufactured metal edge fascia system, and metal edge fascia extenders shall be formed with a 3/8" opening between sections. The joints of the metal edge fascia system and the metal edge fascia extenders shall be offset a minimum of twelve (12) inches. The joint openings shall be backed by an internal drainage plate formed to the profile of fascia piece. The pre-manufactured metal edge fascia system and metal fascia extenders shall be embedded in two rows of butyl sealant over the internal drainage plate. The internal drainage plate shall be embedded in two rows of butyl sealant over the continuous cant dam and fastened through the opening between the sections and loose locked to the drip edges.
- G. Joints for the pre-manufactured coping cap system shall be formed with a 1/4" opening between sections. Joints for metal edge fascia extenders shall be formed with a 3/8" opening between sections. The joints of the pre-manufactured coping cap and the metal edge fascia extenders shall be offset a minimum of twelve (12) inches. The joint openings shall be backed by an internal drainage plate formed to the profile of fascia piece. The pre-manufactured metal coping cap system shall be embedded in two rows of butyl tape over the internal drainage plate.
- H. Joints for counterflashings shall be overlapped a minimum of 3", and counterflashings shall extend 4" below the roof flashing termination bar.
- I. Install sheet metal to comply with ANSI/SPRI, SMACNA and NRCA standards, and per the manufacturer's instructions.

3.5 FLASHING MEMBRANE INSTALLATION

A. ROOF DRAIN

1. Prime lead at a rate of 100 square feet per gallon and allow to dry.

2. Set lead flashing (30" square minimum) in a 1/4" bed of mastic.
3. Install specified roof flashing system.
4. Install metal clamping ring and strainer. Stop all plies short of the clamping ring and seal edge with a three course application of the specified SILVER-FLASH aluminized mastic as specified in the hot applied modified bitumen roof system specification and reinforcing mesh.
5. Install specified stainless steel gravel guard.

B. PLUMBING STACK

1. Prime flange and sleeve at a rate of 100 square feet per gallon and allow to dry.
2. Install properly sized sleeves in a 1/4" bed of roof cement.
3. Turn sleeve a minimum of 1" down inside of stack or lead caps on pipes 2" or less in diameter.
4. Caulk intersection of the membrane and flange with elastomeric asphaltic sealant or roof cement.

C. EQUIPMENT SUPPORTS/EXHAUST VENTS/SKYLIGHT CURBS/ROOF HATCH

1. Mill finished aluminum counterflashing and/or slip flashing extender shall be provided with watertight accessories such as miters, transitions, end caps, etc. and finished to match.
2. Accessories: Joint covers, corners, fasteners, strip flashing at joinings, fastening, and other accessories shall be included.
3. On small units, install an 0.040 mill finished aluminum extender will be installed under the existing counterflashing or curb lip to cover the newly installed roof flashing system by at least 4 inches. The new extender will be secured with fasteners and neoprene washers every 8 inches on center.

D. PITCH POCKET

1. Prime flange and sleeve at a rate of 100 square feet per gallon and allow to dry.
2. Install properly sized and prefabricated stainless steel or copper pitch pockets with welded or soldered watertight joints in a 1/4" bed of roof mastic. The pitch pocket MUST have continuous deck flanges at the corners.
3. Install specified two ply roof flashing system.
4. Caulk intersection of the flashing membrane and flange with elastomeric asphaltic sealant or roof cement.

5. In accordance with project the detail and manufacturer's recommendations, prime penetrations and the pitch pocket surfaces, and fill pitch pocket with non-shrink grout and pourable sealer.

E. PRE-MANUFACTURED METAL EDGE FASCIA SYSTEM

1. Install new metal fascia/extender system with continuous cleat. Fasten to wood fascia as specified but at a minimum of six (6) inches o.c. Metal fascia extender shall cover the bottom of the wood nailer and top of wall (interface between wood blocking and wall) a minimum of two (2) inches.
2. Position base plies of the modified bitumen membrane roof system over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.
3. Install miters first.
4. Cant Dam: Install Cant Dam in a bed of mastic and secure with roofing nails twelve (12) inches on center through the top of metal flange and outside face. Overlap the ends of the cant dam one (1) inch.
5. Modified Flashing System: Prime Cant Dam at a rate of one hundred (100) square feet per gallon and allow to dry. Strip in Cant Dam with base flashing membrane installed in the specified cold applied adhesive and extending six (6) inches into roof field, followed with a cap sheet installed in the specified cold applied adhesive and extending nine (9) inches into the roof field. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.
6. Fascia Cover: Install fascia cover with splice plate under one end by pressing downward firmly until "snap" occurs and cover is engaged along entire length of miter. Field cut where necessary with fine tooth saw. Sealant is to be placed between six (6) inch wide splice plates on metal edge pieces, one bead, approximately one (1) inch from fascia cover joint.

F. PRE-MANUFACTURED SNAP-ON METAL COPING CAP SYSTEM

1. Accessories: Joint covers, seam sealant, seam tape, caulking, fasteners, and other accessories shall be included.
2. Where metal extender is required, install continuous cleat on the outside face of the wall and fasten to the vertical face to the wood nailer at 6" o.c. staggered. Install new metal fascia extender hooked onto the continuous cleat and nail to the wood nailer outside face at 6" o.c. staggered.
3. Metal coping cap pieces shall be formed with ¼" joints between sections. The joint shall be backed by an internal drainage plate formed to the profile of fascia piece. The metal coping cap shall be embedded in two (2) rows of butyl sealant tape over the internal drainage plate. The internal drainage plate shall be installed over the anchor chair.
4. Install Miters first.

5. Position base flashing of the Modified Roofing membrane over the wall edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.
6. Install minimum sixteen (16) inch long anchor chairs at forty (40) inches on center.
7. Install 8" wide splice plate by centering over sixteen (16) inch wide anchor chair. Install two (2) layers of butyl sealant tape, one (1) to either side of the splice plate's center. Approximately two (2) inches from the coping cap joint. Install Coping Cap by hooking outside hem of coping on outside face of anchor chair. Press downward on inside edge of coping until "snap" occurs and hem is engaged on the entire chair.

G. CURB DETAIL/AIR HANDLING STATION

1. Mill finish aluminum slip flashing extender shall be provided with watertight accessories such as miters, transitions, end caps, etc. and finished to match.
2. Accessories: Joint covers, corners, fasteners, strip flashing at joinings, fastening, and other accessories shall be included.
3. Over the termination bar, an 0.040 mill finished aluminum extender will be installed under the existing counterflashing or curb lip to cover the newly installed roof flashing system by at least 4 inches. New counterflashing will be secured with fasteners and neoprene washers every 8 inches on center.

H. HEAT STACK

1. Prime flange and sleeve at a rate of 100 square feet per gallon and allow to dry.
2. Install properly sized sleeves in a 1/4" bed of roof cement.
3. Reuse existing collar over cape. Where required, weld collar or install stainless steel draw band.
4. Caulk intersection of the membrane and flange with asphalt roofing cement.

I. REGLET MOUNTED COUNTERFLASHINGS

1. Install specified roof flashing system with both plies terminating at the top of the specified flashing height. Secure continuous termination bar through top of flashing system and into wall at a maximum of 6" o.c. Caulk top of the termination bar and roof flashing system with a three-course application of asphaltic mastic and reinforcing mesh, or the specified elastomeric asphaltic sealant to provide a watertight seal.
2. Saw cut mortar joint to proper depth to accept receiver. Secure new counterflashing with lead plugs at 12" on center. Seal top of receiver with a continuous bead of the specified polyurethane sealant. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and sealed to a watertight condition. The bottom of the cap flashing insert shall

project ¼" from the face of the wall with a down turned drip edge. The new counterflashing shall cover the termination bar and top of the roof flashing system a minimum of four (4) inches.

3. Install counterflashing system in accordance with plan details and in accordance with referenced standards and manufacturer's instructions.

J. SURFACE MOUNTED COUNTERFLASHINGS

1. Install specified roof flashing system with both plies terminating at the top of the specified flashing height. Secure continuous termination bar through top of flashing system and into wall at a maximum of 6" o.c. Caulk top of the termination bar and roof flashing system with a three-course application of asphaltic mastic and reinforcing mesh, or the specified elastomeric asphaltic sealant to provide a watertight seal.
2. Install new surface mounted counterflashing receiver and secure with neoprene gasketed fasteners at eight (8) inches on center. Seal top of counterflashing receiver with a continuous bead of the specified polyurethane sealant. End joints shall be interlocking and overlapping not less than 3". Corners shall be mitered and sealed to a watertight condition. The bottom of the cap flashing insert shall project ¼" from the face of the wall with a down turned drip edge. The new counterflashing shall cover the termination bar and top of the roof flashing system a minimum of four (4) inches.
3. Install counterflashing system in accordance with plan details and in accordance with referenced standards and manufacturer's instructions.

END OF SECTION 07 60 00

SECTION 07811 - SPRAYED FIRE-RESISTIVE MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concealed SFRM.
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel" for surface conditions required for structural steel receiving SFRM.

1.3 DEFINITIONS

- A. SFRM: Sprayed fire-resistive material.
- B. Concealed: Fire-resistive materials applied to surfaces that are concealed from view behind other construction when the Work is completed

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For Installer and testing agency.
- C. Compatibility and Adhesion Test Reports.
- D. Product Test Reports.
- E. Research/Evaluation Reports.
- F. Field quality-control test reports.
- G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by SFRM manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its SFRM to the

Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer.

- B. Source Limitations: Obtain SFRM through one source from a single manufacturer.
- C. SFRM Testing: By a qualified testing and inspecting agency engaged by Contractor or manufacturer to test for compliance with specified requirements for performance and test methods.
 - 1. SFRMs are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Testing is performed on specimens of SFRMs that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
 - 3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
- D. Compatibility and Adhesion Testing: Engage a qualified testing and inspecting agency to test for compliance with requirements for specified performance and test methods.
 - 1. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 2. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with SFRM.
- E. Fire-Test-Response Characteristics: Provide SFRM with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify bags containing SFRM with appropriate markings of applicable testing and inspecting agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency acceptable to authorities having jurisdiction, for SFRM serving as direct-applied protection tested per ASTM E 119.
- F. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
- G. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Extent of Mockup: Approximately 100 sq. ft. (9 sq. m) of surface for each product indicated.
 - 2. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review products, exposure conditions, design ratings, restrained and unrestrained conditions, calculations, densities, thicknesses, bond strengths, and other performance requirements.

2. Review surface conditions and preparations.
3. Review field quality-control testing procedures.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire-resistance ratings applicable to Project.
- B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
- C. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from Project site and discard wet or deteriorated materials.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply SFRM when ambient or substrate temperature is 40 deg F (4 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of SFRM. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.8 COORDINATION

- A. Sequence and coordinate application of SFRM with other related work specified in other Sections to comply with the following requirements:
 1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
 2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace SFRMs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:

- a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of SFRM from substrates.
 - b. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCEALED SFRM

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following:
1. Concealed Cementitious SFRM: Basis-of-Design
 - a. Grace, W. R. & Co. - Conn., Construction Products Div.; Monokote Type MK-6.
 - b. Isolatek International Corp.; Cafco 300
 - c. Southwest Veemiculite Co. Inc.; Type 5
 - d. Carbolite Co., Fireproofing Products Div. ; Pyrolite 15 High Yield
 - e. Or Approved Equal.
- B. Material Composition: Manufacturer's standard product as follows:
1. Concealed Cementitious SFRM: Factory-mixed, dry formulation of gypsum or portland cement binders, additives, and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
 2. Materials may not contain mineral fibers.
- C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
1. Dry Density: 15 lb/cu. ft. (240 kg/cu. m) for average and individual densities, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWC Technical Manual 12-A, Section 5.4.5, "Displacement Method."
 2. Thickness: Minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than 0.375 inch (9 mm), per ASTM E 605:
 - a. Where the referenced fire-resistance design lists a thickness of 1 inch (25 mm) or more, the minimum allowable individual thickness of SFRM is the design thickness minus 0.25 inch (6 mm).
 - b. Where the referenced fire-resistance design lists a thickness of less than 1 inch (25 mm) but more than 0.375 inch (9 mm), the minimum allowable individual thickness of SFRM is the greater of 0.375 inch (9 mm) or 75 percent of the design thickness.
 - c. No reduction in average thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft. (240 kg/cu. m).

3. Bond Strength: 150 lbf/sq. ft. (7.2 kPa) minimum per ASTM E 736 based on laboratory testing of 0.75-inch (19-mm) minimum thickness of SFRM.
4. Compressive Strength: 5.21 lbf/sq. in. (35.9 kPa) minimum per ASTM E 761. Minimum thickness of SFRM tested shall be 0.75 inch (19 mm) and minimum dry density shall be as specified but not less than 15 lb/cu. ft. (240 kg/cu. m).
5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, or delamination per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of SFRM is 0.75 inch (19 mm), maximum dry density is 15 lb/cu. ft. (240 kg/cu. m), test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.
9. Fire-Test-Response Characteristics: Provide SFRM with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Flame-Spread Index: 10 or less.
 - b. Smoke-Developed Index: 0.
10. Fungal Resistance: No observed growth on specimens per ASTM G 21.

2.2 AUXILIARY FIRE-RESISTIVE MATERIALS

- A. General: Provide auxiliary fire-resistive materials that are compatible with SFRM and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: For use on each substrate and with each sprayed fire-resistive product, provide primer that complies with one or more of the following requirements:
 1. Primer's bond strength complies with requirements specified in UL's "Fire Resistance Directory" for coating materials based on a series of bond tests per ASTM E 736.
 2. Primer is identical to those used in assemblies tested for fire-test-response characteristics of SFRM per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of SFRM.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of work. A substrate is in satisfactory condition if it complies with the following:
 1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, incompatible paints, incompatible encapsulants, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
 2. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.

3. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.

- B. Verify that concrete work on steel deck has been completed.
- C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work are completed.
- D. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
- B. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, and incompatible primers, paints, and encapsulants.

3.3 APPLICATION, GENERAL

- A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- B. Apply SFRM that is identical to products tested as specified in Part 1 "Quality Assurance" Article and substantiated by test reports, with respect to rate of application, accelerator use, sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.
- C. Coat substrates with bonding adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by SFRM manufacturer for material and application indicated.
- D. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by SFRM manufacturer, install body of fire-resistive covering in a single course.
- E. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by SFRM manufacturer.

3.4 APPLICATION, CONCEALED SFRM

- A. Apply concealed SFRM in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if specified in Part 2 "Concealed SFRM" Article.

3.5 APPLICATION, EXPOSED SFRM

- A. Apply exposed SFRM in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if indicated.
- B. Cure exposed SFRM according to product manufacturer's written recommendations.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage and pay for an Owner approved qualified testing agency to perform tests and inspections and prepare test reports.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Tests and Inspections: Testing and inspecting of completed applications of SFRM shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of SFRM for the next area until test results for previously completed applications of SFRM show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.
 - 1. Thickness for Floor, Roof, and Wall Assemblies: For each 1000-sq. ft. (93-sq. m) area, or partial area, on each floor, from the average of 4 measurements from a 144-sq. in. (0.093-sq. m) sample area, with sample width of not less than 6 inches (152 mm) per ASTM E 605.
 - 2. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
 - 3. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
 - 4. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: For each 10,000-sq. ft. (929 sq. m) area, or partial area, on each floor, cohesion and adhesion from one sample of size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 736.
 - 5. If testing finds applications of SFRM are not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
- C. Remove and replace applications of SFRM that do not pass tests and inspections for cohesion and adhesion, for density, or for both and retest as specified above.
- D. Apply additional SFRM, per manufacturer's written instructions, where test results indicate that thickness does not comply with specified requirements, and retest as specified above.

3.7 CLEANING, PROTECTING, AND REPAIR

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect SFRM, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Substantial Completion.
- C. Coordinate application of SFRM with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect SFRM and patch any damaged or removed areas.
- D. Repair or replace work that has not successfully protected steel.

END OF SECTION 07811

SECTION 07812 – INTUMESCENT FIRE-RESISTIVE MATERIAL

PART 1 - GENERAL

1.1 SCOPE

- 1.1.1 This specification covers labor, materials, equipment, and application necessary for, and incidental to, the complete and proper installation of intumescent fire protection for application to steel structures and supports in accordance with all applicable requirements of contract documents.
- 1.1.2 This specification shall be supplemented by the applicable requirements of building codes, insurance rating organizations and all other authorities having jurisdiction.

1.2 SECTION INCLUDES

- 1.2.1 Intumescent fire protection material.
- 1.2.2 Topcoat protective decorative finish.

1.3 RELATED SECTIONS

- 1.3.1 Section 05120 - 05500: Structural steel and metal fabrications with reference to primer receiving fire protection materials.
- 1.3.2 Section 07811: Spray-Applied Fire Resistive Material.
- 1.3.4 Section 07841: Firestopping and Smoke Seals.
- 1.3.5 Section 09900: Painting.

1.4 REFERENCES

- 1.4.1 Underwriters Laboratories Inc. (UL) Fire Resistance Directory.
- 1.4.2 Underwriters Laboratories of Canada (ULC) - List of Equipment and Materials.
- 1.4.3 FIRETEX FX5120 has been certified by Underwriters Laboratories to UL263 and listed by the following designs:
a. Design No. D981
b. Design No. N636
c. Design No. Y623
d. Design No. Y624

- 1.4.4 Test Standards

A. UL 263 (ASTM E119) - Fire Tests of Building Construction and Materials.

B. CAN/ULC-S101 - Standard Methods of Fire Endurance Tests of Building Construction and Materials.

**C. ASTM E84 - Surface Burning Characteristics of Building Materials.
Flame Spread Maximum: 0 and Smoke Developed Maximum: 5. Class A**

D. ASTM D2240 – Durometer Hardness: SHORE “D”- 53

E. ASTM D2794 – Impact Resistance: Direct: 16 in/lb Reverse: 20 in/lb

F. ASTM D4060 – Abrasion Resistance- 1000 Cycles/ 1kg Weight, CS17 Wheel: 290 mg loss

G. ASTM D4541 – Bond Strength (Type IV). Average: 391 psi.

- 1.4.4 Steel Structures Painting Council (SSPC) Surface Preparation Standards.
- 1.4.5 Material manufacturer's current published Product Technical Data Sheet (PDS) and Material Safety Data Sheet (MSDS).
- 1.4.6 AWC Technical Manual 12-B "Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide", Latest Edition.

1.5 SYSTEM DESCRIPTION

- 1.5.1 The intumescent fire protection materials shall be applied at the required thickness to provide the UL fire resistive ratings.

1.6 SUBMITTALS

- 1.6.1 Manufacturer's Data: Submit manufacturer's Product Data Sheet (s), and certifications as may be required to verify material compliance with contract documents.

1.7 QUALITY ASSURANCE

- 1.7.1 Manufacturer - Company specializing in manufacturing fire protection products.
- 1.7.2 The intumescent fire resistive material shall be manufactured under the Follow-Up Service program of UL or ULC and bear the UL and/or ULC label (mark).
- 1.7.3 Applicator - A firm with expertise in the installation of fire resistive or similar materials.
- 1.7.4 Product - The product shall be approved by the architect and applicable authorities having jurisdiction.

1.8 DELIVERY, STORAGE AND HANDLING

- 1.8.1 Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaged materials shall bear the appropriate labels, seals and UL label (mark) for fire resistive ratings and shall be stored at temperatures between 41° F (5° C) and 77° F (25° C), in a dry interior location away from direct sunlight. **DO NOT FREEZE.**

1.9 PROJECT/SITE CONDITIONS

- 1.9.1 When the temperature at the job site is less than 50° F (10° C), a minimum substrate and ambient temperature of 50° F (10° C) shall be maintained prior to, during, and a minimum of 72 hours after application. If necessary for job schedule, the General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.

- 1.9.2 In enclosed areas, ventilation shall not be less than 4 complete air exchanges per hour until the material is dry.
- 1.9.3 Relative humidity shall not exceed 85% throughout the total period of application and drying for the intumescent fire resistive material, and must not exceed 85% throughout the application and drying for the protective decorative topcoat.

1.10 SEQUENCING AND SCHEDULING

- 1.10.1 Applicator shall cooperate in the coordination and scheduling of fire protection work to avoid delays in job progress.
- 1.10.2 The installation of piping, ducts, conduit or other suspended equipment shall not commence until the application of the thin-film fire resistive material is complete in that area.

PART 2 - PRODUCTS

2.1 COMPATIBLE METAL PRIMER

- 2.1.1 Primer shall be approved by manufacturer and applied in full accordance with the primer manufacturer's written instructions.

2.2 INTUMESCENT FIRE PROTECTION SYSTEM

- 2.2.1 The intumescent fire resistive material shall be Sherwin-Williams® FIRETEX FX 5120™ as supplied by The Sherwin-Williams Company Or Approved Equal.
- 2.2.2 Intumescent fire resistive material shall be applied in accordance with drawings and/or specifications, and shall have been tested in accordance with the procedures of UL 263 or ASTM E119 or CAN/ULC-S101, and reported by Underwriters Laboratories, Inc. or Underwriters Laboratories of Canada only.
- 2.2.3 Thin-Film Fire-Resistive Intumescent Mastic Coating: Factory-mixed formulation.
- A. Water-Based Formulation: Approved by manufacturer and authorities having jurisdiction for indicated use.
 - B. Verify with manufacturer that products selected are suitable for use indicated.
 - C. UL Fire Tested Designs Only based on UL 263 (ASTM-E119).
 - D. A representative mock-up sprayed Architectural finish sample must be submitted, reviewed, and accepted by the architect in advance.

2.3 TOPCOATING

- 2.3.1 Topcoat materials shall be as required for color-coding, aesthetics or additional surface protection, approved by the thin-film fire resistive material manufacturer and applied in full accordance with the coating manufacturer's written instructions.

PART 3 - EXECUTION

3.1 PREPARATION

- 3.1.1 All surfaces to receive thin-film fire resistive material shall be clean, dry and free of oil, grease, loose mill scale, dirt, dust or other materials which would impair bond of the thin-film fire resistive material to the surface.

3.1.2 Confirm compatibility of surfaces to receive thin-film fire resistive material. Steel surfaces shall be primed with a compatible primer approved by the thin-film fire resistive material manufacturer.

3.1.3 Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated with intumescent coating.

3.2 APPLICATION

3.2.1 The thin-film fire resistive material shall be applied at the required dry film thickness per the appropriate UL design number guidelines and manufacturers written application instructions.

3.3 MOCK UP

3.3.1 Before proceeding with the work, the applicator shall apply the thin-film fire resistive material to a section witnessed by the architect's or owner's representative. The application shall be subject to their approval and shall be used as a guide for texture and thickness of the finished work.

3.4 CLEAN UP AND REPAIR

3.4.1 Upon completion of installation, all excess material, overspray and debris shall be cleared and removed from the job site.

3.4.2 Patching and Touch-Up shall be performed by an applicator with expertise in the installation of Intumescent Fire Protection Coatings. Repair shall be in accordance with UL design number guidelines and manufacturers written application instructions.

3.5 INSPECTION AND TESTING

3.5.1 Refer to AWCI Technical Manual 12-B "Standard Practice For The Testing and Inspection Of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide", Latest Edition, prior to application of the topcoat.

3.5.2 The results of the above tests shall be made available to all parties at the completion of each area and approved prior to the application of topcoat.

4.0 COATING SCHEDULE

1. Minimum Surface Preparation: SSPC-SP1 Solvent Cleaning, SP2 Hand Tool Cleaning and/or SP3 Power Tool Cleaning as required. For optimum performance, Abasive Blast Clean steel surfaces per SSPC-SP6 Commercial Blast Cleaning.
2. Prime Coat: Kem Bond HS Universal Metal Primer #B50Z Series @3.0-4.0 Dry Mils (or other compatible primer)
3. Intumescent: FIRETEX FX 5120 Waterbased Intumescent Fireproofing (Dry Film Thickness refer to UL263 Thickness Tables)
4. Topcoat: See Firetex FX 5120 data pages for appropriate finish coats.

END OF SECTION 07812

09670 – RESINOUS FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Resinous flooring systems with integral formed epoxy cove base
 - 2. Preparation of existing concrete substrate.
 - 3. Protection of adjacent materials and surfaces

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: For each resinous flooring system required, provide 3 samples of the various flake color blends that are 6 inches square, applied to a rigid backing by Installer for this Project. Custom Color Flake blends to be provided by Architect.
- C. Shop Drawings: Shop Drawings shall be furnished showing installation of cove base, termination details and details at floor material transitions and where adjoining equipment.

1.5 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- B. Material Certificates: For each resinous flooring component, from manufacturer.
- C. Material Test Reports: For each resinous flooring system.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.
- B. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
 - 1. Installation shall be performed by an applicator with minimum 10 years' experience in work of similar nature and scope.
- C. Installer to keep daily log of the date of installation, room number, type, color, and method of application of product being installed. Log must be available for inspection by the Architect upon request.
- D. Mockups: Provide a full-thickness, portable finished mock-up sample measuring 2 ft x 2 ft minimum to demonstrate non-slip texture, color, thickness, chemical resistance, cleanability,

and other features of the resinous floor. Simulate finished lighting conditions for review of in-place field sample.

1. If the initial control sample is unacceptable, make adjustments to comply with requirements until acceptable and approved.
2. The approved mock-up to be the standard of quality for installed work.
3. Unacceptable installed work to be removed and replaced until acceptable. Aesthetically unacceptable but well bonded work may be overlaid or recoated if thickness clearances permit.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

E. On-Site installation Meeting to coordinate desired finish coat (level of slip resistance) w/ Owner & Architect

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials in dry protected area at a temperature between 60° F to 80° F.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.
 1. Product, specifications, and quality of design standards are based on products by Key Resin Company or Approved Equal
- B. Alternative manufacturers must have as a minimum the standards set forth in this specification and must be preapproved in accordance with project requirements. Other products that may be acceptable upon a compliance review include:
 1. Dur-A-Flex
 2. Stonhard

2.2 RESINOUS FLOORING TYPE 1 (RES-1)

- A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, decorative-aggregate-filled, urethane cement and epoxy-resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base at perimeter unless noted otherwise.
1. Basis of Design Product: Key Resin Company – Key Urecon SLT Quartz with Key #470 Polyaspartic seal coat, 1/8" - 3/16" Urethane Cement Resinous Flooring with broadcast quartz finish
- B. System Characteristics:
1. Color and Pattern: As selected by Architect from manufacturer's full range of standard and custom blends.
 2. Wearing Surface: Key Urecon SLT Quartz is a moisture vapor tolerant polymer flooring system consisting of a urethane cement mortar base and decorative colored quartz broadcast finish.
 3. Overall System Thickness: Minimum 3/16 inch.
- C. Primer: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.
- D. Patching and Fill Material: Resinous product approved by resinous flooring manufacturer for application indicated.
- E. Body Coat:
1. Resin: Urethane cement mortar.
 2. Type: Key Urecon SL or Flowfresh SL
 3. Application Method: Self-leveling slurry with broadcast aggregates.
 4. Number of Coats: One
 5. Thickness of Coats: 1/8 - 3/16 inch.
 6. Aggregates: colored BCM broadcast quartz.
 7. Broadcast to excess
- F. Second Broadcast Coat:
1. Resin: 100% Solids Clear Epoxy.
 2. Number of Coats: One
 3. Thickness of Coats: 10-15 mils.
 4. Aggregates: colored BCM broadcast quartz.
- G. Topcoat: Sealing or finish coats.
1. Resin: Key #511 or #514 UV Resistant Epoxy and Key #470 Polyaspartic
 2. Type: Clear.
 - a. Seal/Grout broadcasted flakes with Key #511 or #514
 - b. Finish/Top system with Key #470 with additional non-skid additive.
 3. Number of Coats: Two
 4. Total Thickness of Coats: 6-12 mils
 5. Finish: Gloss.
- H. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
1. Compressive Strength: 7,700 psi minimum according to ASTM C 579.
 2. Tensile Strength: 1,100 psi minimum according to ASTM C 307.
 3. Flexural Strength: 2,600 psi minimum according to ASTM C 580.
 4. Impact Resistance: Withstands 16 ft-lbs without chipping, cracking, or delamination according to MIL-D-3134J.

5. Resistance to Elevated Temperature: No slip or flow required temperature of 158°F according to MIL-D-3134J.
 6. Abrasion Resistance: 45 mg maximum weight loss according to ASTM D 4060.
 7. Hardness: 80-85, Shore D according to ASTM D 2240.
- I. Provide slip-resistant, cleanable textured finish. Mock-up to be approved by Architect or Owner per Section 1.7.D.
 - J. Provide 6" inch integral coved base as required by Architect or Owner.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verification of Conditions: Examine conditions under which products are to be installed in coordination with Installer of materials and components specified in this Section and notify affected General Contractors in writing, with copies to the Owner's Representative and Architect, of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- B. Obtain Architect's approval of mock-up before installing flooring; specified in QUALITY ASSURANCE.
- C. Preparation of Surfaces:
 1. Effectively remove existing concrete laitance by steel shot blasting or other mechanical method approved by flooring manufacturer. Surface profile must be a minimum CSP-3-4 profile according to International Concrete Repair Institute Guideline #03732
- D. Moisture Testing: Verify the moisture vapor emission rate of the slab does not exceed that as recommended by the manufacturer at time of installation of the flooring. Moisture vapor emission and moisture content testing must conform with the requirements of ASTM F-2170-11 (Relative Humidity Probe Test). If any test result shows excessive levels of moisture content or vapor emission rate, submit change order to apply manufacturer's recommended moisture vapor emission control material based upon the highest reading.
- E. All expansion joints shall be honored through the finished flooring system. Treat cracks in concrete using manufacturer's recommended practice
- F. Notify Architect in writing prior to commencing work of any conditions deemed unsatisfactory for the installation; installation of flooring materials is understood as acceptance of the substrate as satisfactory.

3.2 APPLICATION

- A. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- B. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- C. Primer: If required, apply primer over prepared substrate at manufacturer's recommended spreading rate.

- D. Integral Cove Base: Apply cove base mix to wall surfaces in conjunction with the resinous flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
 - 1. Integral Cove Base: 6 inches high unless noted otherwise on Drawings.
- E. Self-Leveling Body Coat: Apply self-leveling slurry body coats in thickness indicated for flooring system.
 - 1. Aggregates: Broadcast aggregates to refusal, after resin is cured, remove excess aggregates.
 - 2. Ensure that the body coat sufficiently covers and levels the floor, leaving no indication of grout joints in the finished floor.
- F. Second Broadcast Coat: Apply epoxy in thickness indicated.
 - 1. Aggregates: Broadcast aggregates to refusal and after resin is cured, remove excess aggregates.
- G. Grout/Top coats: Apply grout and top coats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.
- H. Match finished work to approved sample; uniform in thickness, color, texture and free from defects detrimental to appearance.

3.3 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- B. Dispose of waste properly

END OF SECTION

SECTION 321313 – CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 - 1. Concrete pads.
 - 3. Curbs.
 - 4. Walkways.
- B. Related Sections include the following:
 - 1. Section 31 20 00 "Earthwork" for subgrade preparation, grading, and subbase course.
 - 2. Section 32 13 73 "Concrete Pavement Joint Sealants" for joint sealants within concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Samples: 10-lb (4.5-kg) sample of exposed aggregate.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.

4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or adhesive.
8. Joint fillers.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.
- C. Testing Agency Qualifications: The Contractor is responsible for providing an independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
 1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixes.
 - c. Ready-mix concrete producer.
 - d. Concrete subcontractor.

1.6 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves of a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.
- C. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.
- D. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- E. Epoxy-Coated Reinforcement Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars.
- F. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
- G. Plain Steel Wire: ASTM A 82, as drawn.
- H. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A coated, plain steel.
- I. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.
- J. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain steel bars.
- K. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- L. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar

supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer coated wire bar supports.
- N. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

- A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.
- B. Portland Cement: ASTM C 150, Type I or II.
1. Fly Ash: ASTM C 618, Class F or C.
 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.
- D. Blended Hydraulic Cement: ASTM C 595M, Type IP portland pozzolan cement.
- E. Blended Hydraulic Cement: ASTM C 595M, Type I (PM) pozzolan-modified portland cement.
- F. Blended Hydraulic Cement: ASTM C 595M, Type I (SM) slag-modified portland cement.
- G. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
1. Class: 4S.
 2. Class: 4M.
 3. Class: 1N.
 4. Maximum Aggregate Size: 1 inch (25 mm) nominal.
 5. Do not use fine or coarse aggregates containing substances that cause spalling.
- H. Exposed Aggregate: Selected, hard, and durable; washed; free of material that reacts with cementitious material or causes staining; from a single source, with gap graded coarse aggregate as follows:
1. Aggregate Sizes: 1/2 to 3/4 inch (13 to 19 mm) nominal.
- I. Water: ASTM C 94.
- ## 2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1 inch (13 to 25 mm) long.
- B. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1 inch (13 to 25 mm) long.
- C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Fibrillated Fibers:
 - a. Fibrasol F; Axim Concrete Technologies.
 - b. Fibermesh; Fibermesh, Div. of Synthetic Technologies.
 - c. Forta CR; Forta Corporation.
 - d. Grace Fibers; W. R. Grace & Co., Construction Products Div.
 - 2. Monofilament Fibers:
 - a. Fibrasol IIP; Axim Concrete Technologies.
 - b. Fiberstrand 100; Euclid Chemical Co.
 - c. Fibermix Stealth; Fibermesh, Div. of Synthetic Industries.
 - d. Forta Mono; Forta Corporation.
 - e. Grace MicroFiber; W. R. Grace & Co., Construction Products Div.
 - f. Polystrand 1000; Metalcrete Industries.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

- D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- G. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
- H. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- I. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Cimfilm; Axim Concrete Technologies.
 - b. Finishing Aid Concentrate; Burke Group, LLC (The).
 - c. Spray-Film; ChemMasters.
 - d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - e. Sure Film; Dayton Superior Corporation.
 - f. Eucobar; Euclid Chemical Co.
 - g. Vapor Aid; Kaufman Products, Inc.
 - h. Lambco Skin; Lambert Corporation.
 - i. E-Con; L&M Construction Chemicals, Inc.
 - j. Confilm; Master Builders, Inc.
 - k. Waterhold; Metalcrete Industries.
 - l. Rich Film; Richmond Screw Anchor Co.
 - m. SikaFilm; Sika Corporation.
 - n. Finishing Aid; Symons Corporation.
 - o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.
 - 2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:
 - a. AH Curing Compound #2 DR; Anti-Hydro International, Inc.
 - b. Res-X Cure All Resin; Burke Group, LLC (The).
 - c. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
 - d. Day-Chem Rez Cure; Dayton Superior Corporation.
 - e. Kurez DR; Euclid Chemical Co.
 - f. Nitocure S; Fosroc.
 - g. #64 Resin Cure; Lambert Corporation.
 - h. L&M Cure DR; L&M Construction Chemicals, Inc.
 - i. 3100-Clear; W. R. Meadows, Inc.
 - j. Seal N Kure FDR; Metalcrete Industries.
 - k. Rich Cure; Richmond Screw Anchor Co.
 - l. Resi-Chem C309; Symons Corporation.
 - m. Horncure 30; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
 - n. Uni Res 150; Unitex.
 - o. Certi-Vex RC; Vexcon Chemicals, Inc.

3. Clear Waterborne Membrane-Forming Curing Compound:
 - a. AH Curing Compound #2 DR WB; Anti-Hydro International, Inc.
 - b. Aqua Resin Cure; Burke Group, LLC (The).
 - c. Safe-Cure Clear; ChemMasters.
 - d. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
 - e. Day Chem Rez Cure (J-11-W); Dayton Superior Corporation.
 - f. Nitocure S; Fosroc.
 - g. Aqua Kure-Clear; Lambert Corporation.
 - h. L&M Cure R; L&M Construction Chemicals, Inc.
 - i. 1100 Clear; W. R. Meadows, Inc.
 - j. Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
 - k. Rich Cure E; Richmond Screw Anchor Co.
 - l. Resi-Chem Clear Cure; Symons Corporation.
 - m. Horncure 100; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
 - n. Hydro Cure; Unitex.
 - o. Certi-Vex Enviocure; Vexcon Chemicals, Inc.

4. White Waterborne Membrane-Forming Curing Compound:
 - a. AH Curing Compound #2 WB WP; Anti-Hydro International, Inc.
 - b. Aqua Resin Cure; Burke Group, LLC (The).
 - c. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
 - d. Thinfilm 450; Kaufman Products, Inc.
 - e. Aqua Kure-White; Lambert Corporation.
 - f. L&M Cure R-2; L&M Construction Chemicals, Inc.
 - g. 1200-White; W. R. Meadows, Inc.
 - h. White Pigmented Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
 - i. Rich Cure White E; Richmond Screw Anchor Co.
 - j. Resi-Chem High Cure; Symons Corporation.
 - k. Horncure 200-W; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
 - l. Hydro White 309; Unitex.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Coloring Agent: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
 1. Color: As selected by Owner from manufacturer's full range.
- E. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.

- F. Pavement-Marking Paint: Latex, water-base emulsion; ready mixed; complying with FS TT-P-1952.
 - 1. Color: As indicated.
- G. Glass Beads: AASHTO M 247.
- H. Wheel Stops: Precast, air-entrained concrete; 4500-psi minimum compressive strength; approximately 7 inches high, 7 inches wide, and 72 inches long. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter of 1 inch, minimum length 18 inches.
- I. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- J. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- K. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch (9.5-mm) sieve and 85 percent retained on a No. 8 (2.36-mm) sieve.
- L. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type: Class I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 2. Type: Class IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
 - 1. Do not use Owner's field quality-control testing agency as the independent testing agency.
- C. Proportion mixes to provide concrete as indicated on plans with the following properties:
 - 1. Compressive Strength (28 Days): 4500 psi (Class B).
 - 2. Compressive Strength (28 Days): 4000 psi (Class C).
 - 3. Slump Limit at point of placement: 3 inches

- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.
- E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.
- F. Coloring Agent: Add coloring agent to mix according to manufacturer's written instructions.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixers of 1 cu. yd. (0.76 cu. m) or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixers of capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
 - 1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap to adjacent mats.

3.4 JOINTS

- A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
 - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
 - 1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 3. Provide tie bars at sides of pavement strips where indicated.
 - 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet, unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - a. Radius: 1/4 inch (6 mm).
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
1. Radius: 1/4 inch (6 mm).

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

- D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery, or during placement.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- M. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- N. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 SPECIAL FINISHES

- A. Monolithic Exposed Aggregate Finish: Expose coarse aggregate to pavement surfaces as follows:
1. Immediately after floating, spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
 2. Cover with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.

4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.
- B. Seeded Exposed Aggregate Finish: Immediately after floating, broadcast a single layer of aggregate uniformly onto the pavement surface. Tamp seeded aggregate into plastic concrete, and float to entirely embed aggregate with mortar cover of 1/16 inch (1.6 mm).
1. Spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
 2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.
 4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.
- C. Slip-Resistant Aggregate Finish: Before final floating, apply slip-resistant aggregate finish to pavement surfaces according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened nonslip aggregate over the surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- D. Rock-Salt Finish: After initial floating, uniformly seed 5 lb/100 sq. ft. (0.2 kg/10 sq. m) over the concrete surface.
1. Cover surface with 1-mil- (0.025-mm-) thick polyethylene sheet and remove when concrete has hardened and seven-day curing period has elapsed.
 2. Embed rock salt into plastic concrete, power float concrete, and trowel finish.
 3. After seven-day curing period, saturate concrete with water and broom-sweep surface to dissolve remaining rock salt.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (9 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/4 inch (6 mm).
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: The contractor is responsible to engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Services: Testing shall be performed according to the following requirements:
 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m). One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
 7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 8. When total quantity of a given class of concrete is less than 50 cu. yd. (38 cu. m), Architect may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.
 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
 10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).
- C. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as the sole basis for approval or rejection.
- E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.
- 3.11 REPAIRS AND PROTECTION
- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313



January 5, 2024

**RE: Pre-Bid Meeting Minutes
Additions and Interior Renovations to
Gantner, Gilbert, and 16th Ave. Elementary Schools
Elmwood Park Board of Education
D/R Project No. 4132**

Meeting Date / Time

January 5, 2024 / 10:00 a.m.

Meeting Location

Elmwood Park Board Office
60 East 53rd Street
Elmwood Park, NJ

Attendees:

*Refer to the attached Meeting Sign-in Sheet

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1. The Architects (Allen Barnett, AIA, Principal, Kenneth Ross, RA, Senior Project Architect, and Christopher Gofredo, DiCara Rubino Architects), BOE representatives (Mark Jacobus, Business Administrator and Steve Bakreski, Director of Facilities), and the Construction Management (Bill Costello and Kyle Pollara, Epic Management) were introduced.
 2. Please be advised that attendance at the Pre-Bid Meeting is strongly recommended for project review and bidder questions but is not mandatory. The minutes to the Pre-Bid Meeting will become a part of the contract documents and will be attached to Addendum #1 which will be issued at a future date. A bidder may submit a bid without attending the Pre-Bid Meeting.
 3. Addendums will not be issued within seven (7) business days prior to the Bid Date. As of the time of this meeting, the last day an Addendum can be issued is Tuesday, February 6, 2024, at 4pm. **All RFI's should be received no later than Monday, February 5, 2024, at 5pm.**
 4. Bidders are to note the list of required documents to be submitted with the Bids (Bidder's Checklist), and the Bidders are asked to provide each of these documents, fully completed as part of their Bids. Bidders are also asked to complete every line item on the Bid Form, and associated documents. Omissions of the required bid documents or omissions of the requested information may result in the disqualification of a Bid.
 5. Bidders are to note the list of Allowances listed in Specification Section 01020.
 6. The working hours are in Division 1 Section "Summary of Work".

30 galesi drive • wayne, new jersey 07470 • tel 973.256.0202 • fax 973.256.0227

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7. **Bids are due on Thursday, February 15, 2024, at 11:00 a.m.**, at the Elmwood Park Board of Education Administration Office, located at 60 East 53rd Street, Elmwood Park, NJ. The Bids will be opened and read publicly shortly thereafter.
8. The Project Milestone Schedule and Project Completion date is located at the end of Specification Division 1 Section "Summary of Work". Note that all three (3) schools are to be completed concurrently.
9. The Architect reviewed the Scope of Work for the project with the Contractors present. The Work includes, but is not limited to:
 1. **Additions and Interior Renovations at Gantner, Gilbert, and 16th Ave. Elementary Schools**
10. The Bidders must take into account of their bids that the school site will be occupied by students, faculty, and staff, and that their bids should include all precautions in maintaining the safety of the same occupants. The Bidders should also take note that the school is located in a residential neighborhood and the Bidders will be responsible for policing their own work crews in respecting the school's neighborhood.
11. All questions regarding the Bids (RFI's) will be sent to the Architect on the RFI sheets provided to all Bidders. If questions need to be deferred to the Engineers, the Architect will forward the RFI's to the appropriate Engineer. This system will allow the Architect to monitor turnaround time of the responses to all RFI's. Please include a copy in Word format for accurate documentation on addenda. All RFI's are to be directed to Kenneth Ross, RA. **Email: kross@dicararubino.com**
12. It is the responsibility of the successful Bidder to fill out the permit applications / jackets and pull permits with the local municipality. Any permit fees will be paid by the Board of Education. Refer to the General Conditions of the Contract for Construction.
13. If a Bidder wishes to visit the project site after the Pre-Bid Meeting, they can contact the Board's representative, Mr. Steve Bakreski at telephone number 201-796-8700 (office) or 201-410-0994 (Cell) to arrange for an appointment. A minimum of 48 hours' notice is required.
14. The buildings have custodial staff Monday through Friday during the school year from 7am -11pm.
15. Full background checks will be required of all workers on site. See specifications for additional information.
16. The project is a Pre-K Grant with the NJDOE. There may be additional paperwork required by the NJDOE as part of the payment reimbursement process. The awarded contractor shall be required to provide all paperwork required by the NJDOE.
17. The construction budget for the project is \$11,200,000.00 for all three schools combined.

If there are any discrepancies between the understanding of the attendees and these minutes, please notify our office within three (3) business days of receipt, to make any revisions to these minutes as necessary. If there are any additional comments or questions, please forward them to our attention.

Submitted by,



DICARA | RUBINO ARCHITECTS

Kenneth Ross, RA
Senior Project Architect

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Bid Sign-in Sheet

Project: Elmwood Park BOE – Additions and Renovations at Gantner, Gilbert, and 16th Avenue Elementary Schools

Pre Bid Date: 1/5/24

Project #: 4132

Bid Date: 2/15/24

Name	Company	Phone #
Ken Ross	DRA	973-256-0202
Chris Gottredo	DRA	973-256-0202
Nicholas Pelenskiy	Brockwell and Carrington	973-237-1222
Reman Barsaam	Bismark Construction	862-386-1378
Yanah Saleh	EPPS	201-796-8700
Luke Morahan	ATC Systems	908-930-7086
Otis Miller	Local 10 Roofers & Decking	973-343-8770
Peter Dorice	DMD CONTRACTING, LLC	973-333-4952
Kyle Pollera	ERIC MGMT.	201 866 842 1119
Bill Costello	ERIC MANAGEMENT	732-239-5062
Allen Barnett	DRA	
Steve Bakresmi	JB	
Mark S. Jacobus	EP BOE	
Kris Bercero	GL Group Inc	201-560-8168
Stephanie Brax	Vanas Construction	201-883-1944