

2025 ROOF REMEDIATION SPECIFICATIONS

For

**LIVONIA PUBLIC SCHOOLS:
WEBSTER ELEMENTARY SCHOOL
32401 PEMBROKE STREET
LIVONIA, MICHIGAN**

Prepared For

**LIVONIA PUBLIC SCHOOLS
15125 FARMINGTON ROAD
LIVONIA, MICHIGAN**

RTA PROJECT NO. 22-080
September 27, 2024

**SECTION 00 0110
TABLE OF CONTENTS**

PROCUREMENT AND CONTRACTING REQUIREMENTS

1.01 DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

- A. 00 0110 - Table of Contents
- B. Bid Information
- C. Official Bid Requirements
- D. Familial Relationships
- E. Iran Economic Sanctions Act
- F. Equal Opportunity Statement
- G. 00 2114 - Instructions to Bidders
- H. 00 4100 - Bid Form
- I. 00 5000 - Contracting Forms and Supplements
- J. AIA Document A-105

SPECIFICATIONS

2.01 DIVISION 01 -- GENERAL REQUIREMENTS

- A. 01 1000 - Summary
- B. 01 2000 - Price and Payment Procedures
- C. 01 2200 - Unit Prices
- D. 01 5000 - Temporary Facilities and Controls

2.02 DIVISION 07 -- THERMAL AND MOISTURE PROTECTION

- A. 07 5300 - Elastomeric Membrane Roofing
- B. 07 6200 - Sheet Metal Flashing and Trim

END OF SECTION

LIVONIA PUBLIC SCHOOLS
15125 FARMINGTON ROAD
LIVONIA, MI 48154-5474
(734) 744-2500

The Livonia Public Schools Board of Education, Livonia, Michigan, hereby invites the submission of **sealed bids** for the purchase of: **Central Offices, Churchill High School, Webster Elementary School, and Warehouse Roof Replacement**

(See Attached Specifications)

Request for Proposal (RFP) documents can be obtained at the Livonia Public School Website, www.livoniapublicschools.org under the section titled DISTRICT, Purchasing Bids, 2023-24 school year, Open Bids OR the SIGMA Website, www.michigan.gov/SIGMAVSS. Please feel free to include additional pages of information if necessary. For bids to be considered they must meet or exceed all specifications herein.

Sealed bids marked **“Central Offices, Churchill High School, Webster Elementary School, and Warehouse Roof Replacement”** will be received until **10:00 a.m. on the 24th day of October 2024, at the Board of Education complex, 15125 Farmington Road, Livonia, Michigan**. Mailed bids should be sent to the attention of: Phillip Francis, Assistant Superintendent of District Services, Livonia Public School, 15125 Farmington Road, Livonia, Michigan, 48154. **Livonia Public Schools is not liable for any delivery or postal delays.**

A **walk-through** will be held at **Churchill High School, 8900 Newburgh Road, Livonia, MI 48154, on October 10, 2024, at 10:00 a.m.** Please meet on the east side of the building - door #36.

The **Bid Opening will take place at LPS Central Office Complex on October 24th, 2024, at 10:00am**, at Livonia Public Schools Board of Education complex, 15125 Farmington Road, at which time all bids will be publicly opened and read. No bids will be accepted after the date and time specified and will not be opened. Oral, telephone, fax, or electronic mail bids are invalid and will not receive consideration.

All bids must be accompanied by a sworn and notarized statement of disclosing any familial relationship that exists between the owner and any employee of the bidder and any member of the Livonia Board of Education, the Livonia Public Schools Superintendent or Chief Financial Officer, any member of the Wayne RESA Board of Education or the Superintendent of Wayne RESA. **No bid shall be accepted that does not include this sworn and notarized disclosure statement.**

All bids must be accompanied by a sworn and notarized Affidavit of Compliance – Iran Economic Sanctions Act. **No bid shall be accepted that does not include this sworn and notarized statement.**

All bids must be accompanied by the Equal Opportunity Statement. **No bid shall be accepted that does not include this statement.** All bids must include a Treasury listed bid bond or certified check made payable to Livonia Public Schools for not less than five percent (5%) of the contract for each bid over \$29,500.00 and must be submitted with the bid forms furnished with specification.

All bids must be submitted on the forms provided in the bid packet and all sheets must be returned for the bid. All proposals shall remain firm for a period of ninety (90) days.

The Board of Education reserves the right to accept or reject any or all bids, either in whole or in part: to award to other than the low bidder: to waive any irregularities and/or informalities: and, in general, to make awards in any manner deemed to be in the best interests of the district, including awarding by line item, with rationale to support such a decision. Livonia Public Schools local preference resolution will be followed for all proposals.

Prices bid are to be **F.O.B. Destination**. All purchases are to be exempt from all taxes, including state and federal taxes. Exemption certificates will be furnished upon request.

Any bid submitted will be binding for ninety (90) days subsequent to the date of the bid submission. All bids must be submitted on the attached bid form and signed by the bidder. Two (2) signed copies of the bid package are to be addressed to the attention of:

Phillip Francis, Assistant Superintendent of District Services
Livonia Public Schools
15125 Farmington Road
Livonia, MI 48154-5474

“Central Offices, Churchill High School, Webster Elementary School, and Warehouse Roof Replacement”

One (1) copy of the bid package should be retained for your files. Any questions **regarding bid specifications** should be referred to Harry Lau, Administrator of Facilities and Operations, hlau@livoniapublicschools.org, 734.744.2537, between 8 a.m. and 2:00 p.m. EDT. **All samples should be sent to Harry Lau, 15125 Farmington Road, Livonia, MI 48154.**

LATE BIDS WILL NOT BE ACCEPTED

OFFICIAL BID REQUIREMENTS

Central Offices, Churchill High School, Webster Elementary School, and Warehouse Roof Replacement

NAME OF COMPANY _____

REPRESENTATIVE _____

BUSINESS ADDRESS _____

CITY, STATE, ZIP _____ **DATE** _____

The bidder above-mentioned declares and certifies:

- A. That said bidder is of lawful age and the only one interested in this bid; that no one other than said bidder has any interest herein.
- B. That this bid is made without any previous understanding, agreement, or connection with any other person, firm or corporation making a bid for the same purpose, and is, in all respects, fair and without collusion or fraud.
- C. Bid prices **MUST** include ALL delivery charges.
- D. Specifications: Any deviation from the specifications set forth must be clearly identified and detailed on the bid proposal form; otherwise, it will be considered that items offered are in strict compliance with these specifications, and successful bidder will be held responsible. In the event that a supplier wishes to bid a voluntary alternate in addition to the base bid (and as a cost savings consideration for the District), such alternate shall be submitted with the bid, on separate sheets and labeled as such with a brief description of the difference and rationale. However, if any substitution or departure is not clearly noted and described, it will be understood that the bid intends to exactly meet the specifications.
- E. That the prices quoted herein are net and exclusive of all federal, state, and municipal sales and excise taxes. **TAXES-** The successful company within this context is considered to be providing a service in which the company is the consumer of all equipment, supplies and materials used in providing this service. The company must pay tax on all equipment, supplies and materials used. When it comes to the affixation of materials to real property or the purchasing of services from a company, the school district's exemption does not flow through to the company who is the consumer of material for tax purposes. Any questions regarding this issue of tax, please contact the Michigan Department of the Treasury at 517.339.1123.
- F. All price proposals and delivery terms shall remain firm for ninety days after the date of bid opening and pricing should be based on current market value with agreement to invoice according to any price **reduction** that may occur prior to final delivery.
- G. District reserves the right to award this bid separately or in total, or for reasons of establishing uniformity, to other than the low bidder.
- H. No member of Livonia Public Schools Board of Education, or any officer, employee, or person whose salary is payable in whole or in part from the treasury of said Board of Education is directly or indirectly interested in this bid or in the supplies, materials, equipment, work, services or any portion of the profits thereof to which it relates.
- I. The bid **MUST** be signed by an authorized company agent and submitted on the attached forms (**School District designed form**).
- J. Under penalty of perjury, the vendor bidding certifies that this bid has not been arrived at collusively or otherwise in violation of Federal or State anti-trust laws. The bidder also certifies that their bid is made without any previous understanding, agreement, or connection with any other person, firm or corporation making a bid for the same purpose, and is, in all respects, fair and without collusion or fraud.

OFFICIAL BID REQUIREMENTS (continued):

K. All bids must be accompanied by the following three statements:

- 1) Familial Disclosure Statement – **sworn and notarized.**
- 2) Affidavit of Compliance – Iran Economic Sanctions Act – **sworn and notarized.**
- 3) Equal Opportunity Statement.

No bid shall be accepted that does not include all of these statements.

L. A bid bond executed by a U.S. Treasury listed surety company acceptable to the owner, or a cashier's check in the amount of 5% of the sum of the proposal payable to Livonia Public Schools shall be submitted with each proposal in excess of \$29,500.00.

M. Any error or omission found within this specification packet shall be communicated to all bidders as soon as possible. Bidders will not be allowed to take advantage of any errors or omissions in the specifications of this bid. Full instructions shall be given regarding any errors and omissions if called to the attention of Livonia Public Schools within two working days of the bid date.

N. Bidder must be a firm established not less than three (3) years in the field for which this bid is solicited.

O. Additional references may be requested after the bids are submitted. When requested, references are to be furnished as called for. Failure to honor this request will cause the bidder to be subject to rejection.

P. The undersigned certifies that the bid contained herein meets or exceeds specifications.

Signature _____ Print Name _____

Title _____ Date _____

**LIVONIA PUBLIC SCHOOLS
SWORN AND NOTARIZED FAMILIAL DISCLOSURE STATEMENT**

Central Offices, Churchill High School, Webster Elementary School, and Warehouse Roof Replacement

All bidders must complete the following disclosure in compliance with MCL 380.1267 and attach this information to the bid. The bid proposal will be accompanied by a sworn statement disclosing any familial relationship that exists between the owner or any employee of the bidder and any member of the Livonia Public Schools Board of Education, the Livonia Public Schools Superintendent or the Chief Financial Officer, any member of the Wayne RESA Board of Education or the Superintendent of Wayne RESA. The District will not accept a bid proposal that does not include this sworn and notarized disclosure statement.

The members of the Livonia Public Schools Board are: Madeline Acosta, Karen Bradford, Tammy Bonifield, Colleen Burton, Crystal Frank, Liz Jarvis, and Mark Johnson. The Livonia Public Schools Superintendent is Andrea Oquist and the Chief Financial Officer and Board Treasurer is Alison Smith.

The following are the familial relationship(s):

	Owner/Employee Name	Related to:	Relationship:
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

Attach additional pages if necessary to disclose familial relationships

BIDDER'S FIRM NAME _____
BY (SIGNATURE _____
PRINTED NAME AND TITLE _____

STATE OF MICHIGAN)
)SS
COUNTY OF)

Subscribe and sworn before me on this _____

Day of _____, 20__ , a Notary Public

In and for _____ county,

Notary Public

My Commission expires _____

EQUAL OPPORTUNITY STATEMENT

Central Offices, Churchill High School, Webster Elementary School, and Warehouse Roof Replacement

Livonia Public Schools:

It is the publicly stated policy of _____ not to discriminate against any employee, applicant for employment, contractor, or material supplier, because of race, religion, national origin, ancestry, or sex. With regards to employment, such non-discrimination includes, but not limited to, our (my) policies of recruitment, recruitment advertising, selection for apprenticeships or other training, rates of pay, promotion, transfer, lay-off or termination.

In all advertising for employment, subcontractors, or suppliers we (I) shall state all applicants or respondents will receive consideration without regard to race, religion, color, national origin, ancestry, or sex.

We (I) understand that any contract for the Livonia Public Schools shall be in consideration of our maintaining the above mentioned non-discrimination policy.

We (I) understand that we (I) may be required to submit further information covering the race, color and work classification for our employees and those of subcontractors to be employed on this project.

NAME OF BIDDER (COMPANY): _____

SIGNATURE: _____

NAME: _____

TITLE: _____

VENDOR PROFILE:

Livonia Public Schools requests that vendors participating in the **LPS Central Office Paving Phase 1 Updates Bid**, provide specific information about their company. This information will be taken into consideration when the bids are evaluated.

CONTACT INFORMATION:

NAME OF COMPANY: _____

ADDRESS: _____

CITY/STATE/ZIP: _____

PHONE: _____ FAX: _____

SALES MANAGER: _____

Email address: _____

NO. YEARS IN BUSINESS: _____ TOTAL NUMBER OF EMPLOYEES: _____

CLIENT CONTACTS:

Please provide a list of the five (5) or more references of school districts and/or companies using the products or services recommended in this bid proposal:

NAME OF SCHOOL DISTRICT/COMPANY: _____

Contact/position: _____

Email Address: _____

Address: _____

City: _____ PHONE: _____

Estimated volume of business per year: \$ _____

NAME OF SCHOOL DISTRICT/COMPANY: _____

Contact/position: _____

Email Address: _____

Address: _____

City: _____ PHONE: _____

Estimated volume of business per year: \$ _____

NAME OF SCHOOL DISTRICT/COMPANY: _____

Contact/position: _____

Email Address: _____

Address: _____

City: _____ PHONE: _____

Estimated volume of business per year: \$ _____

CLIENT CONTACTS (continued):

NAME OF SCHOOL DISTRICT/COMPANY: _____

Contact/position: _____

Email Address: _____

Address: _____

City: _____ PHONE: _____

Estimated volume of business per year: \$ _____

NAME OF SCHOOL DISTRICT/COMPANY: _____

Contact/position: _____

Email Address: _____

Address: _____

City: _____ PHONE: _____

Estimated volume of business per year: \$ _____

NAME OF SCHOOL DISTRICT/COMPANY: _____

Contact/position: _____

Email Address: _____

Address: _____

City: _____ PHONE: _____

Estimated volume of business per year: \$ _____

**SECTION 00 2114
INSTRUCTIONS TO BIDDERS**

PART 1 GENERAL

1.01 THE PROJECT

- A. In accordance with these instructions, the bidder is requested to submit a Bid for project and Contract work indicated in the Roof Replacement Specifications.
- B. Each bidder is referred to the Bid Solicitation for this project, which includes instructions and requirements for bidders in addition to those included in this section.

1.02 CONTRACTS

- A. The Owner will enter into a single lump sum Contract with the selected bidder.

1.03 SUBMISSION OF BIDS

- A. Place for Receiving Bids
 - 1. Sealed Bids for performing the work pertaining to this project will be received by Livonia Public Schools, 15125 Farmington Road, Livonia, Michigan 48154.
 - 2. All copies of the Bid Form and any other documents required to be submitted with the Bid, shall be enclosed in a sealed opaque envelope.
 - 3. The sealed Bid envelope shall be properly and clearly addressed and shall be identified with the project name, the Bidder's name and address, and the project description for which the Bid is submitted.
 - 4. If the Bid is sent by mail, the sealed envelope shall be enclosed in a mailing envelope with notation "SEALED BID - ROOF REPLACEMENT, Livonia Public Schools" on the face of the envelope.
- B. Date for Receiving Bids
 - 1. Bids shall be mailed or otherwise delivered on time to reach the designated location on or before the time and date of receipt of Bids indicated in the Bid Solicitation, unless extension is made by Addendum. Bids received after time and date for receipt of Bids will remain unopened.
 - 2. Bidders shall assume full responsibility for timely delivery at location designated for receipt of Bids.
 - 3. Oral, telephone, or facsimile Bids are invalid and will not receive consideration.

1.04 BIDDERS REPRESENTATIONS

- A. Each bidder by making his Bid represents that:
 - 1. He has read, understands, and makes his Bid in accordance with the Bidding Documents.
 - 2. He has visited the site, has familiarized himself with the local conditions under which the Work is to be performed and has correlated his observations with the requirements of the proposed Bidding Documents.
 - 3. His Bid is based upon the materials, systems, and equipment required by the Bidding Documents without exception.

1.05 INSPECTION OF SITE

- A. Before submitting his Bid, each bidder shall personally inspect the site of the proposed work to arrive at a clear understanding of the conditions under which the work is to be done.
- B. Each bidder shall be held to have compared the premises and the site with the Drawings and Specifications, and to have satisfied himself as to the conditions of the premises, the existing obstructions, and any other conditions affecting the completion of his work, all before the delivery of his proposal.
- C. No allowances or extra considerations on behalf of any bidder will be permitted subsequently by reason or error or oversight on the part of the bidder, or on account of interferences by the activities of the Owner.

1.06 BIDDING DOCUMENTS

- A. Bidding Documents which will be issued for the use of bidders and upon which all proposals are to be based, consist of those listed in these specifications.
 - 1. Documents consist of: Plans and specifications prepared by Roofing Technology Associates, Ltd.
- B. In the event that additional documents are required to explain revisions which are made during the bidding period or to give additional information to the bidders, the Roof Consultant will prepare such documents in the form of an Addendum with accompanying drawings, if required, and will send copies of the same to all bidders, prior to the date for receipt of proposals. All proposals are to include the work described and indicated on such additional documents.
- C. Interpretation or Correction of Bidding Documents
 - 1. Bidders shall promptly notify the Roof Consultant of any ambiguity, inconsistency or error which they may discover upon examination of the bidding documents or of the site and local conditions of the work.
 - 2. Any interpretation, correction or change of the documents will be made by the Roof Consultant by Addendum. Interpretations, corrections or changes of the bidding documents made in any other manner will not be binding and bidders shall not rely upon such interpretations, corrections and changes.
 - 3. All questions or inquiry relative to this project shall be directed to: Ron Kinne, Project Manager, Roofing Technology Associates, Ltd. at (734)-591-4444.

1.07 BIDDER'S OPTIONS

- A. For products specified only by reference standard, select product meeting that standard by any manufacturer.
- B. For products specified by naming several products or manufacturers, select any one of the products and manufacturers named which comply with the technical specifications.
- C. For products specified by naming several products or manufacturers and stating or approved equal or similar wording, submit a request for approval for review and approval by the Roof Consultant.
- D. For products specified by naming only product and manufacturer, there is no option and no substitutions will be allowed.

1.08 SUBSTITUTIONS

- A. Base Bid shall be in accordance with these Bidding Documents.
- B. No substitution of products or roofing systems will be allowed on this project, unless a product or roofing system specified is no longer manufactured.
- C. In the event that a product or roofing system is no longer manufactured, contact the Roof Consultant. An Addendum will be issued with additional documents for acceptable alternate products or roofing systems.

1.09 BIDDING PROCEDURES

- A. Form of Bids
 - 1. Bid forms are furnished within the Project Specifications. Each bidder shall submit his bid in duplicate and retain one copy for his files.
 - 2. Bids must be filled out fully and correctly and submitted only on Bid Forms provided. Bids in any other form will be rejected.
 - 3. All information required to be provided on the Bid Form shall be typewritten or printed manually in ink with a handwritten signature where noted.
- B. Bid Security
 - 1. Bids shall be accomplished by a Bid Security in the form of a bid bond or a certified check made payable to the Owner in the amount of five percent (5%) of the Base Bid lump sum price.

2. Such Bid Security shall be submitted with the following understanding:
 - a. If a Bidder defaults in executing an Agreement or in furnishing and delivering the performance bond and labor and material payment bonds within seven (7) calendar days after receipt of an award of the contract, the Owner will sustain liquidated damages in the amount covered by the Bid Security and the Bid Security will become the property of the Owner.
 - b. If the Bidder executes and delivers the Agreement and the performance bond and labor and material payment bonds within the above time, or if the bid is not accepted within the time stipulated under "Withdrawal of Bid" in the Bid Form, the Bid Security will be returned to the Bidder by the Owner.
 - c. The Bid Security for all except the lowest three Bidders will be returned within ten (10) working days after the opening of bids, unless otherwise agreed upon with the Owner.
 - d. The remaining Bid Securities will be returned to the remaining Bidders with ten (10) working days after an Agreement has been executed. If an Agreement has not been executed within the time stipulated under "Withdrawal of Bid" in the Bid Form, then the Bid Security of any Bidder so desiring will be returned upon his written request, provided such Bidder has not been notified of the acceptance of the Bid prior to the date of such request.
- C. Modification or Withdrawal of Bid
 1. A Bid may not be modified, withdrawn or canceled by the bidder during the stipulated time period following the time and date designated for the receipt of Bids, and bidder so agrees in submitting his bid.
 2. Bidder may withdraw his proposal at any time prior to the time set for opening of proposals.

1.10 CONSIDERATION OF BIDS

- A. Opening of Bids
 1. The properly identified bids received on time will be opened and publicly read aloud as stated in the Bid Solicitation.
- B. Acceptance of Bid (Award)
 1. The Board of Education reserves the right to accept or reject any total bid, or part thereof, and to award the total Contract or part thereof to other than the low bidder. All decisions regarding Contract award will be final.
 2. The Owner shall have the right to accept Alternates in any order or combination, and to determine the low bidder on the basis of the sum of the Base Bid and the Alternates accepted.
- C. Notice of Award
 1. The Contract shall be deemed as having been awarded when formal notice of acceptance of his Proposal has been duly served upon the intended awardee by an officer or agent of the Owner duly authorized to give such notice. The Contract Date shall be the date of this Notice of Award.
 2. The bidder to whom the Contract is awarded by the Owner shall, within seven (7) days after Notice of Award and/or receipt of Agreement forms from the Owner, sign and deliver to the Owner all required copies.
- D. Time of Starting and Completion
 1. The roofing work shall begin on June 9, 2025 and be fully completed on August 15, 2025.
 - a. NOTE: Area D at Webster Elementary is scheduled to have an extended school year in which faculty and students will occupy this portion of the building for approximately three (3) weeks beyond the June 9, 2025 start date. Coordinate the reroofing work to avoid working in Area D during this time frame.

2. The successful bidder shall furnish insurance and commence active work on the Project within ten (10) days after receipt of notice of award and shall complete the work within the time stated above.

E. Work Week

1. The bidder, if awarded a Contract, shall be required to establish the work week and hours of work as required to properly man the project, maintain the progress schedule and complete the work within the time stated in the Contract. The Contractor shall provide and pay for any overtime necessary to complete his work within the agreed time, with no change in the Contract Sum or additional costs to the Owner.

1.11 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

A. Time of Delivery and Form of Bonds

1. Bidders, will be required to furnish bonds executed on AIA Document A311, with the amount shown for each if over \$50,000, part equal to 100 percent of the total amount payable by terms in the Contract. Premiums for such bonds shall be included in the Base Bid
2. The Bidder shall deliver the required Bonds to the Owner not later than the date of execution of the Contract, or if the Work is commenced prior thereto in response to a Notice of Award, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be issued.

1.12 FORM OF CONTRACT BETWEEN OWNER AND CONTRACTOR

- A. A Contract for the Work will be written on AIA A105 - Standard Form of Agreement Between Owner and Contractor for a Residential or Small Commercial Project; 2007.

1.13 PERMITS

- A. Do not include the cost of the building permits in the Base Bid. Provide the Owner with a change order, upon request by the Owner, for the cost of building permits required by the local municipality or the State of Michigan.

END OF SECTION

**SECTION 00 4100
BID FORM**

PART 1 GENERAL

1.01 TO:

- A. Owner
 - 1. Livonia Public Schools
 - 2. 15125 Farmington Road
 - 3. Livonia, Michigan 48154
 - 4. Attention: Mr. Phillip Francis

1.02 FOR:

- A. Roof Replacement of the Designated Roof Areas
- B. Project: Webster Elementary School
- C. 32401 Pembroke Street
- D. Livonia, Michigan 48152

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)

- A. Bidder's Full Name _____
 - 1. Address _____
 - 2. City, State, Zip _____

1.05 THE UNDERSIGNED IN SUBMITTING THIS PROPOSAL AGREES AS FOLLOWS:

- A. The entire work shall subject to the requirements of the General Conditions of the Contract contained in and forming a part of AIA Document A105-2007, Standard Form of Agreement Between Owner and Contractor for a Residential or Small Commercial Project.
- B. Prior to execution of the Agreement for this work, the Contractor shall furnish the Owner with copies of Certificates of Insurance.

1.06 LIABILITY

- A. The Contractor shall and does assume liability under the terms of the Workmen's Compensation Law of the State in which the work is being performed.
- B. Contractor assumes all liability for injury to persons or damage to, or loss of property of (a) Contractor, his agents or employees, (b) Owner, its agents or employees, or members and (c) any other person, firm or corporation arising in any way directly or indirectly out of the performance of this Contract whether or not such injury, damage, or loss is due to the negligence of the Contractor, its agents or employees. This foregoing assumption of liability by Contractor shall include, without limiting the generality of the foregoing, any injury, damage, or loss arising out of the operation of motor vehicles. This assumption of liability by Contractor shall also include, without limiting the generality of the foregoing, any injury, damage or loss (1) arising out of the negligence of Contractor, (2) arising out of the joint or combined negligence of Contractor and Owner, (3) arising out of the negligence of a third party or parties and Contractor, or (4) without limiting in any way the foregoing, arising in any way, directly or indirectly out of the conduct or occurrence not fully limited to the separate sole negligence of the Owner as proven by Contractor or third party.
- C. Should the Owner or an agent or employee of the Owner or members be made a party to any suit or proceeding, even though such suit or proceeding is groundless, false or fraudulent, arising out of injury, damage, or loss for which the Contractor assumes liability under this Contract, the Contractor will defend such suit or proceeding and shall indemnify and save harmless the Owner, its agents or employees, of and from all liability loss, expenses, judgments (including interest thereon), including Attorney's fees.

- D. Since Contractor hereunder shall be an independent Contractor and not agent, servant, or employee of Owner, Contractor assumes full responsibility for compliance with any and all Federal, State, or municipal laws, ordinances, and regulations, including (but not limited to) those having to do with labor, wages and benefits, or taxes and duties collectible from employees under all applicable provisions of the law.

1.07 INSURANCE

- A. Unless otherwise specified, the Contractor shall, before commencing work hereunder, procure and thereafter maintain policies of insurance satisfactory to the Owner covering the liabilities assumed above in the following minimum amounts.
- B. Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than \$1,000,000 each accident, \$2,000,000 general aggregate and \$1,000,000 aggregate for products-completed operations hazard, providing coverage for claims.
- C. Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than \$1,000,000 per accident, for bodily injury, death of any persons and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.
- D. Workers Compensation Insurance: All liabilities imposed by Workers Compensation statute and Employers Liability Insurance with limit not less than \$1,000,000 per accident for bodily injury or disease.
- E. The following party must be named as additional insured: Webster Elementary and Livonia Public Schools.
- F. The Contractor agrees to file with the Owner before commencing work hereunder, copies of policies of such insurance which shall contain by endorsement, the specific liabilities assumed above, together with Certificates of Insurance which shall contain a provision that no change in the amount of said insurance, or termination thereof, shall take place without previous 10 days written notice to the Owner and its written consent to such change or termination.

1.08 OFFER

- A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Bid Documents prepared by Roofing Technology Associates, Ltd. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sums of:
- B. BASE BID - WEBSTER ELEMENTARY SCHOOL (ALL ROOF AREAS)
 - 1. _____
Dollars
 - 2. (\$ _____), in lawful money of the United States of America.
- C. Costs included within the lump sum base bid price to provide pollution insurance as shown within Article 5 of the Contract:
 - 1. _____
Dollars
 - 2. (\$ _____), in lawful money of the United States of America.
 - a. NOTE: This cost will be deducted from the base bid price should the Owner elect to remove it from the project, upon award to the lowest responsible bidder(s).
- D. All purchases are to be exempt from all taxes, including state and federal taxes. Exemption certificates will be furnished upon request.

1.09 ACCEPTANCE

- A. This offer shall be open to acceptance and is irrevocable for ninety (90) days from the bid closing date.
- B. If this bid is accepted by Owner within the time period stated above, we will:
 - 1. Execute the Agreement within seven days of receipt of Notice of Award.

1.10 CONTRACT TIME

- A. Start Date: On _____, 2025.
- B. Completion Date: On _____, 2025.
- C. Failure to complete the Contract within the specific time parameters shall result in a 1% penalty per week of the total Contract Price.
- D. NOTE: Area D at Webster Elementary is scheduled to have an extended school year in which faculty and students will occupy this portion of the building for approximately three (3) weeks beyond the June 9, 2025 start date. Coordinate the reroofing work to avoid working in Area D during this time frame.

1.11 REJECTION OF BID

- A. The undersigned understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

1.12 UNIT PRICES

- A. UNIT PRICES - The undersigned agrees that at the Owner's discretion, the Base Bid Sum may be altered as follows if the Unit Prices indicated and defined in the Unit Prices Section and elsewhere in the Bidding Documents are to be executed. Failure to bid upon requested Unit Prices shall indicate no change in the Base Bid Sum.

B. UNIT PRICE NO. 1 - WOOD NAILERS & PLYWOOD

- 1. Add the sum of:

- 1" x 4" _____ Dollars (\$ _____)
per lineal foot
- 1" x 6" _____ Dollars (\$ _____)
per lineal foot
- 1" x 8" _____ Dollars (\$ _____)
per lineal foot
- 2" x 4" _____ Dollars (\$ _____)
per lineal foot
- 2" x 6" _____ Dollars (\$ _____)
per lineal foot
- 2" x 8" _____ Dollars (\$ _____)
per lineal foot
- 2" x 10" _____ Dollars (\$ _____)
per lineal foot
- 2" x 12" _____ Dollars (\$ _____)
per lineal foot
- 1/2-inch CDX plywood _____ Dollars (\$ _____)
per square foot
- 3/4-inch CDX plywood _____ Dollars (\$ _____)
per square foot

C. UNIT PRICE NO. 2 - 18 GAUGE SHEET METAL PLATE

- 1. Add the sum of:

_____ Dollars (\$ _____)
per square foot

D. UNIT PRICE NO. 3 - ROOF DRAIN REPLACEMENT

1. Add the sum of:

_____ Dollars (\$ _____)
per drain

E. UNIT PRICE NO. 4 - TECTUM ROOF DECK REPLACEMENT

1. Add the sum of:

_____ Dollars (\$ _____)
per square foot

F. UNIT PRICE NO. 5 - STEEL ROOF DECK REPLACEMENT

1. Add the sum of:

_____ Dollars (\$ _____)
per square foot

G. UNIT PRICE NO. 6 - ACOUSTICAL STEEL ROOF DECK REPLACEMENT

1. Add the sum of:

_____ Dollars (\$ _____)
per square foot

H. UNIT PRICE NO. 7 - REPLACEMENT 1.5-INCH ISOCYANURATE ROOF INSULATION

1. Add the sum of:

_____ Dollars (\$ _____)
per square foot

1.13 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

1. Addendum # _____ Dated _____.

2. Addendum # _____ Dated _____.

1.14 BID FORM SIGNATURE(S)

A. The Corporate Seal of

B. _____

C. (Bidder - print the full name of your firm)

D. was hereunto affixed in the presence of:

E. _____

F. (Authorized signing officer, Title)

G. (Seal)

H. _____

I. (Authorized signing officer, Title)

END OF SECTION

DRAFT AIA® Document A105™ – 2017

Standard Short Form of Agreement Between Owner and Contractor

AGREEMENT made as of the « » day of « » in the year «Two Thousand Nineteen.»
(In words, indicate day, month and year.)

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

«Livonia Public Schools»
«15125 Farmington Road
Livonia, MI 48154 »

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

« »
« »
« »
« »

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

«Livonia Public Schools»
«Sinking Fund Roofing Projects»
« »

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

«Roofing Technology Associates, Ltd. »
«38031 Schoolcraft
Livonia, Michigan 48150-1065»
«734 591-4444 »

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.

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**SECTION 00 5000
CONTRACTING FORMS AND SUPPLEMENTS**

PART 1 GENERAL

1.01 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. The Agreement and General Conditions are based on AIA A105.

1.02 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Post-Award Certificates and Other Forms:
1. Schedule of Values Form: AIA G703.
 2. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- C. Clarification and Modification Forms:
1. Change Order Form: AIA G701.
- D. Closeout Forms:
1. Certificate of Substantial Completion Form: AIA G704.

1.03 REFERENCE STANDARDS

- A. AIA A105 - Standard Form of Agreement Between Owner and Contractor for a Residential or Small Commercial Project; 2007.
- B. AIA G701 - Change Order; 2001.
- C. AIA G702 - Application and Certificate for Payment; 1992.
- D. AIA G703 - Continuation Sheet; 1992.
- E. AIA G704 - Certificate of Substantial Completion; 2017.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 1000
SUMMARY**

PART 1 GENERAL

1.01 REQUIREMENT

- A. This section is a part of the entire set of Contract Documents and shall be coordinated with the applicable provisions of the other parts.
- B. All bidders shall be held to have thoroughly examined all of the drawings and specifications and to have visited the site to determine the extent of reroofing and alteration work required. All measurements are the responsibility of the bidder.
- C. It is the declared and acknowledged intention and meaning of these specifications to repair, reroof and to alter the existing premises as required to provide a watertight roofing system.
- D. The work will include the furnishing of all materials and equipment and the performing of all labor required, whether or not specifically indicated by the drawings and specifications, to provide a watertight roofing system.

1.02 PROJECT

- A. Project Name: Webster Elementary School Roof Replacement.
- B. Owner's Name: Livonia Public Schools.
- C. Owner's Representative: Mr. Phillip Francis, Assistant Superintendent of District Services, Livonia Public Schools.
- D. Roof Consultants Name: Roofing Technology Associates, Ltd., Contact: Mr. Ron Kinne, (734)591-4444.
- E. The Project consists of reroofing the designated roof areas at Webster Elementary School in Livonia, Michigan.

1.03 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5000 - Contracting Forms and Supplements.

1.04 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of alterations work is indicated on drawings and described in the individual specification sections.
- B. Remove existing roof systems down to the structural decks.
 - 1. NOTE: Save the existing isocyanurate insulation in Area C, F, I and G.
 - 2. NOTE: Save the existing coping in both locations of Area G.
- C. Section 07 5300 - Elastomeric Membrane Roofing
 - 1. Demolition and substrate preparation requirements for the low slope roof areas.
 - 2. Install wood nailers as shown in the RTA Details and at locations required in the written specifications.
 - 3. Install flat stock isocyanurate insulation and/ or tapered isocyanurate insulation.
 - 4. Install tapered isocyanurate insulation saddles.
 - 5. Fully adhere 60 mil reinforced EPDM membrane and flashing on the low-slope roof areas in accordance with the selected membrane manufacturer's specifications.
- D. Section 07 6200 - Sheet Metal Flashing and Trim
 - 1. Install prefinished sheet metal coping at designated locations
 - 2. Install premanufactured fascia cap at designated locations.
 - 3. Install prefinished galvanized counterflashing at roof curbs and walls.
 - 4. Install expansion joints and area dividers at designated locations.
 - 5. Install new gutters on Areas E and F.

1.05 SEQUENCE OF OPERATIONS

- A. The various parts of the work shall be carried on in a manner which will best serve in providing for the continuous operations of all necessary functions of the existing building and to cause as little inconvenience to the public as practicable in their occupancy and use of the facilities.

1.06 WORKMANSHIP AND MATERIALS

- A. All materials and equipment shall be furnished, installed and completed in a first class, workmanlike manner as indicated in the Conditions of the Contract, on the accompanying drawings and in the technical specifications.

1.07 FIELD CONDITIONS AND DIMENSIONS

- A. The dimensions, details and other information provided relative to the existing work are furnished subject to verification by the Contractor. The Contractor shall verify all existing conditions and dimensions. No additional compensation will be granted for the Contractor's failure to comply with the above requirements.

1.08 MATERIALS AND SUBSTITUTIONS

- A. Whenever an article, material or item of equipment is defined by describing a proprietary product, or by using the name of the manufacturer or vendor, the term "or equivalent," if not inserted, shall be implied. The specific article, material or item of equipment mentioned shall be understood as indicating the minimum requirements of fulfilling contract obligations in regard to type, function, standard of design and efficiency.
- B. Materials of manufacturers, other than those which may be named, will be given equal consideration, provided that written approval for the substitution is obtained from the Roof Consultant, and further provided that the Contractor shall be totally responsible for all costs incurred by dimension changes and weight changes occasioned by this substitution. No approvals concerning any phase of the Contract shall be valid unless given in writing by the Roof Consultant.

1.09 SHOP DRAWINGS AND PRODUCT DATA

- A. Prior to the delivery of any material or equipment to the job site, the Contractor shall check and verify all field measurements and existing conditions. Thereafter, the Contractor shall submit to the Roof Consultant, with such promptness as to cause no delay in the work, a minimum of three copies of shop drawings, product data catalogs, material schedules, etc. Following examination by the Roof Consultant, two copies will be retained for the Owner's use and remaining copies will be returned to the Contractor with indication of approval or with notations for correction.

1.10 TIME OF COMPLETION

- A. All work specified in the Contract Documents shall be completed within the specified time period. If, at any time during the life of this Contract, the Contractor finds that for reasons beyond his control it is impossible to complete the work within the specified time period fixed by the Contract, a written request for a change to the Contract extending the time of completion shall be submitted. Such a request shall set forth in precise detail the reasons believed to justify an extension and shall be in such format as The Owner may require.

1.11 MIOSHA SAFETY STANDARDS

- A. All work must be accomplished in accordance with all applicable Construction Safety Standards rules and regulations for Construction Operations, as set forth by the Michigan Department of Labor (MIOSHA).

1.12 SAFETY

- A. The Contractor shall furnish, install and maintain as long as necessary and remove when no longer required, adequate barriers, warning signs and lights at all dangerous points throughout the work for protection of staff, workmen, and the public. The Contractor shall hold the Owner harmless from damage or claims arising out of any injury or damage that may be sustained by any person or persons as a result of the work under the Contract. The Contractor shall hold the Owner harmless from fines resulting from the Contractor's failure to provide all required safety protection required by the Michigan Department of Labor (MIOSHA).

1.13 STRUCTURAL PROTECTION

- A. The Contractor shall furnish, install, and maintain adequate protection of existing building elements and finishes and adjacent structures from damage caused by his operations. The Contractor shall repair or replace any damaged building element or finish to match its condition prior to the start of the work and remove all protections when the work is complete.

1.14 TEMPORARY UTILITIES

- A. Water and electricity will be available in the area where work will be performed. The Contractor will not be charged for reasonable use of these services for construction operation. The Contractor shall pay costs for installation and removal of any temporary connections including necessary safety devices and controls.

1.15 REPAIRS AND FINISHES

- A. Existing disturbed materials and equipment resulting from the construction operations shall be repaired and finished to match existing or adjacent finishes.
- B. The Contractor shall replace any glass that may be broken in the existing structure, resulting from and/or related to construction operations. All new glass shall match the existing construction.

1.16 REMOVAL OF DEBRIS AND CLEANING

- A. The Contractor shall continuously remove from the site all material and debris. No storage of removed items or debris will be permitted on the site unless so directed by the Owner.
- B. The premises shall be kept as clean as practical, consistent with the neatness required for the Owner's normal operations.

1.17 EXISTING MATERIAL AND EQUIPMENT REMOVED

- A. Contractor shall remove all fixed equipment designated to be removed.
- B. Items of existing equipment which are to be reused, shall be carefully removed, stored and protected, and later reinstalled in original or new locations as required.
- C. Certain materials, particularly specified, shall be reused in the work, such material shall be in good usable condition and shall be cleaned and conditioned as required for reuse.
- D. All existing material and equipment which is to remain in place or to be reused and has been damaged or defaced during the progress of the work, shall be restored to a condition equal to that which existed prior to the start of the work, or shall be replaced with new materials and equipment equal in all respects, and finished so as to be uniform in appearance to adjacent existing work.

1.18 SALVAGED MATERIALS

- A. Salvaged materials which are not to be reused will, unless otherwise specified, or verbally requested by the Owner's Representative, become the property of the Contractor and will be removed from the premises by him and legally disposed of off-site by him.

1.19 PROGRESS MEETINGS

- A. The Owner will schedule meetings to be held on the job site whenever needed, supply information necessary to prevent job interruptions, to observe the work or to inspect completed work. The Contractor shall be represented at each progress meeting by persons with full authority to act for the Contractor in regard to all portions of the work.

1.20 APPLICABLE CODES

- A. The Contractor shall comply with all applicable state and local rules and regulations relating to buildings, employment, the preservation of public health and safety, use of streets, and the performance of the work of this Contract.
- B. Should the Contractor perform any work knowing it to be contrary to existing laws, rules and regulations, and fail to give notice of such fact to the Owner, he shall bear all costs arising there from and hold the Owner harmless for such violation.
- C. Where the contract documents require the work or parts of the work to be done in accordance with a particular standard or code recognized in the building industry, and that cited code includes requirements above the standards required by state or local law, such work shall be completed in accordance with the requirements of the Contract.

1.21 CONSTRUCTION SIGNS

- A. No signs regarding advertisement of any kind may be erected or displayed on the site. The Contractor shall provide all signs, barricades, etc. to alert, warn and/or protect the general public, building employees and their own personnel against the on-going reroofing operations in accordance with all applicable Construction Safety Standards (MIOSHA).

1.22 EXISTING CONDITIONS

- A. The Contractor shall check all dimensions and verify all conditions shown on the drawings at the site in relation to his work.
- B. Information as shown on the plans is given solely for the convenience of the Contractor, and use of such dimensions, elevations, sizes or information is made at his own risk.
- C. Conditions other than those which are described in these specifications shall be identified in writing to the Roof Consultant before proceeding with the work. The Roof Consultant will provide approved alternate details as required by changed conditions. The Contractor shall be responsible for any unauthorized changes he incorporates in the work.

1.23 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.24 CONTRACTOR USE OF SITE AND PREMISES

- A. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Use of site and premises by the public.
- B. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Existing building spaces may not be used for storage.
- D. Time Restrictions:
 - 1. Limit conduct of especially noisy exterior work to the hours established by local municipality ordinances 7am to 11pm.
- E. Utility Outages and Shutdown:
 - 1. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2000
PRICE AND PAYMENT PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Correlation of Contractor submittals based on changes.
- C. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Section 00 5000 - Contracting Forms and Supplements: Forms to be used.
- B. Section 01 2200 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.

1.03 SCHEDULE OF VALUES

- A. Submit a printed schedule on AIA Form G703 - Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Roof Consultant for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Roof Consultant for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit one electronic and three hard-copies of each Application for Payment.
- J. Include the following with the application:
 - 1. Transmittal letter on Contractor's letterhead.
 - 2. Partial release of liens from major subcontractors and vendors.

3. Notarized Sworn Statements.

- K. When Roof Consultant requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Roof Consultant will issue instructions directly to Contractor.
- C. For other required changes, Roof Consultant will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Roof Consultant will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.
- E. Contractor may propose a change by submitting a request for change to Roof Consultant, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Roof Consultant for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Roof Consultant.
 3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
 4. For change ordered by Roof Consultant without a quotation from Contractor, the amount will be determined by Roof Consultant based on the Contractor's substantiation of costs as specified for Time and Material work.
- G. Substantiation of Costs: Provide full information required for evaluation.
1. On request, provide the following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- H. Execution of Change Orders: Roof Consultant will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

1.06 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 1. All punchlist items have been satisfactorily completed as determined by the Roof Consultant.
 2. Contractor's and Manufacturer's warranties have been issued.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2200
UNIT PRICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. List of unit prices, for use in preparing Bids.
- B. Measurement and payment criteria applicable to Work performed under a unit price payment method.
- C. Defect assessment and non-payment for rejected work.

1.02 COSTS INCLUDED

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES

- A. Take all measurements and compute quantities. Measurements and quantities will be verified by Roof Consultant.
- B. Measurement by Area: Measured by square dimension using mean length and width or radius.
- C. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

1.05 PAYMENT

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Roof Consultant, multiplied by the unit price.
- B. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products remaining on hand after completion of the Work.
 - 4. Loading, hauling, and disposing of rejected Products.

1.06 DEFECT ASSESSMENT

- A. Replace Work, or portions of the Work, not complying with specified requirements.
- B. If, in the opinion of Roof Consultant, it is not practical to remove and replace the Work, Roof Consultant will direct one of the following remedies:
 - 1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Roof Consultant.
 - 2. The defective Work will be partially repaired to the instructions of the Roof Consultant, and the unit price will be adjusted to a new unit price at the discretion of Roof Consultant.
- C. The authority of Roof Consultant to assess the defect and identify payment adjustment is final.

1.07 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1 - Wood Nailers and Plywood - Replace, as necessary and designated by the Owner's Representative, deteriorated wood nailers and plywood. Quote a per lineal foot price for dimensional lumber and a per square foot price for plywood on the Bid Form for the following sizes:
 - 1. 1" x 4"
 - 2. 1" x 6"
 - 3. 1" x 8"
 - 4. 2" x 4"
 - 5. 2" x 6"

6. 2" x 8"
 7. 2" x 10"
 8. 2" x 12"
 9. 1/2-inch CDX plywood
 10. 3/4-inch CDX plywood
- B. Unit Price No. 2 - Repair isolated roof deck damage or openings not exceeding 6-inches x 6-inches with galvanized 18-gauge flat stock extending a minimum of 6-inches beyond the damaged area in all directions. Install No. 12 self-drilling screws at 6-inch on center along the perimeter of the plate. The price quoted shall be per square foot.
- C. Unit Price No. 3 - Roof Drain Replacement - Replace deteriorated drain bowls, if necessary and as directed by the Owner's Representative, to provide watertight drain assemblies. Install in accordance with state and local plumbing codes. This work is to be accomplished by a licensed plumbing sub-contractor hired by the Contractor. The price quoted shall be per roof drain bowl removed and replaced, including labor and material.
- D. Unit Price No. 4 - Tectum Roof Deck Replacement - Replace the Tectum roof deck, if necessary and as directed by the Owner's Representative, to provide a structurally sound deck matching the existing Tectum roof deck in type. The price quoted shall be a per square foot cost, including removal and replacement labor. Quote a price on the Bid Proposal Form.
- E. Unit Price No. 5 - Steel Roof Deck Replacement - Replace deteriorated steel roof deck, if necessary and as directed by the Owner's Representative, with compatible materials to provide a structurally sound deck matching existing deck type and thickness. The price quoted shall be a per square foot of decking replaced including labor.
- F. Unit Price No. 6 - Acoustical Steel Roof Deck Replacement - Replace deteriorated acoustical steel roof deck, if necessary and as directed by the Owner's Representative, with compatible materials to provide a structurally sound deck matching existing deck type and thickness. Include fiberglass batt insulation fill in the acoustical steel roof deck ribs. The price quoted shall be a per square foot of decking replaced including labor.
- G. Unit Price No. 7 - Replacement Roof Insulation - Replace, as necessary and designated by the Owner's Representative, wet, warped, delaminated or damaged roof insulation. Replacement insulation is to be 1.5-inch thick isocyanurate roof insulation with non-asphaltic fiber reinforced felt facers. Roof insulation board replacement shall be bid as a Unit Price Extra. The price quoted shall be per square foot.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.01 ROADWAYS, DRIVES, PARKING AREAS AND SIDEWALKS

- A. The Contractor is responsible for the condition of all existing roadways, sidewalks, etc., used during construction operations and shall repair same as required and leave same in good condition at the completion of the job.

1.02 BARRICADES AND PROTECTION

- A. The property on which work is to be done is in use. This means that employees and other general public may be adjacent to and below the construction operations.
- B. The Contractor will provide and maintain in good repair all barricades, guard railings and temporary protection as required by law and/or to suit job conditions.
- C. The Contractor shall do everything possible to protect the public, the workmen, the premises and adjoining property from injury or damage.
- D. Properly protect all sidewalks, pavements, existing building areas, building facades, windows and skylights. Replace or repair all parts of same which become damaged or defaced during or as a result of construction operations. Repairing of damaged parts shall be done in strict accordance with all local codes and ordinances and the Owner as conditions require.

1.03 VANDALISM

- A. The Contractor shall pay for all damage by vandalism to material or equipment that occurs to items finished or installed under this Contract. The Contractor shall be responsible for the work under this Contract during the construction period from the start until the final acceptance of the entire project by the Owner.

1.04 PROTECTION

- A. Provide and erect all required barricades and safety precautions in accordance with local, State and Federal Codes and other legal requirements.
- B. Provide secure, weatherproof protection for existing buildings, finishes, walks, drives, landscaping, lawns, etc., to remain. Repair any damage to the satisfaction of the Owner.
- C. Remove all protection and guards when work is completed and restore disturbed areas.
- D. Whenever lifting materials or equipment over or near existing or occupied buildings, give advance notice and arrange to have any potentially endangered spaces vacated.
- E. Protect the roof areas used to access the designated areas of roof removal and replacement. Protect the existing roofs (inside the areas designated for removal and replacement) by placing 1/2-inch plywood over 1.5-inch insulation and fastened together. Any damage to the existing roofs shall be repaired immediately to prevent leakage into the roof and the building interior.

1.05 TEMPORARY WEATHER PROTECTION

- A. The Contractor shall provide, maintain and pay for all temporary weather protection as required to properly protect all parts of the work from damage. This shall include temporary protective coverings.

1.06 RUBBISH DISPOSAL, FIRE SAFETY

- A. During non-construction hours, trash containers shall be covered and sealed to prevent windblown debris and access into trash containers.
- B. The location of the trash containers shall be subject to the approval of the Owner.
- C. All rubbish and debris shall be removed from the site daily or more often if directed by the Owner's Representative. Burning of trash on-site shall not be allowed.
- D. No open fire shall be permitted on the building site at any time.

1.07 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.

1.08 REMOVAL OF TEMPORARY WORK

- A. All temporary structures, barricades, protection and similar work shall be removed by the Contractor at completion of the project or when directed. Any repairs or alterations necessitated by such removal shall be made by the Contractor, and at the Contractor's expense.

1.09 WORK ACTIVITIES

- A. Contractors and subcontractors shall direct their employees to conduct themselves so as not to interfere with or disrupt the building activities. The Contractor shall schedule construction operations to minimize interference with operations, and cooperate with Owner's Representative in maintaining public access to existing building facilities.
- B. All construction operations, delivery and storage of material and movement of equipment shall be governed by applicable local building codes, traffic regulation and safety and fire regulation of local authorities.
- C. Contractors, subcontractors, and their employees or suppliers shall not use or interfere with existing public access, drives, roads or parking lot, except as specifically indicated or by prior arrangement with the Owner's Representative.
- D. Contractor's employees parking, delivery trucks and other construction vehicle parking shall only be at areas designated by the Owner's Representative.

1.10 TEMPORARY SERVICES

- A. Temporary power, as required for the project, shall be provided by the Contractor. The generator and all electrical cords must be maintained in areas approved by the Owner's Representatives.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 07 5300
ELASTOMERIC MEMBRANE ROOFING**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Section 07 6200 - Sheet Metal Flashing and Trim

1.02 SECTION INCLUDES

- A. Furnish all labor, materials and equipment required, and furnish and install roofing and sheet metal, complete with all accessories and incidentals required, in accordance with the Drawings and these Specifications, including but not limited to the following:
 - 1. Removal of existing roofing systems, insulation and base flashings.
 - 2. Roof insulation, flat stock and tapered insulation.
 - 3. Single-ply roofing and base flashings.
 - 4. Wood blocking and nailers.
- B. Existing Roofing
 - 1. See the New and Existing Insulation Schedule on the Roof Plan.

1.03 REFERENCE STANDARDS

- A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2021.
- B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-- Tension 2016 (Reapproved 2021).
- C. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane 2015 (Reapproved 2021).
- D. UL (DIR) - Online Certifications Directory Current Edition.
- E. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 QUALITY ASSURANCE

- A. Qualifications of Installers
 - 1. Roofing installer must be currently approved by the manufacturer of the selected roofing system.
- B. Standards
 - 1. Accomplish work under this Section in strict accordance with the roofing manufacturer's published installation instructions and best trade practices to achieve a completely watertight roofing and flashing installation.
 - 2. Provide materials which have been tested, listed and labeled by Underwriters Laboratories (UL).
 - 3. Roof insulation shall be approved components by Factory Mutual for insulated deck construction and shall bear FM approval mark and meet I-60 wind uplift requirements.
- C. General
 - 1. Be responsible for measurements. Before ordering material, preparing shop drawings, or doing any work, verify at the site all dimensions which may affect the work. Assume full responsibility for the accuracy of figures. No allowance for additional compensation will be considered for discrepancies between dimensions on the drawings and actual field dimensions.
 - 2. Immediately refer to any conflicts among requirements of these specifications on drawings, those of regulatory agencies, material manufacturer's recommendations and good roofing practices to the Roof Consultant.
 - 3. Accomplish all work in strict compliance with the roofing manufacturer's latest published specifications and details reviewed by the Roof Consultant and shall follow the best trade practices to achieve a complete watertight roofing and flashing installation.

4. Final results are the entire responsibility of the Contractor.
- D. Installer Qualifications: A single installer ("Roofer") shall perform work of this section; and shall be a firm with not less than 5 years of successful experience in installation of roofing systems similar to those required for this project and which is acceptable to or licensed by manufacturer of primary roofing materials.
 1. Installer Certification: Obtain written certification from manufacturer of roofing system certifying that Installer is approved by manufacturer for installation of specified roofing system. The certification shall be submitted with the bid.
 2. Installer's Field Supervision: Installer must maintain full-time supervision on jobsite during times that roofing work is in progress. Supervisor must have a minimum of 5 years experience in roofing work similar in nature and scope to specified roofing.

1.05 SUBMITTALS

- A. Provide Safety Data Sheets (SDS) to the Owner for any materials prior to delivery to the site.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, and fasteners.
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and tapered insulation layout plan.
- D. Safety and Work Schedule
 1. Submit copies of your written Safety Plan to the Owner.
 2. Submit a written work schedule to the Owner with a detailed time line from Contract Award to project completion.
- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- F. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 INSPECTION

- A. Prior to final payment, and as a condition thereof, the Contractor shall obtain final approval from Roofing Technology Associates, Ltd. indicating proper compliance with the Contract Documents. The Contractor shall coordinate inspection services during roof installation.
- B. The Roofing Consultant shall perform inspections as work is being performed to insure conformance with manufacturer's recommendations and recognized roofing procedures.
- C. The Roofing Consultant shall review and approve all shop drawing submittals.
- D. Notify Roofing Consultant whenever roofing work is to be done, in sufficient time to arrange inspections. Provide safe access to the roof for inspection.
- E. Furnish Roofing Consultant with all pertinent job information prior to beginning work in accordance with Roofing Consultant directions.
- F. The Roofing Consultant shall perform any testing required to verify the integrity of the work and confirm that work is in conformance with manufacturer's recommendations.

1.07 PRE-CONSTRUCTION MEETING

- A. Prior to scheduled commencement of roofing work, the Contractor and representatives of other entities directly concerned with performance of roofing system shall have a pre-construction meeting. Review requirements (Contract Documents), submittals, status of coordinating work, availability of materials and installation facilities and establish preliminary installation schedule. Review requirements for inspections, testing, certifications, forecasted weather conditions, governing regulations, insurance requirements, and proposed installation procedures. The Contractor shall record the items discussed including agreement or disagreement on matters of significance; furnish copy of recorded discussions to each participant. Review foreseeable methods and procedures related to roofing work, including but not necessarily limited to the following:
1. Tour representative areas of roofing substrates, inspect and discuss conditions of substrate.
 2. Review roofing system requirements (drawings, specifications and other Contract Documents).
 3. Review required submittals.
 4. 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.
 5. Review required inspection, testing, certifying and material usage accounting procedures.
 6. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer s original containers, dry and undamaged, with seals and labels intact.
- B. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- C. Store and handle roofing materials in a manner which will prevent moisture damage. Store adhesives and flashings in a dry, warm, well-ventilated, weather-tight place. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.
- D. Provide a 6-foot high chain link fence system around the storage and set-up areas.

1.09 PROJECT CONDITIONS

- A. Coordinate the work with installation of associated flashings and counterflashings installed by other sections as the work of this section proceeds.

1.10 WARRANTY

- A. Furnish the Owner with a Contractor s written warranty covering all materials and workmanship for a 2-year period after Date of Substantial Completion.
- B. Manufacturer s Warranty: Furnish Owner with the selected roofing manufacturer s 20-year total system warranty covering all materials and labor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Performance: Provide roofing materials recognized to be of generic type indicated and tested to show compliance with indicated performances, or provide other similar materials certified in writing by roofing manufacturer to be equal or better than specified in every significant respect and acceptable to the Owner.
- B. Compatibility: Provide products which are recommended by the roofing manufacturer to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.

- C. EPDM Membrane Materials:
1. Carlisle SynTec Incorporated; Sure-Tough EPDM Reinforced Membrane Roofing System, Design "A" - Fully Adhered: www.carlisle-syntec.com.
 2. Holcim Elevate Roofing Systems; RubberGard Max Fully Adhered System: www.holcimelevate.com.

2.02 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-monomer (EPDM); externally reinforced with fabric; complying with minimum properties of ASTM D4637/D4637M.
1. Thickness: 60 mil, 0.060 inch.
 2. Membrane: 0.060-inch thick, reinforced, EPDM (Ethylene Propylene Diene Monomer) compounded elastomer. Membrane sheet size shall be the largest sheet possible as determined by the job conditions.
- B. Base Flashing: Reinforced .060-inch thick EPDM flashing sheet as furnished by the roofing manufacturer.
- C. All materials used in the roofing system shall be as furnished by a single roofing manufacturer. Seam tape, adhesives, cleaners, sealants, water cut-off mastic and other required items shall be as furnished or recommended by a single roofing manufacturer.
- D. All details relating to the installation of the roof system shall be approved by the roofing manufacturer and installed in such a manner that the roofing manufacturer will furnish its 20-year total system warranty for the installation.

2.03 INSULATION

- A. Manufacturers: Match the roofing manufacturer. Subject to compliance with requirements:
1. Carlisle SynTec Incorporated, InsulBase Polyiso, InsulBase Tapered Polyiso and SecurShield HD Plus Polyiso Cover Board.
 2. Holcim Elevate, ISOGARD GL Flat, ISOGARD GL Tapered and ISOGARD HD Cover Board.
 3. Georgia-Pacific, Densdeck Prime Roof Board.
- B. Insulation Materials:
1. Flat Stock Roof Insulation: Closed-cell polyisocyanurate foam core with non-HCFC blowing agent, integrally laminated to heavy non-asphaltic fiber reinforced felt facers; conform to ASTM C 1289-13e1, Type II, Grade 2.
 - a. Thermal Resistivity (R-value): 15.0 at 75 degrees F for 2.6-inch thick insulation board.
 - b. Thermal Resistivity (R-value): 11.4 at 75 degrees F for 2.0-inch thick insulation board.
 - c. Thermal Resistivity (R-value): 8.5 at 75 degrees F for 1.5-inch thick replacement insulation board.
 - d. Compressive Strength: 20 psi.
 - e. Maximum size (mechanically fastened): 4-feet by 8-feet.
 - f. Maximum size (adhered): 4-feet by 4-feet.
 - g. Provide other thicknesses as required.
 2. Tapered Roof Insulation: Closed-cell polyisocyanurate foam core with non-HCFC blowing agent, integrally laminated to heavy non-asphaltic fiber reinforced felt facers; conform to ASTM C 1289-13e1, Type II, Grade 2.
 - a. Slope: 1/8-inch per foot.
 - b. Compressive Strength: 20 psi.
 - c. Maximum size: 4-feet by 4-feet.
 - d. Minimum thickness: 1/2-inch.
 3. Roofing Saddles: Closed-cell polyisocyanurate foam core with non-HCFC blowing agent, integrally laminated to heavy non-asphaltic fiber reinforced felt facers; conform to ASTM C 1289-13e1, Type II, Grade 2.
 - a. Slope: 1/4-inch per foot.

- b. Maximum size: 4-feet by 4-feet.
 - c. Minimum thickness: 1/2-inch.
 4. Roof Sumps: Closed-cell polyisocyanurate foam core with non-HCFC blowing agent, integrally laminated to heavy non-asphaltic fiber reinforced felt facers; conform to ASTM C 1289-13e1, Type II, Grade 2.
 - a. Slope: 1/2-inch per foot.
 - b. Maximum size: 4-feet by 4-feet.
 - c. Minimum thickness: 1/2-inch.
 - d. Roof sump size: 8-feet by 8-feet.
 5. Cover Board (Areas C,F,G and I): Closed-cell polyisocyanurate foam core with non-HCFC blowing agent, integrally laminated to glass coated facers; conform to ASTM C 1289, Type II, Class 4, Grade 1.
 - a. Thermal Resistivity (R-value): 2.5 at 75 degrees F for 0.5-inch thick insulation board.
 - b. Compressive Strength: 80 to 109 psi minimum.
 - c. Maximum size: 4-feet by 4-feet.
 - d. Minimum thickness: 1/2-inch.
 6. Gypsum Roof Board (Area E only): Fiberglass mat faced gypsum, roof board. Fire resistance rating (UL 790 and ASTM E108): Class A. Approved for use with fully adhered roof membrane. Thickness: 1/2-inch. Maximum board size: 4-feet by 4-feet.
 - a. Acceptable product or approved equal: GP, DensDeck Prime or U.S. Gypsum Securock.
 7. Tapered Edge Strips: Wood fiber uniform density board complying to ASTM C 208.
 - a. Tapered edge strip: 1-1/2-inches by 18-inches.
 8. Acoustical Steel Deck Rib Fill: Fiber glass batt insulation (unfaced). Size to fit the deck ribs.
 9. Expansion Joint Material: 6 mil polyethylene sheeting (vapor retarder), fiber glass batt insulation (unfaced).
- C. Fasteners for securing the roof insulation to steel roof deck shall be a heavy duty screw (self-drilling) and metal plate system approved by the roofing manufacturer for the type of deck being covered. The fasteners shall provide a minimum of 300 pounds of pull-out when tested on the subject deck. Length shall be sufficient to penetrate deck a minimum of 1/2-inch to a maximum of 1-1/2-inch. Minimum insulation plate size: 3-inches.
1. Carlisle SynTec Incorporated Sure Seal HP Fasteners
 2. Holcim Elevate - Heavy Duty Fasteners
 3. NOTE: White fasteners required at interior exposed steel roof deck areas (Areas C, F and I).
- D. Fasteners for securing the roof insulation to the Tectum roof deck shall be polymer fasteners and 3-inch steel plates.
1. Carlisle SynTec Incorporated, Gyptec Fasteners.
 2. Holcim Elevate, Polymer Fasteners.
- E. Insulation Adhesive: Two-component, construction grade, insulating polyurethane low-rise adhesive. Approved manufacturers and products:
1. Carlisle SynTec Incorporated, FAST Bag in a Box Adhesive.
 2. Holcim Elevate, I.S.O. Stick Adhesive.

2.04 WOOD NAILERS AND PLYWOOD

- A. Wood nailers and blocking: PS 20, construction grade lumber.
1. Sizes: Nominal sizes as indicated on drawings, S4S.
 2. Moisture Content: S-dry or MC19.
 3. Species: SPF.
 4. Grade: No. 2.
- B. Plywood Sheathing: PS 1, Grade C-D, Exposure I. Thicknesses: 3/4-inch and 5/8-inch.

- C. Fasteners in contact with wood blocking and nailers: Galvanized nails in conformance with ASTM A153 unless otherwise specified.

2.05 MISCELLANEOUS

- A. Tectum deck replacement: Match existing roof deck: width, length and thickness. Provide grout to fill Tectum deck joints.
- B. Steel deck replacement: Match existing roof deck; material, gauge, profile and finish.
- C. Acoustical steel deck replacement: Match existing roof deck; material, gauge, profile and finish.
- D. Plates to cover small holes in the various roof deck types and isolated areas of deterioration shall be 18-gauge galvanized steel. Maximum hole size: 6-inches by 6-inches.
- E. Filler for sheet metal penetration pockets shall be non-shrink grout (bottom) and pourable elastomeric sealant (top).
- F. Replacement roof drains and accessories for the low-slope roof areas shall be cast iron as manufactured by J. R. Smith Manufacturing Co., 1000 Series, Size: to match the existing diameter and a bottom outlet to match the existing drain pipe. Acceptable connection: Speedi-Set Gasket. Utilize the drain manufacturer s specified cast iron underdeck clamp, clamping ring and drain strainer.
- G. Replacement roof drain strainers and clamping rings shall be cast iron, sized to fit the existing roof drain bowl.
- H. Walkway Pads: 30-inch by 30-inch by 0.30-inch thick composite rubber with factory laminated seam tape on the back surface, diamond or button tread.
- I. New Roof Hatch: Bilco Company, Type S-50 aluminum.
- J. Roof Hatch Safety Railing System: OSHA Compliant roof hatch mounted safety rail system. Powder coated steel; color: yellow. As manufactured by or approved equal:
 - 1. Bilco Company, Bil-Guard 2.0 Roof Hatch Safety Rail.
- K. Premanufactured Pipe Supports: PHP Systems roller pipe supports sized for the pipe being supported or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify walls and roof deck are clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify roof deck surfaces are dry and free of snow or ice.
- E. Maintain a daily watertight condition in the existing roof areas. At no time shall the existing roof remain vulnerable to moisture intrusion. Overnight tie-ins are required regardless of the weather forecast.

3.02 DEMOLITION AND SURFACE PREPARATION

- A. Remove and discard the following components or prepare surfaces as described:
 - 1. Remove and discard the existing roof membrane, base flashing, roof insulation, cant strips, Tectum cant strips and other miscellaneous existing roofing down to the structural roof deck.
 - a. NOTE: PVC membrane seams with mechanical fasteners may be present below the top PVC roof membrane.
 - b. NOTE: Limit the amount of water sprayed on the built-up roof to prevent leaks in the building.

2. Remove and discard wet, deteriorated or damaged existing 1.5-inch thick insulation in Areas C, F, G and I. 1.5-inch thick insulation determined to be in good condition is to remain.
 - a. NOTE: 1.5-inch thick roof insulation replacement shall be bid as a Unit Price Extra.
3. Remove and discard the existing fascia cap, coping, gravel stop/ fascia, counterflashing, gutter, downspout and other sheet metal flashing accessories.
 - a. NOTE: Remove and save for reinstallation the sheet metal coping in Area G (both locations).
4. Remove and discard the termination bars and fasteners from the walls and perimeter edges. Remove and discard the repair materials from the walls and perimeter edges.
5. Temporarily displace mechanical ventilator unit covers to facilitate the removal and replacement of the base flashing. Remove and discard existing counterflashing from the roof curbs if present. Prepare to raise roof curbs with flashing height less than 8-inches.
6. Remove and discard existing plumbing vent pipe flashings. Clean off all repair materials and caulk from the pipes.
7. Remove and discard the existing sheet metal flange, sleeve and umbrellas from the hot vent stacks.
8. Save and reuse the existing duct supports.
9. Remove and discard the existing penetration pocket flashing and filler material. Clean off the penetrations to remain.
10. Remove and discard the obsolete rooftop equipment as shown on the Roof Plan. Prepare to infill the resultant openings in the roof deck with matching roof deck.
11. Temporarily displace supply lines (electrical and gas) to facilitate the removal and replacement of the roof system. Reuse existing pipe supports and clamps determined to be in good condition. Remove and discard wood blocking pipe supports or pipe supports determined to be in poor condition.
12. Cut the conduit structural channels off where they extend above the conduit. Remove the conduit supports in Area D to allow installation of the wood nailers and plywood for the new pipe chase.
13. Remove and discard roof drain inserts. Review the existing roof drain for condition and prepare to replace the roof drain if necessary. If the roof drain can be reused, provide new cast iron clamping ring and roof drain strainer.
 - a. NOTE: Roof drain inserts will not be allowed to be installed in the new roof system.
14. Remove and discard plastic or broken roof drain strainers. Provide replacement cast iron roof drain strainers.
15. Closely inspect the existing roof drain bowls for cracks, broken flanges or deteriorated conditions. Remove and replace any damaged drain bowl with a matching cast iron drain bowl. The installation shall be in accordance with local plumbing codes.
 - a. Roof drain replacement shall be bid as a Unit Price extra.
16. Thoroughly clean out the roof drain bowls, clamping rings and roof drain strainers in preparation for reuse.
17. Remove and discard deteriorated wood nailers and plywood.
 - a. NOTE: Wood nailer and plywood replacement shall be bid as a Unit Price extra.
18. Prior to cutting and removing deteriorated roof deck, the area below the required deck replacement area must be cordoned off and monitored by the Contractor's appointed safety coordinator during the entire cutting and patching procedure. The safety coordinator must be in communication with the foreman during removal and replacement and have in his possession a fully charged fire extinguisher.
19. Closely inspect the existing roof deck for deteriorated conditions or holes. Repair isolated deck damage not exceeding 6-inches x 6-inches with 18-gauge galvanized steel plate.
 - a. NOTE: Roof deck repairs shall be bid as a Unit Price Extra.
20. Remove and replace deteriorated roof deck with matching roof deck to provide a structurally sound roof deck.
 - a. NOTE: Roof deck replacement shall be bid as a Unit Price Extra.

21. Prepare to install a new roof hatch curb in Area A by cutting and removing the existing Tectum deck to the size opening required by the roof hatch manufacturer.
 - a. Provide structural steel framing around the new opening to properly support the new roof deck and roof hatch. Secure the structural steel to existing structural steel with nut and bolt fasteners.
22. Remove debris, scrap and rubbish from the roof areas and building grounds daily.
23. The Roofing Contractor is required to follow NESHAP regulations for any asbestos containing material (test results in Appendix).

3.03 INSTALLATION - GENERAL

- A. General: Comply with roofing manufacturer s instructions, except where more stringent requirements are indicated herein.
 1. Details relating to the installation of the new roof system shall be approved by the roofing manufacturer and the Roofing Consultant and installed in such a manner that the roofing manufacturer will furnish the specified warranty for the installation.
 2. Do not begin roofing work until all decks, walls, curbs, nailers, accessories, and underlying substrates are ready and acceptable to have roofing materials installed. Deck surfaces must be clean, smooth, dry and free of moisture prior to beginning roof application.
 3. Schedule and supervise work crews so that the area of roofing begun one day is completely finished before leaving the job site that day. Included are all flashings within each day s work area.
 4. Do not install any roofing materials during rain or other inclement weather. One exception is that temporary work may be installed during such weather to protect the building interior and new materials that are already installed. Remove all temporary work and materials that have been exposed to such weather, then install permanent materials as specified during acceptable weather conditions.
 5. At the end of each day s roofing installation, protect edge of incomplete work, including membrane and insulation. Install temporary water cut-offs to provide a weather tight seal to both the roof deck and existing roof membrane. Remove temporary water cut-off materials at the beginning of next day s work.
 6. Materials must be stored dry and protected with tarps and on pallets at all times. Wet or damaged materials will be removed from the job site.
 7. The Contractor will be responsible for cleaning the building interior on a daily basis of any reroofing related debris entering the building as a result of deck repair and reroofing operations. Provide 6 mil plastic sheets to cover the interior as directed by the Owner. Immediately remove and discard the plastic sheets when completed on a daily basis.
 8. Construct a temporary walkway system with a minimum 1.5-inch thick insulation and 3/4-inch thick plywood to protect the existing roof (inside the areas designated for removal and replacement), where traffic is to cross the roof to the disposal area.

3.04 INSTALLATION - SUBSTRATE

- A. Steel Deck
 1. Repairs: Install 18-gauge galvanized plates at small holes (less than 6-inches by 6-inches) and/or at isolated areas of deterioration of the steel roof decks. The plates shall extend 6-inches past the deficient area in each direction. Secure the steel plate to sound roof deck with self-drilling screws spaced 6-inches on center along the perimeter edge of the steel plate.
 2. Replacement: Install new steel roof deck to cover resultant openings at obsolete rooftop equipment or where deteriorated steel roof deck was removed.
 - a. The new steel deck shall not span less than three supports when replacing deteriorated decking. The deck may be installed in single spans (two supports) where obsolete curbs are removed, provided the opening is framed with steel and the opening is less than 6-feet wide. The end of each roof deck panel shall be supported for two inches and overlap the purlin a minimum of two inches. Each roof deck panel is to be fastened to the purlins with self-drilling screws drilled through the bottom ribs

at intermediate supports at 12-inch centers. Fasteners at end laps and intermediate supports within 6-feet of the building perimeter shall be spaced 6-inch centers. The new roof deck panels shall overlap adjacent panels at the side laps. The side laps shall be mechanically fastened with self-tapping sheet metal screws spaced a maximum of 36-inches on-center. For spans under 6-feet, a single side lap fastener be provided at mid-span. For spans over 6-feet, the side lap fasteners shall be placed at the third points of the span.

- b. Install fiberglass batt insulation flute filler in the deck ribs of the acoustical steel deck where new deck is installed or where the existing fiberglass batt insulation flute filler was removed due to water damage.
- B. Tectum Deck
1. Install matching replacement decking where the existing decking was removed due to deterioration. Install replacement decking with the long dimension engaged with the manufactured tongue and groove. Support the endjoints on the existing structural supports by the maximum dimension possible. The installation shall be in accordance with the deck panel manufacturer s specifications.
 2. Mechanically fasten and solidly grout the deck joints in accordance with the manufacturer s requirements.
- C. Roof Drain Replacement
1. The Contractor shall hire a licensed plumbing subcontractor to install replacement roof drains as necessary. The Contractor shall coordinate the roof drain installation with the plumber. Temporary roofing work needed at the roof drain location shall be provided by the Contractor at no additional cost to the Owner.
 - a. Install new roof drain assemblies at the deteriorated roof drain locations. Utilize the manufacturer s recommended underdeck clamp to secure the drain bowl in place or to the sump pan.
 - b. The new roof drain shall be connected to the existing drain pipes in accordance with state and local plumbing codes and the drain manufacturers requirements. Insulate the new roof drain and drain pipe to prevent condensation. Water test the new roof drain to verify that the new roof drain functions properly.
 - c. Install new cast iron clamping rings and cast iron roof drain strainers at the new replacement roof drain locations.
- D. Wood Nailers
1. Install new wood nailers as designated on the attached RTA Details. Secure the wood nailers to existing wood nailers with galvanized 16d nails in two staggered rows spaced 12-inches on center. Secure new wood nailer to the steel deck with heavy duty screws spaced 24-inches on center. Secure new wood nailers to Tectum roof deck areas with polymer fasteners spaced 16-inches on center.
 2. Install wood nailers at roof curbs which are not 8-inches above the new finished roof surface. The wood nailers shall be installed to match the existing opening or inside dimension of the curb. The wood nailers shall be a minimum of 1.5-inches thick and shall be of sufficient width to provide a minimum curb height of 8-inches above the completed roof surface. Secure the wood nailers with appropriate fasteners.
 3. Install wood nailers at the new roof hatch to match the adjacent insulation thickness. Install the new roof hatch at the approximate location shown on the Roof Plans in accordance with the manufacturer s requirements. Secure the wood nailers with heavy duty screws spaced 12- inches on center.
 4. Install ¾-inch thick plywood over the built-in gutters in Area E (see RTA Detail No. 2). The plywood should be installed perpendicular across the gutter and secured with screws to the existing nailers spaced 12-inches on-center.

5. Install a pipe chase over the existing three conduits attached to the south wall of Area H (see RTA Detail No. 17). A stud wall shall be built with stud spacing 24-inches on-center. The bottom plate shall be secured to the deck with polymer fasteners 16-inches on-center. Cover the pipe chase framing with 5/8-inch exterior grade plywood. Extend the new horizontal pipe chase over the existing vertical pipe chase covers to provide a tight, animal proof enclosure.
 - a. Prepare to wrap the new horizontal pipe chase ends with prefinished galvanized steel to match the existing vertical pipe chase covers.
 6. Install replacement wood nailers where the existing wood nailers were removed due to deterioration. The wood nailers shall be secured using the same methods that the originally installed wood nailers were secured and/or in a manner to provide solid securement.
 7. Resecure all loose existing wood nailers to provide solid securement for the new roof system and perimeter edge sheet metal. Secure the existing wood nailers with appropriate fasteners.
- E. Roof Hatch
1. Install new roof hatch in strict accordance with manufacturer s instructions. Locate unit level, plumb, and in proper alignment with adjacent work. Set the roof hatch curb on wood nailers as required to provide 8-inches minimum flashing height. Secure the roof hatch nailing flange to the wood nailers in accordance with the manufacturer s requirements.
 2. Wrap the top edge of the flashing with foam backer rod and insert into the roof hatch curb cap as required by the manufacturer.

3.05 INSTALLATION - INSULATION

- A. General
1. Install the specified insulation in accordance with manufacturer s latest printed instructions as shown on the Roof Plan Insulation Schedule.
 2. Protect the rigid roof insulation from the weather and standing moisture at all times. Lay up no more insulation than can be completely covered with roofing materials on the same day. At the end of each day s work, install temporary water cut-offs at the edges of all insulation to provide a watertight seal. Completely remove water cut-offs when the work is started again.
 3. Install the specified insulation with staggered board joints between boards and layers of insulation.
 4. Stagger board joints by the maximum dimension possible. Neatly cut to fit edges and penetrations. Fill gaps larger than 1/4-inch with matching insulation.
 5. When adhering the insulation in foam adhesive, weigh down each board immediately until the adhesive sets up.
 6. Install tapered edge strips at perimeter edges as needed or in lieu of installing reinforced perimeter attachment strips if height difference will permit. Trim the tapered edge strip as required to provide a smooth transition. Mechanically fasten or foam adhere the tapered edge strip to provide solid securement.
 7. White fasteners required at interior exposed steel roof deck areas (Areas C, F and I).
 8. Insulation fasteners for Tectum roof deck areas: polymer fasteners.
- B. Roof Sump Insulation
1. Install 8-foot by 8-foot by 1/2-inch per foot tapered insulation to form roof sumps at the roof drains as shown on the Roof Plan.
 - a. Mechanically fasten the tapered insulation to the roof deck with one approved fastener and plate per two square feet (8 fasteners per 4-foot by 4-foot board).
- C. Insulation - Area E
1. Install two layers of 2.6-inch thick insulation in the field of the roof. Stagger board joints between rows and layers of insulation. Properly secure the insulation:

- a. Mechanically fasten the base layer of 2.6-inch thick insulation to the roof deck with one approved fastener per four square feet (8 fasteners per 4-foot by 8-foot board) of insulation board. Increase the number of fasteners by 50% at 8-foot wide perimeter edges of the roof. Increase the number of fasteners by 100% at 8-foot by 8-foot building corners.
 - b. Adhere the second layer of 2.6-inch thick insulation to the base layer of insulation with the approved foam adhesive. Maximum board size for adhered insulation is to be 4-foot by 4-foot, per manufacturer requirements. Bead spacing (perimeter): 6-inches on center (8-foot perimeter). Bead spacing (field): 12-inches on center.
 - c. Adhere 1/2-inch thick gypsum roof board onto second layer of 2.6-inch isocyanurate insulation with the approved foam adhesive. Bead spacing: 6-inches on center.
- D. 4-Way Tapered Insulation - Areas A,B,D and H
1. Install a base layer of 2.0-inch thick insulation in the field of the roof. Stagger the board joints between rows and layers of insulation. Properly secure the insulation as follows:
 - a. Mechanically fasten the insulation with one approved fastener per two square feet (8 fasteners per 4-foot by 4-foot board) of insulation board. Increase the number of fasteners by 50% at 8-foot wide perimeter edges of the roof. Increase the number of fasteners by 100% at 8-foot by 8-foot building corners.
 2. Install tapered insulation in accordance with the approved tapered insulation layout plan. The tapered insulation shall be sloped 1/8-inch per foot. The minimum starting thickness of the tapered insulation shall be 2-1/2-inches. Adhere the tapered insulation to the base layer of insulation as follows:
 - a. Adhere the tapered insulation with the approved foam adhesive. Bead spacing (Perimeter): 6-inches on center (8-foot perimeter). Bead spacing (Field): 12-inches on center.
- E. Insulation - Areas C,F,G and I
1. Replacement 1.5-inch Insulation: Install one or two layers of 1.5-inch thick isocyanurate insulation where the existing deteriorated insulation was removed.
 - a. Mechanically fasten the 1.5-inch thick isocyanurate insulation to the roof deck with one approved fastener and plate per two square feet (8 fasteners per 4-foot by 4-foot board).
 2. Install a layer of 2.0-inch thick insulation on the existing insulation in the field of the roof. Stagger the board joints between rows and layers of insulation. Properly secure the insulation as follows:
 - a. Mechanically fasten the insulation to the roof deck with one approved fastener and plate per four square feet (4 fasteners per 4-foot by 4-foot board).
 3. Install 1/2-inch thick isocyanurate insulation HD cover board on the properly installed layers of insulation. Adhere the cover board insulation to the layers of insulation as follows:
 - a. Adhere the cover board insulation with the approved foam adhesive. Bead spacing (Perimeter): 6-inches on center (8-foot perimeter). Bead spacing (Field): 12-inches on center.
- F. Insulation - Roof Curbs and Walls
1. Insulate the roof curbs of the mechanical units and walls that are currently insulated. Mechanically fasten the insulation to the roof curbs or walls.
- G. Tapered Saddles and Tapered Edge Strip
1. Install tapered insulation saddles at the locations shown on the Roof Plan. Adhere the tapered insulation saddles with the approved foam adhesive. Bead spacing: 6-inches on center.
 2. At appropriate locations, install tapered edge strip to provide smooth transitions in the insulation system. Adhere the tapered edge strip with the approved foam adhesive. Bead spacing: 6-inches on center.

3.06 INSTALLATION - ROOF SYSTEM

A. Membrane Installation

1. Roofing system shall be installed following the latest printed installation instructions of the roofing manufacturer.
2. Evenly apply adhesives at rate recommended by the roofing manufacturer to both the underside of the membrane and the insulation. Apply bonding adhesive uniformly, stopping short of the splice areas along the seams and base tie-ins. Allow the adhesive to flash off until tacky.
3. Reposition the membrane, free of air pockets and wrinkles. Firmly press the sheet into place without stretching. Broom the surface to improve adhesion immediately after installation.
4. Overlap edges and ends and seal by roofing manufacturer s recommended dimensions.
5. Shingle lap joints on sloped substrates in the direction of drainage.
6. Complete the roof membrane seams with the roofing manufacturer s seam tape wherever possible. Apply the seam tape in accordance with the roofing manufacturer s instructions, including seam preparation work, proper seam tape alignment and exposure. Roll the completed seam with a hand roller across and along the seam.
7. Secure the roof membrane at base tie-ins with the roofing manufacturer s reinforced perimeter attachment strips. Adhere the reinforced perimeter attachment strips to the insulation with bonding adhesive. Fasten the attachment strips with the roofing manufacturer s approved fasteners. After adhering the roof membrane to the reinforced perimeter attachment strip, roll the splice area with a hand roller across the strip over the length of the splice.
8. Apply T-joint covers, stripping and appropriate sealant where specified by the roofing manufacturer on a daily basis.

B. Flashing Installation

1. Perimeter edge flashing, wall flashing and roof curbs shall be installed in accordance with the roofing manufacturer s flashing details using the longest pieces practicable. The installed flashing shall be fastened along the top edge 12-inches on-center (maximum). The latest printed flashing instructions must be followed as issued by the roofing manufacturer. Hand roll the flashings to promote adhesion.
 - a. NOTE: ALL FLASHINGS SHALL BE COMPLETED DAILY AS THE PROJECT PROGRESSES WITH THE INSTALLATION OF THE NEW ROOF SYSTEM.
2. Install a termination bar at the horizontal and vertical ends of the flashing where the flashing is exposed to the weather or as shown on the details. The termination bar shall be mechanically fastened (12-inches on-center, maximum) into slotted holes. The termination bar and fastener heads shall be sealed with the specified sealant.
3. Secure the top edge of the flashing installed on the roof hatch curb with foam backer rod. Adhere the backer rod in place as required by the roofing manufacturer.
4. Seal roof drains per the roofing manufacturer s required details. Install clamping rings and cast iron drain strainers immediately after placing the membrane. Drain strainers and clamping rings must be securely fastened to the roof drain bowl.
 - a. Replace broken roof drain strainers and plastic roof drain strainers with cast iron roof drain strainers.

C. Penetration Flashing

1. Flash all penetrations passing through the membrane and flashing. Factory prefabricated pipe flashing shall be used to flash all penetrations where installation is possible. Where factory prefabricated pipe flashing cannot be installed, field fabricated penetration flashing may be used. All flashings and terminations to be completed in accordance with the roofing manufacturer s requirements.

2. Install new galvanized sheet metal flange, sleeve and umbrella on the exhaust stack. Install the new sheet metal flashing in accordance with SMACNA Figure 8-9C. Solder all seams to a watertight condition. Install stainless steel drawband to secure the umbrella. Apply sealant to seal the umbrella to the stack.
 3. Install penetration pocket flashings at miscellaneous roof penetrations which cannot be flashed with a prefabricated boot or flange, sleeve and umbrella flashing. Use penetration pocket flashings approved by the roofing manufacturer. Fill the penetration pocket with non-shrink grout (bottom half) and the roofing manufacturer's pourable sealer (top half). Mound the pourable sealer to shed water.
 4. Return the covers onto the multiple pipe penetration flashings to their original position and secure the covers in place as originally fastened.
- D. Sheet Metal Installation
1. See Section 07 6200 Sheet Metal Flashing and Trim.
- E. Miscellaneous
1. Return the existing mechanical units to their original positions and secure to the existing roof curb with EPDM-gasketed screws, a minimum of two on each side of the roof curb.
 2. Reinstall the existing Pate curb covers onto the existing roof curb with EPDM-gasketed screws, a minimum of one fastener on each side of the roof curb.
 3. Install rubber walkpads at the mechanical unit access panels, doors, ladders, downspouts, and beneath equipment on roof surface. Install additional rubber walkpads at the designated locations shown on the Roof Plan. The walkpads shall be adhered to the roof membrane in accordance with the manufacturer's requirements.
 4. Install rubber walkpads below plastic equipment pads.
 5. Return the existing supply lines to their original positions. Reinstall the existing pipe supports on the supply lines. Provide membrane protection if required by the roofing manufacturer. Maximum spacing: 10-feet on center.
 - a. Install new pipe supports where the existing pipe supports are damaged or missing.
 6. Install vapor retarder and batt insulation in the expansion joint curbs.

3.07 PRECAUTIONS

- A. Do not use oil base or plastic roof cement in conjunction with EPDM materials.
- B. Waste products (petroleum, grease, oil and solvents, vegetable or mineral oil and animal fat) should not be allowed to come in contact with the EPDM roof membrane system.
- C. Splicing and bonding surface must be dry.
- D. Daily Seal: Care should be exercised to ensure that water does not flow beneath any completed sections of roof by temporarily sealing the loose edge of the membrane when the weather is threatening. The roofing manufacturer's requirements should be followed closely.
- E. An open flame may not be used to dry the roof membrane or to heat the flashing materials.

3.08 FIELD QUALITY CONTROL

- A. The Contractor shall coordinate inspection services during roof application. Prior to final payment, and as a condition thereof, the Contractor shall obtain final approval from the Roofing Consultant indicating proper compliance with the Contract Documents.
- B. The Roofing Consultant shall review and approve all shop drawing submittals.
- C. Notify Roofing Consultant whenever roofing work is to be done in sufficient time to arrange inspections. Provide safe access to roof for monitoring.
- D. Furnish Roofing Consultant with all pertinent job information prior to beginning work in accordance with Roofing Consultant's directions.
- E. The Roofing Consultant may perform any testing required to verify the integrity of the work and confirm that work is in conformance with roofing manufacturer's recommendations.

3.09 CLEANING

- A. Remove bituminous markings, adhesives or other markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.

3.10 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using rigid insulation and plywood.
- C. Protect the property grounds and building during the course of the project. At set-up locations, protect the pavement, sidewalks, walls, windows, etc. to prevent damage. Repair damage to the areas to match the condition of the area prior to the reroofing project.
- D. Protect the roof areas used to access the designated areas of roof removal and replacement. Protect the existing roofs (inside the areas designated for removal and replacement) by placing 3/4-inch plywood over 1.5-inch insulation and fastened together. Any damage to the existing roofs shall be repaired immediately to prevent leakage into the roof and the building interior.

END OF SECTION

**SECTION 07 6200
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This Section is part of the entire set of Contract Documents and shall be coordinated with the applicable provision of the other parts.

1.02 SECTION INCLUDES

- A. Premanufactured sheet metal fascia cap, coping, counterflashing and miscellaneous flashing.

1.03 RELATED REQUIREMENTS

- A. Section 07 5300 - Elastomeric Membrane Roofing.

1.04 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.
- C. ANSI/SPRI ES-1-2003 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- B. Samples: Submit selection and verification samples for finishes, colors and textures. Color to be selected by the Owner.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience. Engage an experienced installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.
- C. Do not expose to direct sunlight or extreme heat trim material with factory applied strippable film.

PART 2 PRODUCTS

2.01 SHEET METAL FLASHING AND TRIM

- A. Sheet Materials
 1. Galvanized Steel for Continuous Cleat: ASTM A 653, with G90 zinc coating; minimum 0.034 inch (22 gauge) thick base metal.
 2. Galvanized Steel Base Metal: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal.
- B. Prefinished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.
 1. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 2. Color: As selected by Owner from manufacturer's standard colors.
 3. Acceptable Manufacturer's:

- a. Holcim Elevate: Una-Clad
 - b. Petersen Aluminum Corporation: Pac-Clad
- C. Accessories
1. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer.
 2. Gasketed washers: Soft neoprene washers.
 3. Elastomeric Sealant: High performance, one component polyurethane-base, non-sag elastomeric sealant as manufactured by one of the following manufacturers or approved equivalents:
 - a. Sika Corporation, Sikaflex - 1a
 - b. Tremco, Vulkem 116
- D. Fabrication, General
1. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal and other characteristics of the item indicated.
 2. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Form material with watertight end joints and seams.
 4. Fabricate vertical faces with bottom edge hemmed 1/2-inch and bent outward to form a drip edge unless specified otherwise.
 5. Form exposed sheet metal work, shop fabricated or field fabricated, that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated.
 6. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 7. Conceal fasteners and expansion provision where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
 8. Corners: corners must be formed, mitered, lapped, notched, sealed or soldered as necessary to provide a continuous system that is not more susceptible to leaks than straight sections.
- E. Fabrication, Sheet Metal
1. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
 2. Premanufactured Canted Fascia Cap: ANSI/SPRI/FM 4435/ES-1 to design pressure of 29 psf (perimeters) and 37 psf (corners). The fascia cap shall be 24-gauge prefinished galvanized steel.
 - a. Face dimension required: Varies by area. Fabricate a 3/8-inch stiffening rib at the midpoint or add fascia extensions for face dimensions 8-inches or more.
 - b. Concealed splice plates: 6-inches minimum.
 - c. Formed Lengths: 12'-0".
 - d. Slotted Fastening Holes: 12 inches and 6 inches on center.
 - e. Waterdam: 24-gauge galvanized steel.
 - f. Use premanufactured inside and outside corners.
 - g. Owner to choose from standard available colors.
 - h. See RTA Detail Nos. 1,3,5,6,10,14 and 17. Approved manufacturer or approved equal:
 - 1) Metal-Era, Perma-Tite System 200 Fascia, Single-Ply Application, Crimp-On Version.

3. Fascia Extensions: Fabricate from the following material: Prefinished galvanized steel: 0.0276 inch (24 gauge) thick. Use a fascia extension at any perimeter edge condition requiring fascia cap coverage greater than 10-inches. Fabricate the fascia extension in accordance with SMACNA Figure 2-2A. Face dimension as required to cover the fascia plus extend behind the fascia cap 3-inches minimum. Fabricate the bottom edge with an open lock drip edge to receive a continuous cleat. Fabricate 6-inch wide concealed cover plates to be installed at the endjoints.
4. Gravel Stop./ Fascia: Prefinished Galvanized Steel: 0.0276 inch (24 gauge) thick. Fabricate the gravel stop/ fascia in accordance with SMACNA Figure 2-5C. Face dimension in accordance with the RTA Details and a 1/2-inch hemmed drip edge along the bottom edge. One-inch tall gravel stop. Nailing flange dimension: 4-inches minimum. Form the outside face with an open lock to receive a continuous cleat. See RTA Detail No. 7.
5. Fascia Extensions: Fabricate from the following material:
 - a. Prefinished Galvanized Steel: 0.0276 inch (24 gauge) thick.
 - b. Use a fascia extension at any perimeter edge condition requiring fascia cap coverage greater than 10-inches.
 - c. Fabricate the fascia extension in accordance with SMACNA Figure 2-2A. Face dimension as required to cover the fascia plus extend behind the fascia cap 3-inches minimum. Fabricate the bottom edge with an open lock drip edge to receive a continuous cleat. Fabricate 6-inch wide concealed cover plates
6. Coping: Prefinished Galvanized Steel: 0.0276 inch (24 gauge) thick. Fabricate the coping in accordance with SMACNA Figure 3-1. Fabricate the coping with 1-inch tall single lock standing seams. Fabricate the inside face with a minimum face dimension of 3-inches. The outside face of the coping varies by area. Hem the bottom edge of the inside and outside faces and bent outward to form a drip edge. Form the outside face with an open lock to receive a continuous cleat. See RTA Detail Nos. 8, 9 and 15.
7. Gutters and Downspouts: Fabricate from the following material:
 - a. Prefinished Galvanized Steel: 0.0276 inch (24 gauge) thick.
 - b. Fabricate the one-piece gutters in accordance with SMACNA Figure 1-2, Style F.
 - c. Gutter Size: 5-inch by 5-inch. Fabricate the front of the gutter 2-inches below the back of the gutter (see RTA Detail Nos. 2 and 12).
 - d. Gutter Nailing Flange Width: 4-inches wide.
 - e. Fabricate the gutter spacers from 1/8-inch x 1-inch galvanized steel bar professionally primed and painted to match the gutter color.
 - f. Gutter Expansion Joints: Fabricate from matching prefinished galvanized steel in accordance with SMACNA Figure 1-7.
 - g. Fabricate the downspouts using the same prefinished sheet metal as the gutter. Downspout size: 3-inch by 4-inch rectangular downspout fabricated in accordance with SMACNA Figure 1-32B. Downspout connection to the gutter shall be in accordance with SMACNA Figure 1-33B. Provide outlet tubes fabricated from 24 gauge galvanized steel.
 - h. Fabricate the downspout straps in accordance with SMACNA Figure 1-35G. Downspout Straps: Fabricate from 1/8-inch x 1-inch galvanized steel bar professionally primed and painted to match the gutter color.
8. Counterflashing: Fabricate from the following material:
 - a. Prefinished Galvanized Steel: 0.0276 inch (24 gauge) thick.
 - b. Fabricate the receiver mounted counterflashing in accordance with SMACNA Figure 4-5B. Fabricate the counterflashing with a hemmed drip edge along the bottom edge and a minimum face of 4-inches. The top edge to receive behind the receiver as shown in RTA Detail No. 4.
 - c. Fabricate the surface mounted counterflashing (slip flashing) in accordance with SMACNA Figure 4-5B. Fabricate the counterflashing with a hemmed drip edge along the bottom edge and a minimum face of 4-inches. The top edge to receive behind the curb cap cover 2-inches minimum.
9. Miscellaneous Flashing - Fabricate from the following material:

- a. Galvanized Steel: 0.028 inch (24 gauge) thick.
- b. Fabricate penetration pockets in accordance with SMACNA Figure 8-11C. Fabricate the penetration pockets with 4-inch tall sides (minimum), 4-inch wide flanges and soldered corner stiffeners.
- c. Fabricate the closure box flashing in accordance with SMACNA Figure 8-9A. Closure box size shall be as required to accommodate the pipes. Pipe penetration diameters shall closely match the pipe diameters. Provide watershedding slope in the closure box cap. Fabricate the vertical curb covers with 4-inch wide faces and hemmed bottom edges. Lap widths: 1-inch minimum. Seam and solder all joints in the closure box where possible.
- d. Fabricate flange, sleeve and umbrellas in accordance with SMACNA Figure 8-11A. Fabricate the flashing with 4-inch wide flanges. Fabricate the flange and sleeve with continuous soldered joints. Fabricate with a sleeve height of 8-inches minimum. Fabricate the umbrella to lap the top of the sleeve 4-inches minimum.
- e. Fabricate the expansion joint vee metal support as shown in RTA Detail No. 11. Foam backer rod: 1.5 times the size of the expansion joint curb opening.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION

- A. Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions and SMACNA's "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Expansion Provisions: Provide for thermal expansion of exposed sheet metal work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner of intersection.
- C. Prefabricated Sheet Metal Fascia Cap
 1. Install the specified premanufactured sheet metal fascia cap along the designated perimeter edges. The installation shall be in accordance with the manufacturer's requirements. Secure the galvanized sheet metal water dam 6-inches on-center in the flange and 12-inches on-center in the fascia with galvanized ring shank nails. Fully adhere the roof membrane to the cant and fascia.
 2. Install the extruded aluminum anchor bar and secure through the face as required by the manufacturer.
 3. Install the prefinished fascia cover and concealed splice plates onto the anchor bar.
- D. Fascia Extension
 1. Install prefinished sheet metal fascia extensions to extend the coverage of the fascia cap where required. Secure continuous cleats with nails spaced 12-inches-on-center. Hook the bottom hemmed edges of the fascia extensions over the cleats and secure the tops of the fascia extensions with nails spaced 12-inches on-center. Install concealed cover plates between sections of fascia extension.
- E. Gravel Stop/ Fascia
 1. Install gravel stop/ fascia along the designated perimeter edges. Install 6-inch wide back-up plates at the endjoints in accordance with SMACNA Figure 2-5C. Apply sealant between the concealed cover plates and the gravel stop/ fascia sections. Install gravel stop/ fascia sections with 1/4-inch gaps between sections. Secure the nailing flange with roofing nails spaced 4-inches on center in two staggered rows. Strip in the nailing flashing with 6-inch wide self-adhering EPDM cover strip.

F. Coping

1. Install a continuous cleat along the outside face of the parapet wall as shown in the RTA Details in preparation for receiving the coping. Secure the continuous cleat with sheet metal screws spaced 12-inches on-center. Use screws long enough to achieve 1-1/2-inches of embedment into the substrate. Use screws with a screw head which will not contact the back side of the coping.
2. Install coping on the parapet walls as shown in the RTA details. Engage the bottom edge outside face of the coping with the continuous cleat. Hand crimp the bottom edge along the entire length. Secure the coping sections along the inside face with gasketed screws spaced 18-inches on-center. Provide the specified end joints between coping sections.
3. Reinstall the sheet metal copings in Area G. The copings shall be installed in the same manner as original installation.

G. Gutter and Downspouts

1. Install new sheet metal gutter at locations designated on the Roof Plan. Secure the flange with roofing nails 3-inches on center in two staggered rows. Seal the flange to the roof system with two EPDM stripping layers of self-adhering cover tape: 5-inch and 9-inch.
2. Install gutter spacers 18-inches on-center. Secure the spacers into the gutter bead and through the back of the gutter with stainless steel nuts and bolts. Caulk the fastener heads and top of the spacers at the back edge of the gutter with the specified sealant.
3. Lap the joints in the gutter 1-inch and rivet 1-inch on center. Apply a continuous bead of the specified sealant in the lap. Seal the rivets with the specified sealant.
4. Install butt type expansion joints at or less than the specified maximum gutter length in accordance with SMACNA Figure 1-7. Allowances for gutter expansion shall be in accordance with SMACNA Table 1-7.
5. Attach the downspouts to the gutters in accordance with SMACNA Figure 1-33B, Detail 1. Secure the new downspouts to the existing wall with a minimum of two downspout straps and appropriate fasteners in accordance with SMACNA Figure 1-35G. Install downspout elbows and downspout extensions as required.
 - a. Downspout strap fasteners for masonry walls: Rawls ZAMAC Nailin fasteners, 2-inches long. Downspout strap fasteners for plywood walls: Gasketed screws.

H. Counterflashing

1. Receiver Mounted Counterflashing: Install counterflashing into the existing receivers. Notch and lap the end joints in the counterflashing 4-inches. Secure the counterflashing to the receiver with stainless steel pop rivets spaced 24-inches on center.
2. Roof Curb Slip Flashing: Install counterflashing along the top of any curb where the top of the base flashing is not protected by a minimum of 3-inches. The counterflashing must cover the top edge of the base flashing a minimum of 3-inches. The top edge of the counterflashing must be concealed by the curb cap a minimum of 2-inches. Secure 24-inches on center with gasketed screws. Notch and lap the corners and end joints in the counterflashing 4-inches.

I. Penetration Pocket

1. Install sheet metal penetration pockets at miscellaneous roof penetrations which cannot be flashed with a prefabricated boot or flange, sleeve and umbrella flashing. Secure the penetration pocket flanges with screws into the roof deck. Seal the flanges in accordance with the manufacturer's typical details.
2. Fill the flashing with the specified non-shrink grout and pourable sealer. The pourable sealer must be mounded to promote watershedding capabilities.

J. Closure Box

1. Provide new closure boxes at miscellaneous roof penetrations which have existing closure boxes that are deteriorated or have penetrations through the sides of the boxes. Field seam and solder the joints in the closure box.
2. Secure the flange to the roof deck with screws. Neatly field wrap the sheet metal flashing in accordance with the selected membrane manufacturer's requirements.

3. Provide tight sheet metal closures around all pipe penetrations through the sides of the closure box and seal the pipe penetrations with the specified sealant. Loosely fill the closure box with unfaced glass fiber batt insulation.
 4. Install the closure box cap and secure the cap to the box with gasketed screws spaced 6-inches on center or a minimum of one gasketed screw per side of the box.
- K. Hot Stack Flashing
1. Reuse flange, sleeve and umbrella flashing at round stacks and roof penetrations whenever possible.
 2. Secure the flange to the roof deck with screws. Neatly field wrap the sheet metal flashing in accordance with the selected membrane manufacturer's requirements.
 3. Install an umbrella with 1/4-inch minimum clearance from the top of the sleeve. Tightly secure the umbrella in place with a stainless steel drawbands. Seal the top of the umbrella to the penetration with the specified caulk.
- L. Expansion Joint Vee Sheet Metal
1. Install vee sheet metal at the expansion joint curb opening as shown in RTA Detail No. 11. Secure the sheet metal 12-inches on-center with nails on both flanges. Install foam backer rod onto the vee sheet metal. Adhere the foam backer rod to the vee sheet metal. Cover the expansion joint with fully adhered EPDM membrane in accordance with the roofing manufacturers requirements.
- M. Pipe Chase Cover
1. Cover the ends of the new pipe chase with sheet metal to match the existing adjacent sheet metal color.
 2. Wrap the new horizontal pipe chase ends with prefinished galvanized steel to match the existing vertical pipe chase covers. Use appropriate fasteners to solidly secure the sheet metal covers.

3.03 FIELD QUALITY CONTROL

- A. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.04 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.

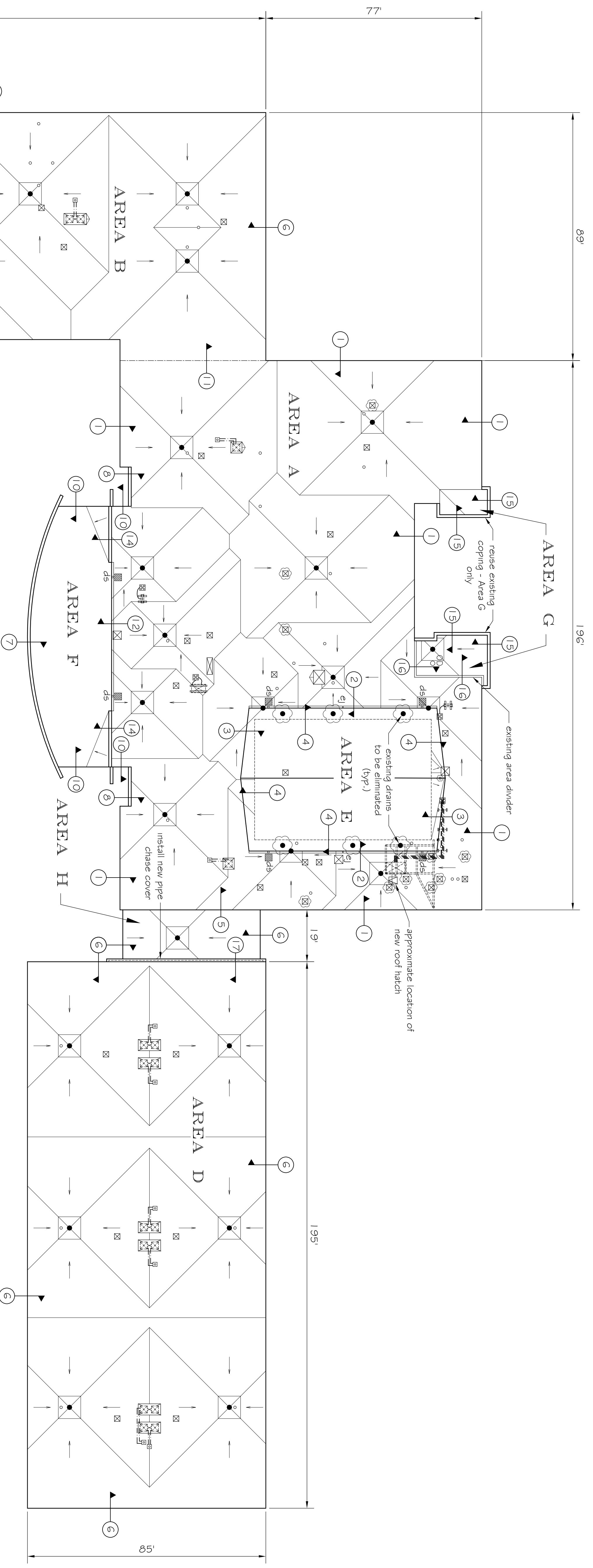
END OF SECTION

APPENDIX

Roof Plan - Webster Elementary SchoolPlate 1
Perimeter EdgeDetail 1
Area E Gutter EdgeDetail 2
Area E Rake EdgeDetail 3
Wall FlashingDetail 4
Elevation ChangeDetail 5
Area B & H Perimeter EdgeDetail 6
Area C & F Parapet WallDetail 7
Parapet WallDetail 8
Area C Parapet WallDetail 9
Area C Perimeter EdgeDetail 10
Expansion JointDetail 11
GutterDetail 12
Expansion JointDetail 13
Raised EdgeDetail 14
Parapet WallDetail 15
Interior Parapet WallDetail 16
Area D New Pipe ChaseDetail 17

Architectural Sheet Metal Manual Sheet Metal and Air Conditioning Contractors National Association, (SMACNA), Seventh Edition, 2012

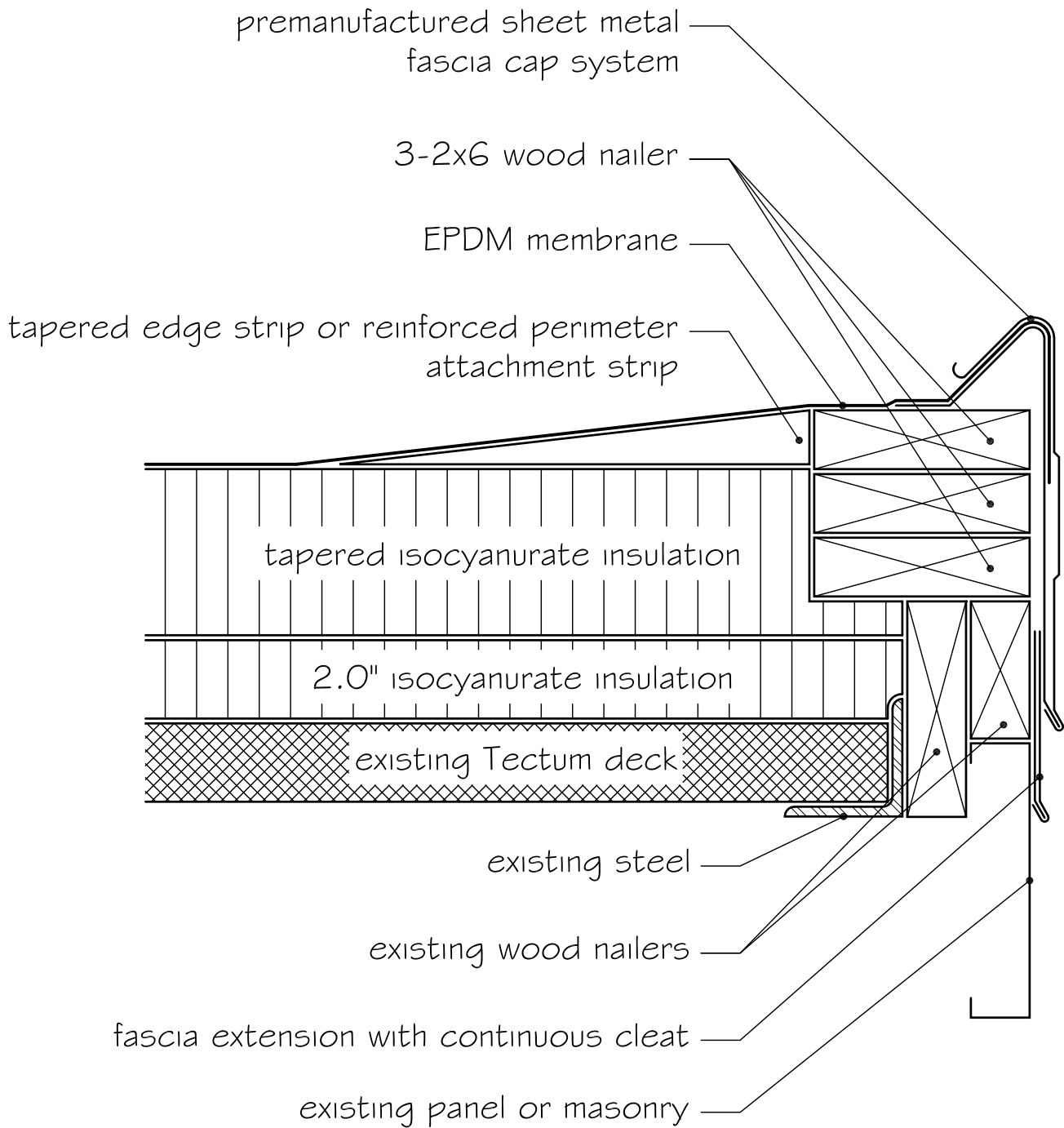
Formed Gravel-Stop Fascia Design DataFigure 2-1
Formed Gravel-Stop Fascia Design DataFigure 2-5
Formed Gravel-Stop Fascia Soffit InstallationFigure 2-7
Formed Metal Copings Design DataFigure 3-1
Counterflashing Systems InstallationFigure 4-4
Roof Penetration Flashing PipesFigure 8-9
Equipment Support FlashingFigure 8-11



NEW AND EXISTING INSULATION SCHEDULE							
AREA DESIGNATION	DECK	EXISTING ROOF MEMBRANE	EXISTING INSULATION	REMOVE OR SAVE	ADD INSULATION	DRAIN/PAPER	SADDLE/SLOPE
A	TECHUM	BUR - Asphalt and PVC	1.25 ISO & 1.5 XPS	REMOVE	20" base & 1/8" per foot tapered isocominate	1/27"ft (G panel)	1/4" ft.
B, D & H	TECHUM	BUR - CTP and 2 PVC	2" EPS & 1.5" XPS	REMOVE	20" base & 1/8" per foot tapered isocominate	1/27"ft (G panel)	1/4" ft.
C, F & I	STEEL	BUR - Asphalt and 3 PVC	2 layers of 1.5" iso 1.5" Perlite, 0.75" EPS & 1.5" XPS	save insulation only	2 layers 3.6" iso and 1/2" gypsum board	1/27"ft (G panel)	na
E	TECHUM	BUR - Asphalt and 3 PVC	1.5" XPS	REMOVE	20" iso and 1/2" HD Board	na	na
G	STEEL	PVC	2 layers of 1.5" iso	save insulation only	1/27"ft (G panel)	na	na

- GENERAL NOTES:**
- All areas and dimensions shown are approximate and based upon rough field measurements taken by representatives of Roofing Technology Associates, Ltd.
 - This drawing should not be used for bidding or estimating purposes. Contractors are responsible for their own field measurements, quantities and verification of conditions shown.

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Project No:	22-090	Drawn By:	JPW
Date:	12/18/23	Checked By:	MCB
ROOF PLAN		Plate No:	1



PERIMETER EDGE
not to scale

NOTE: components shown are new unless noted as existing

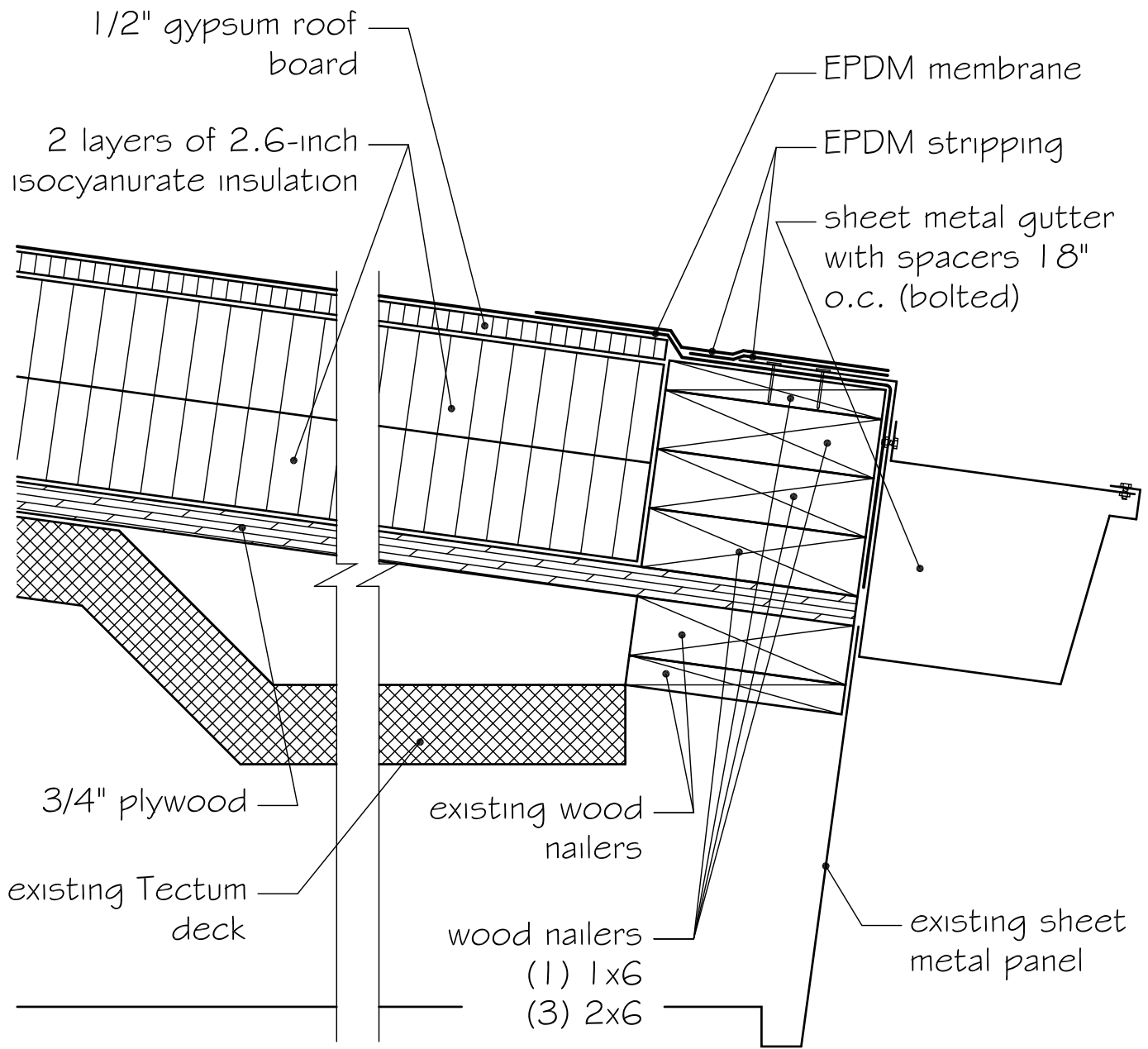


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AREA E - GUTTER EDGE
not to scale

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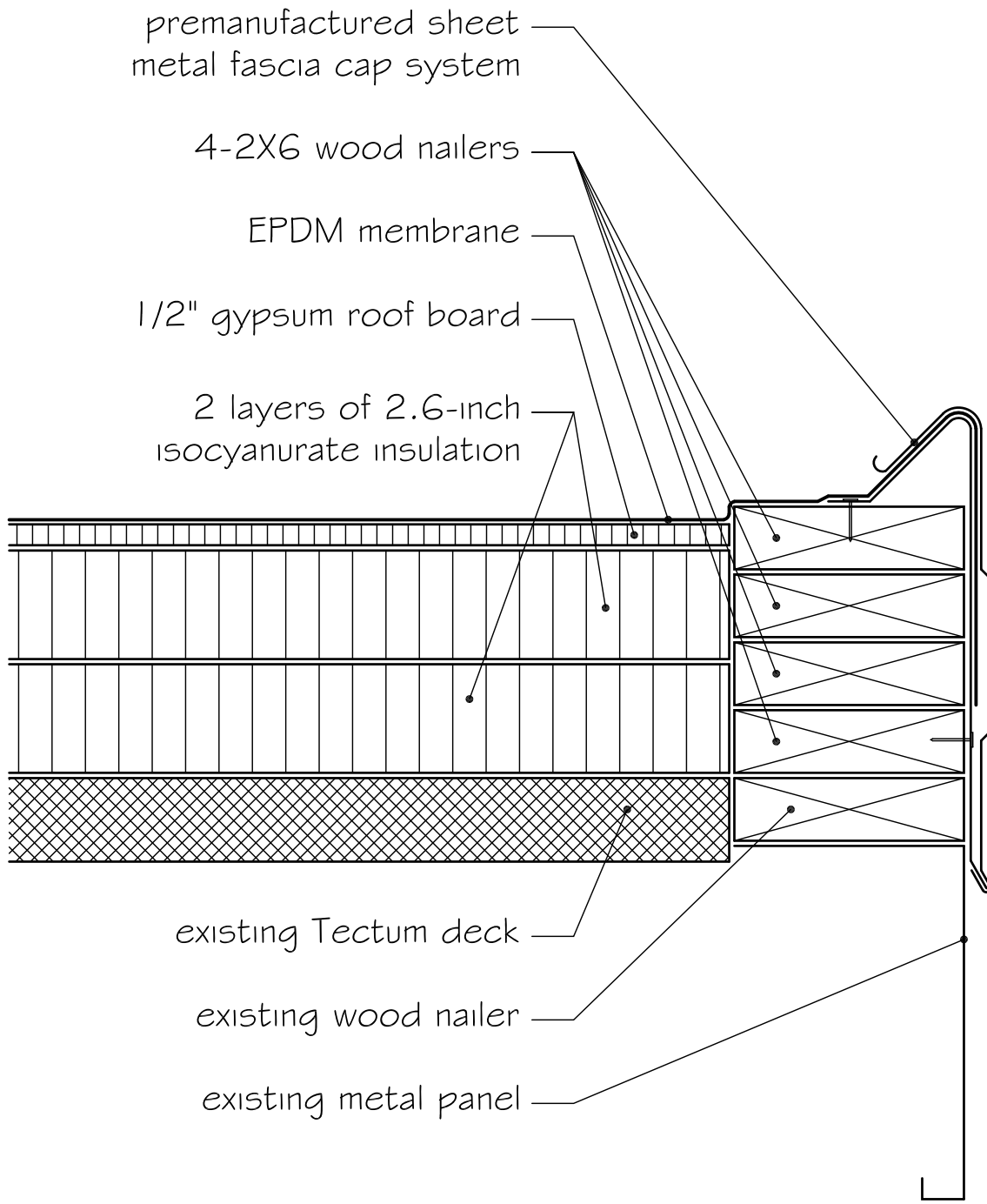
Drawn By: JDS

Detail No:

Date: 12-2-22

Checked By: MCB

2



premanufactured sheet
metal fascia cap system

4-2X6 wood nailers

EPDM membrane

1/2" gypsum roof board

2 layers of 2.6-inch
isocyanurate insulation

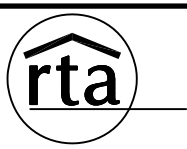
existing Tectum deck

existing wood nailer

existing metal panel

AREA E - RAKE EDGE
not to scale

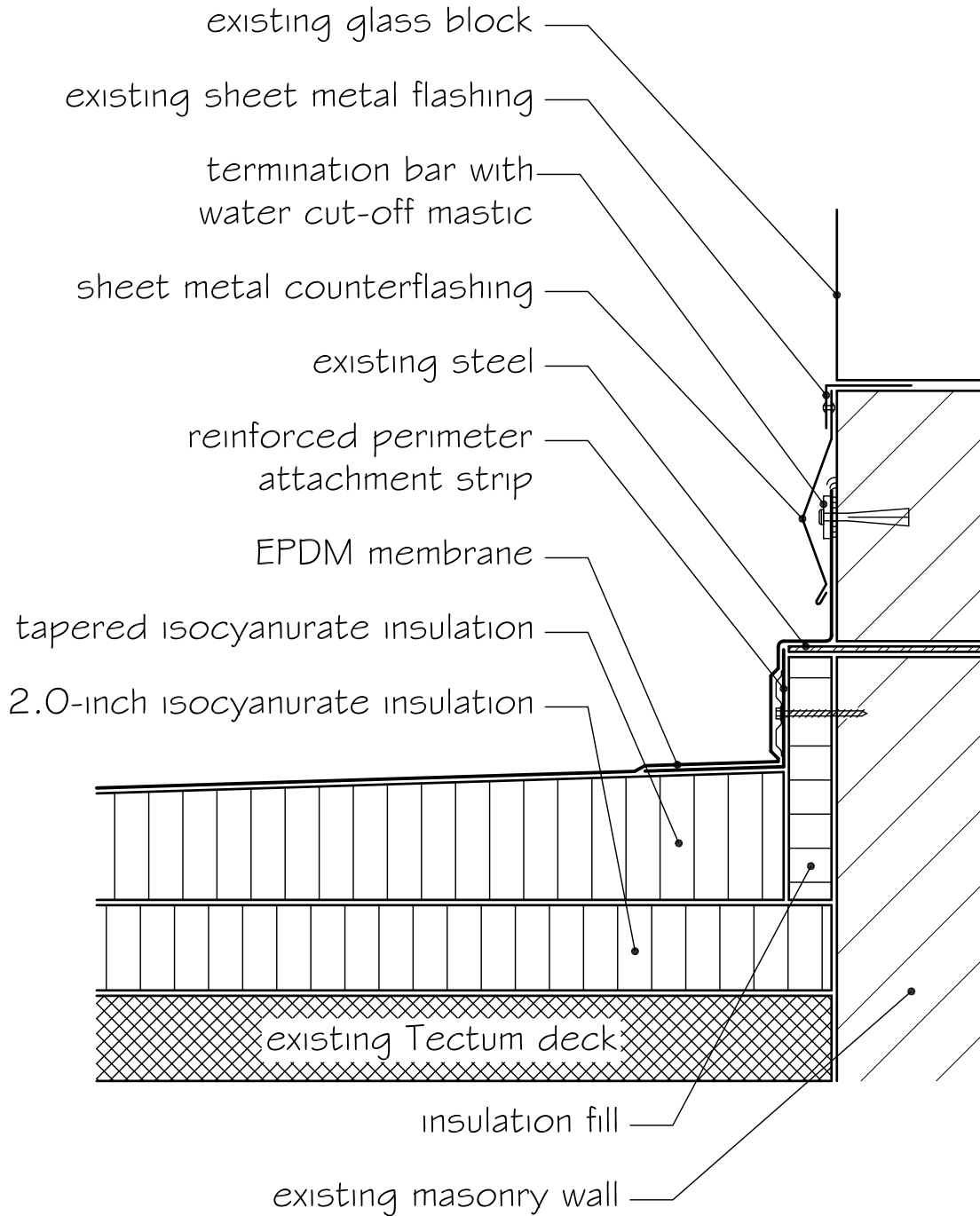
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<i>Project No:</i>	22-080	<i>Drawn By:</i>	JDS	<i>Detail No:</i>	3
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WALL FLASHING
not to scale

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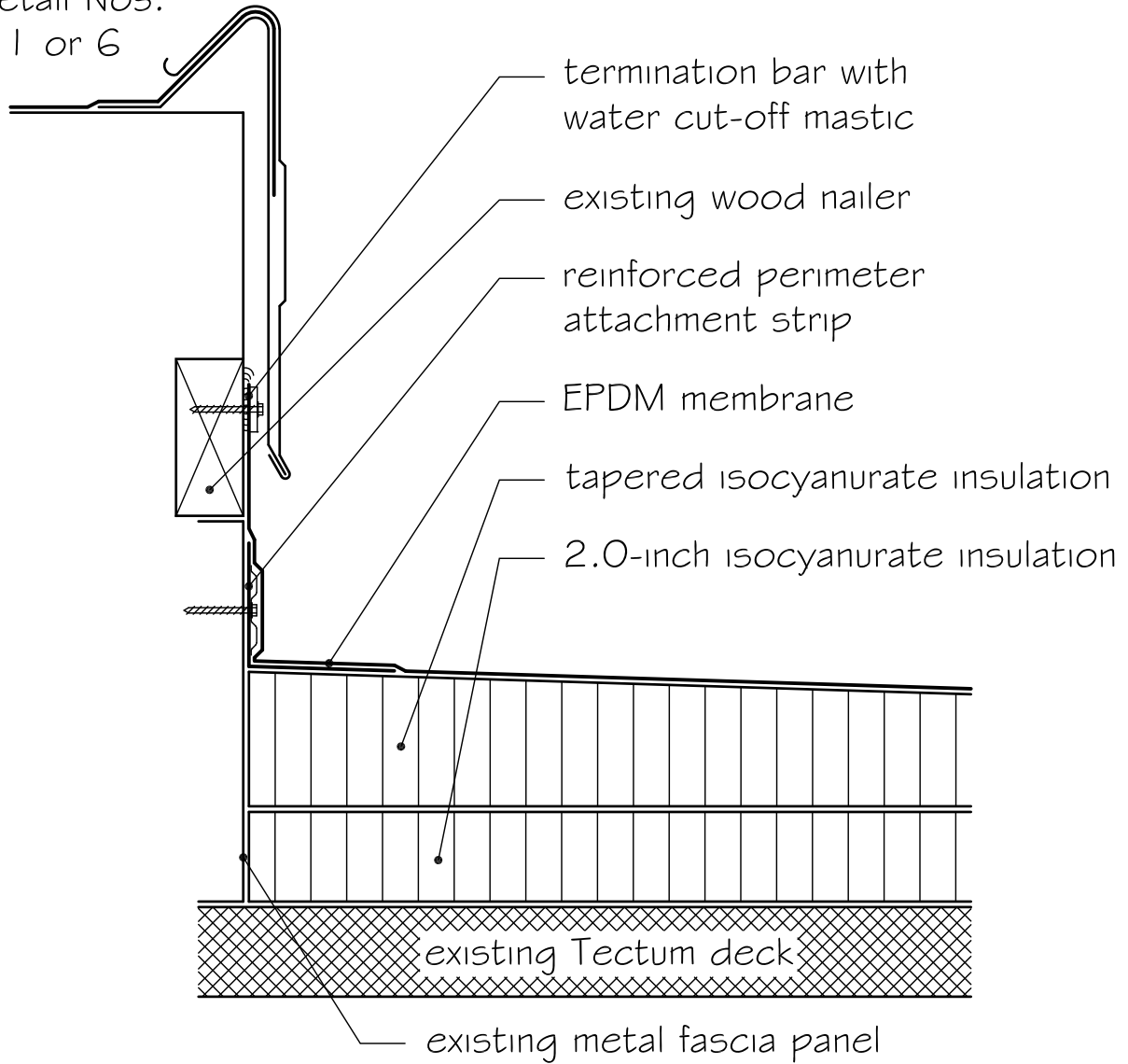
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4

Detail Nos.
1 or 6



ELEVATION CHANGE
not to scale

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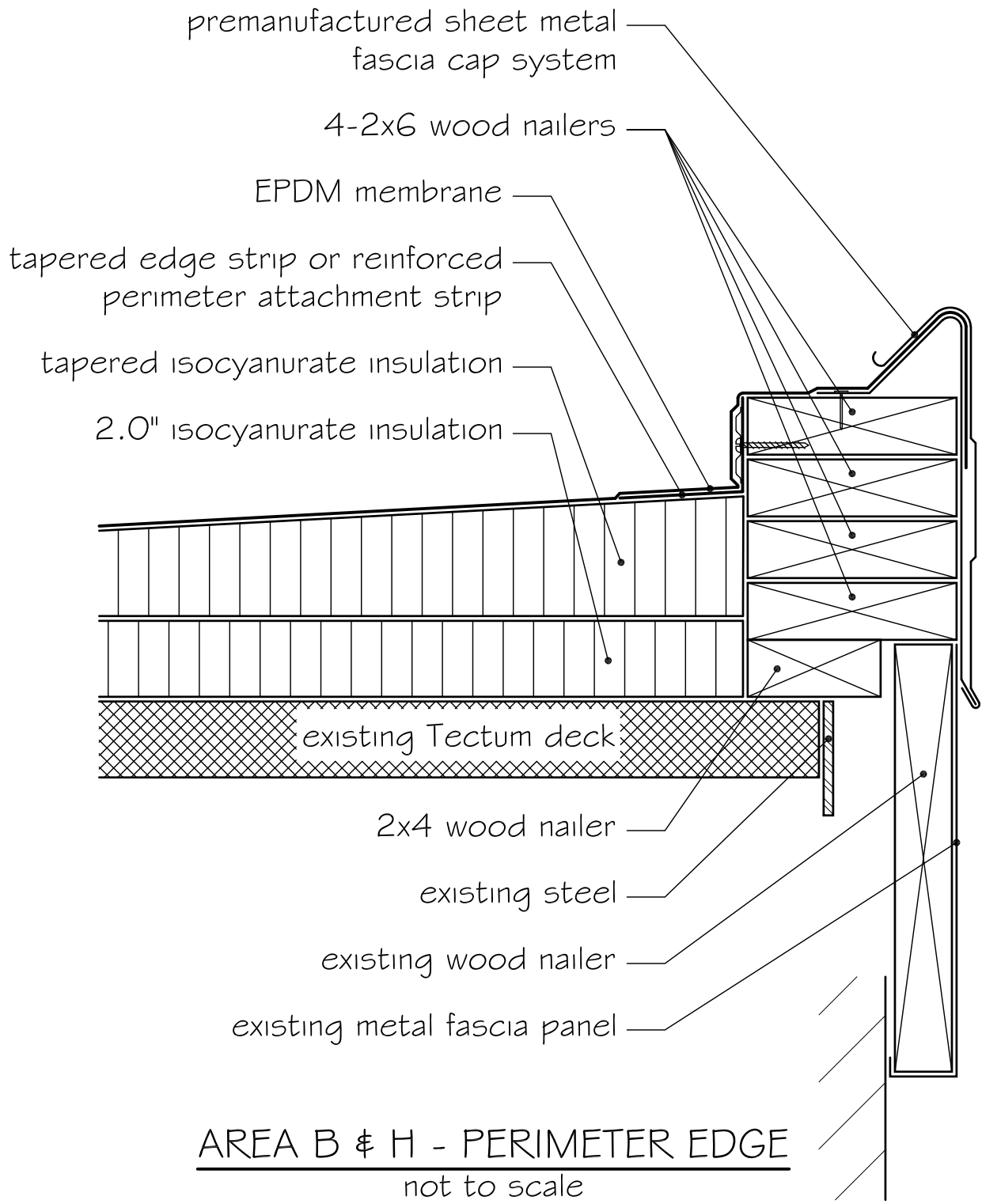
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Detail No:

Date: 12-2-22

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5



AREA B & H - PERIMETER EDGE
not to scale

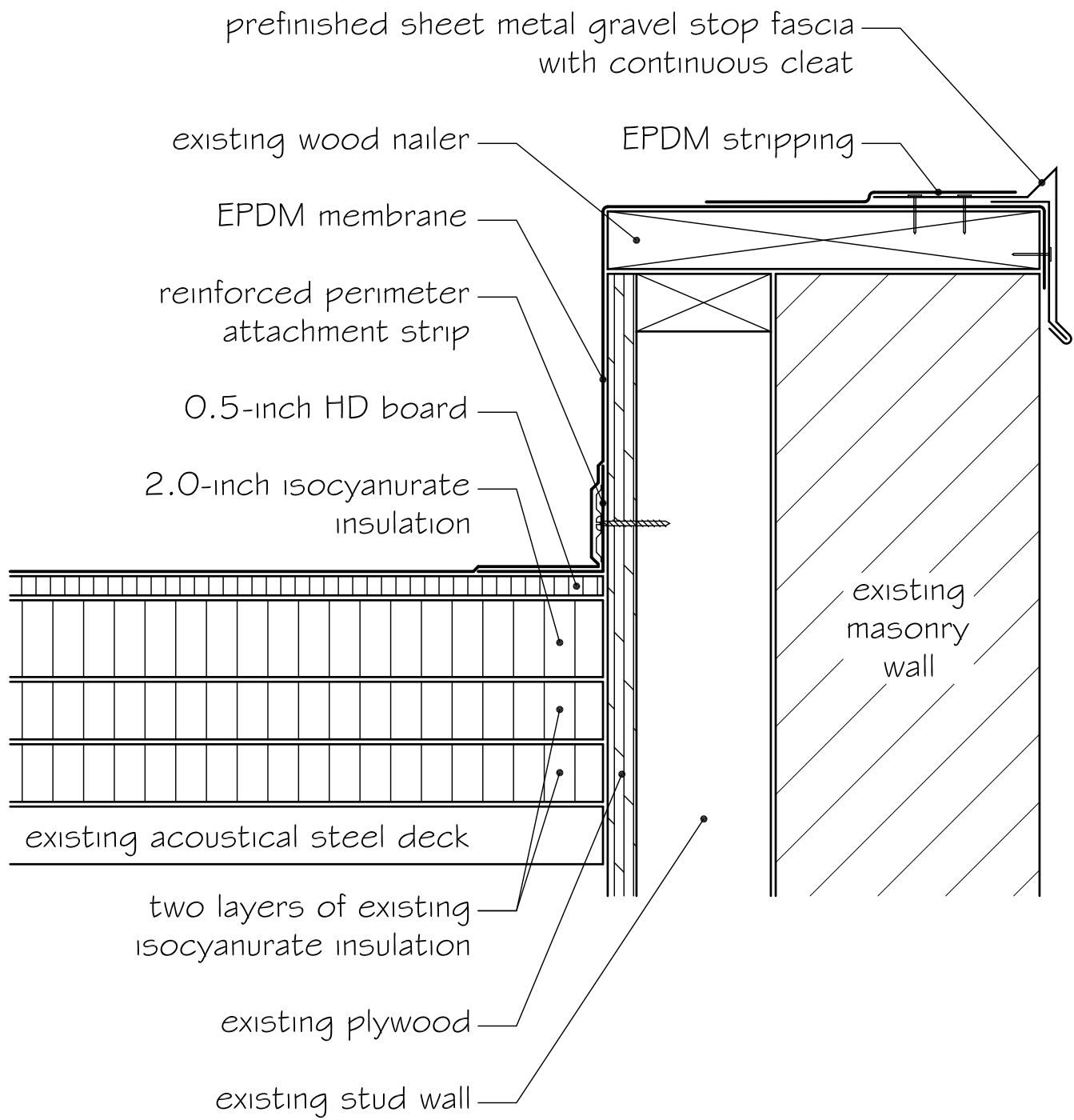
NOTE: components shown are new unless noted as existing



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AREA C & F - PARAPET WALL
not to scale

NOTE: components shown are new unless noted as existing



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Date: 12-6-22

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7

prefinished sheet metal
coping with standing seams
and continuous cleat

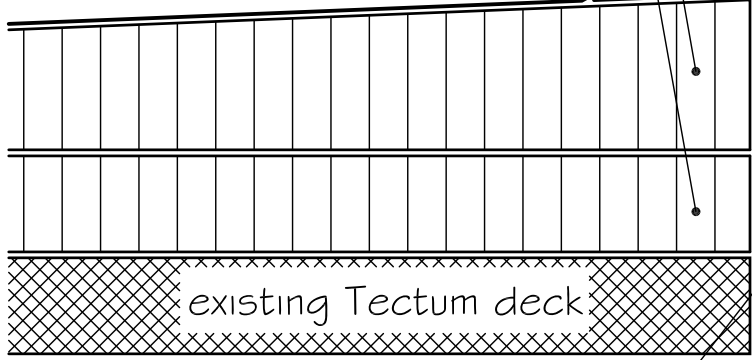
existing wood nailer

EPDM membrane

reinforced perimeter
attachment strip

tapered isocyanurate
insulation

2.0-inch isocyanurate
insulation



existing
masonry
wall

existing plywood

existing stud wall

PARAPET WALL

not to scale

NOTE: components shown are new unless noted as existing



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Detail No:

Date: 12-6-22

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8

prefinished sheet metal coping with standing seams and continuous cleat

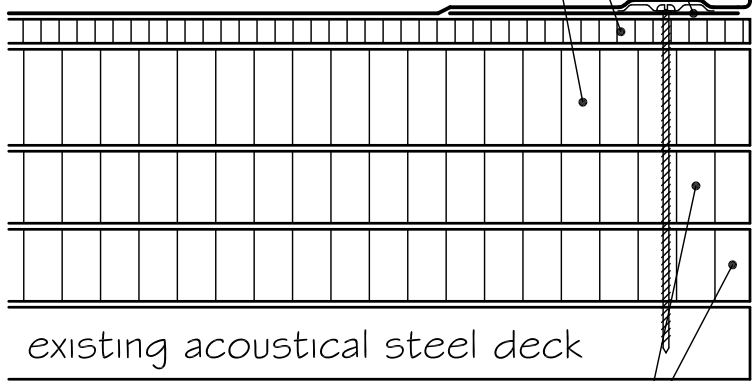
existing wood nailer

EPDM membrane

reinforced perimeter attachment strip

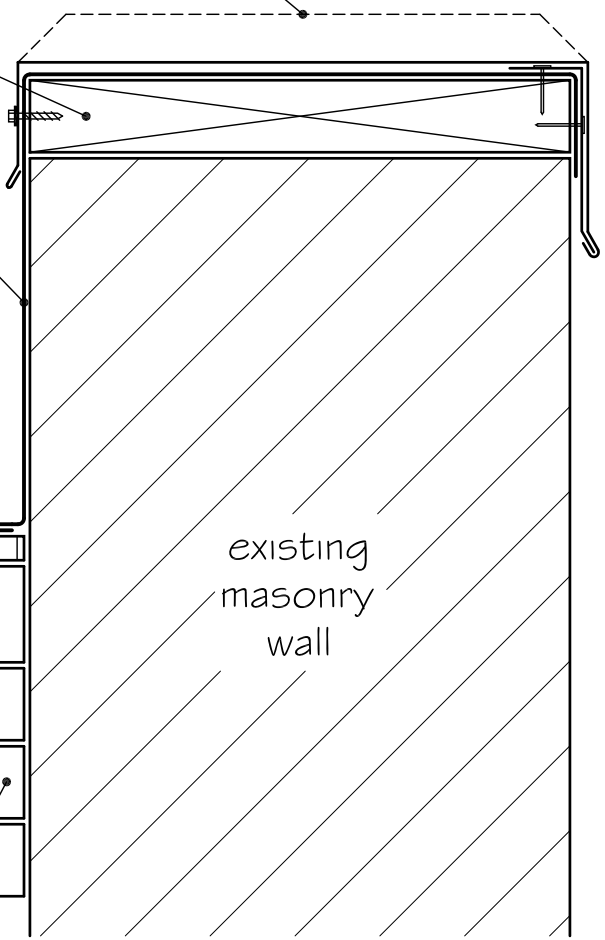
0.5-inch HD board

2.0-inch isocyanurate insulation



existing acoustical steel deck

two layers of existing isocyanurate insulation



existing masonry wall

AREA C - PARAPET WALL not to scale

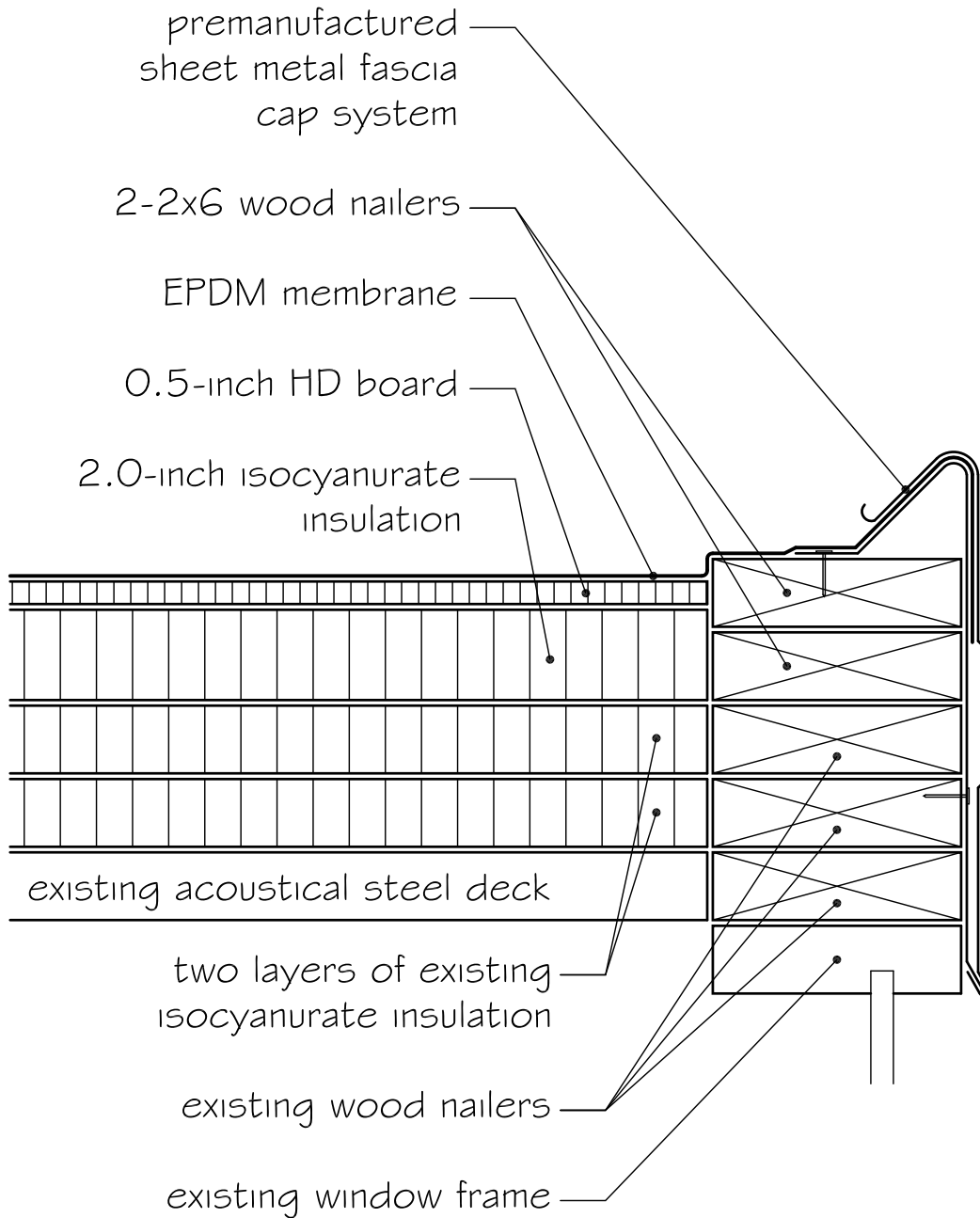
NOTE: components shown are new unless noted as existing



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<i>Date:</i> 12-6-22	<i>Checked By:</i> MCB	



AREA C - PERIMETER EDGE
not to scale

NOTE: components shown are new unless noted as existing



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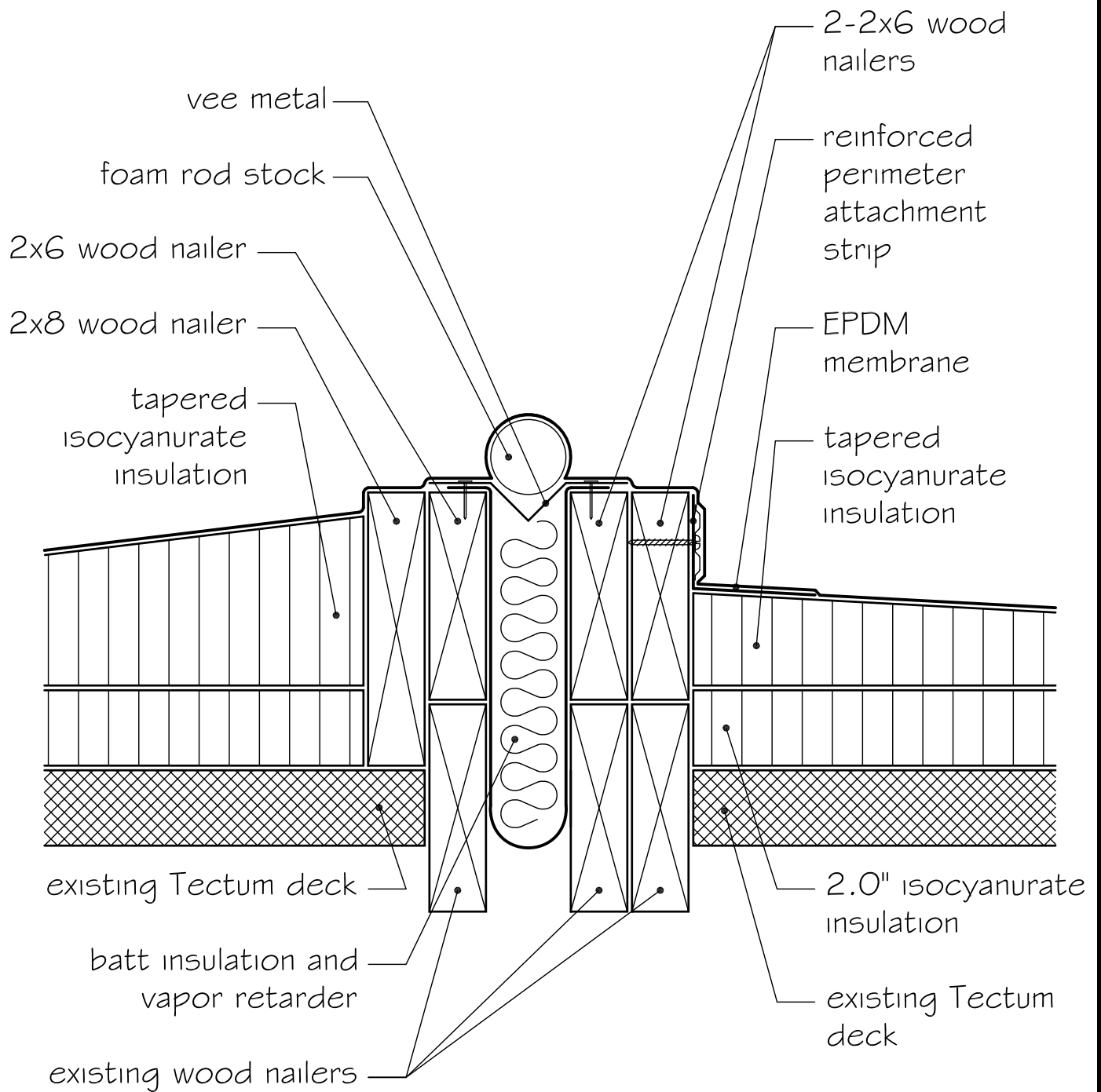
Drawn By: JDS

Detail No:

Date: 12-6-22

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10



AREA A and B - EXPANSION JOINT
not to scale

NOTE: components shown are new unless noted as existing



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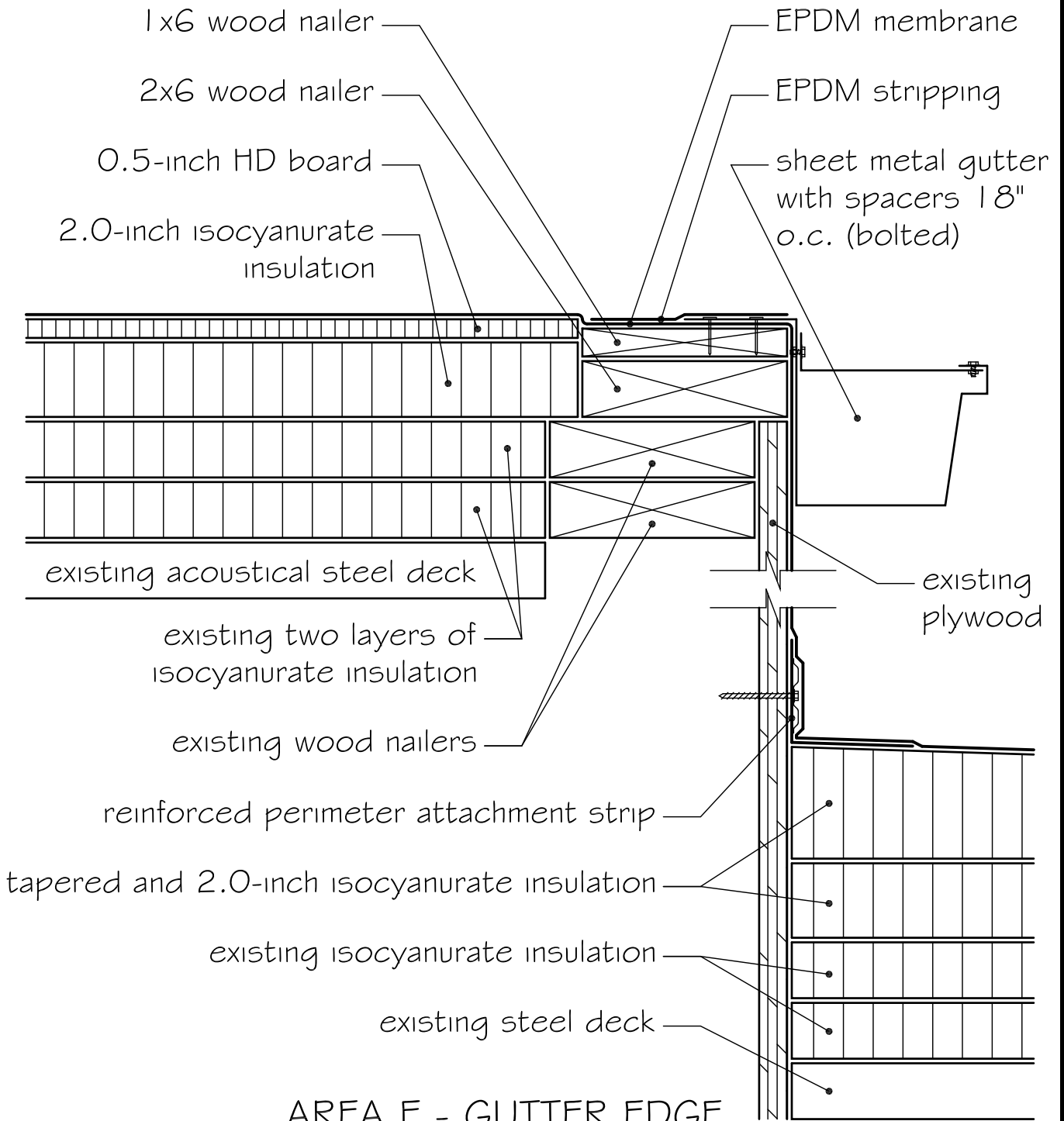
Drawn By: JDS

Detail No:

Date: 12-6-22

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||



AREA F - GUTTER EDGE
not to scale

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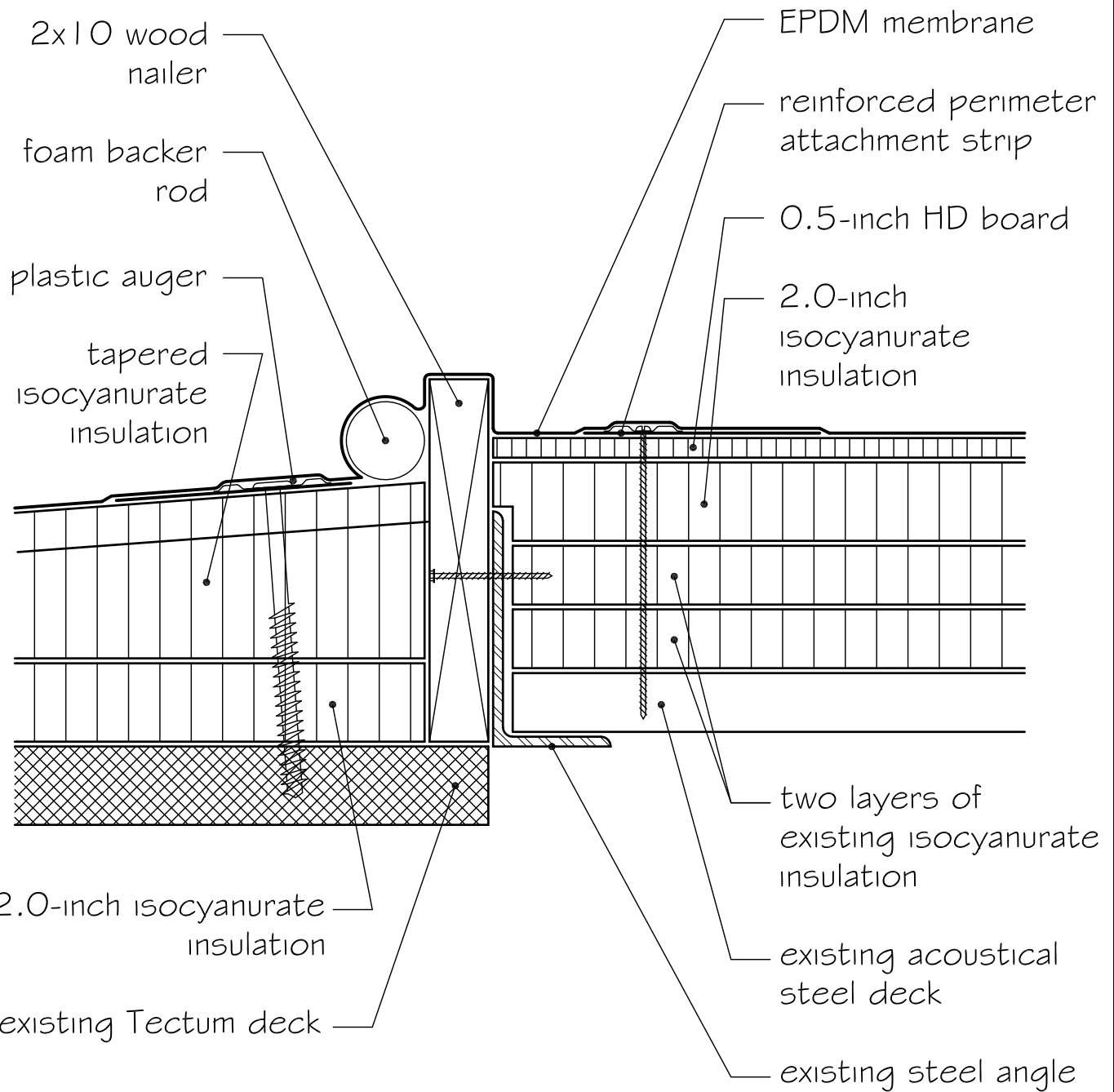
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Detail No:

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AREAS B and C - EXPANSION JOINT
not to scale

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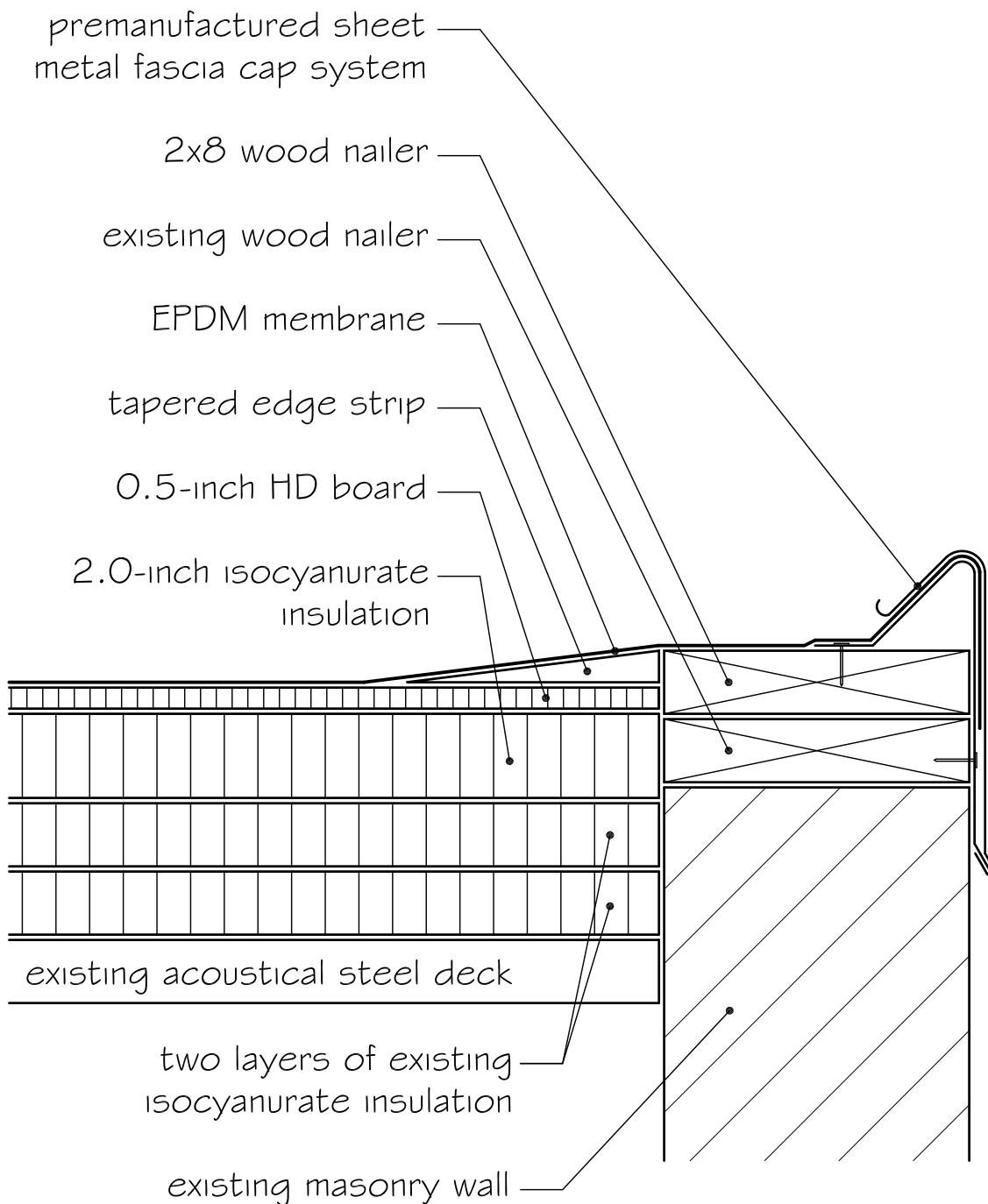
Drawn By: JDS

Detail No:

Date: 12-6-22

Checked By: MCB

13



premanufactured sheet
metal fascia cap system

2x8 wood nailer

existing wood nailer

EPDM membrane

tapered edge strip

0.5-inch HD board

2.0-inch isocyanurate
insulation

existing acoustical steel deck

two layers of existing
isocyanurate insulation

existing masonry wall

AREA F - RAISED EDGE
not to scale

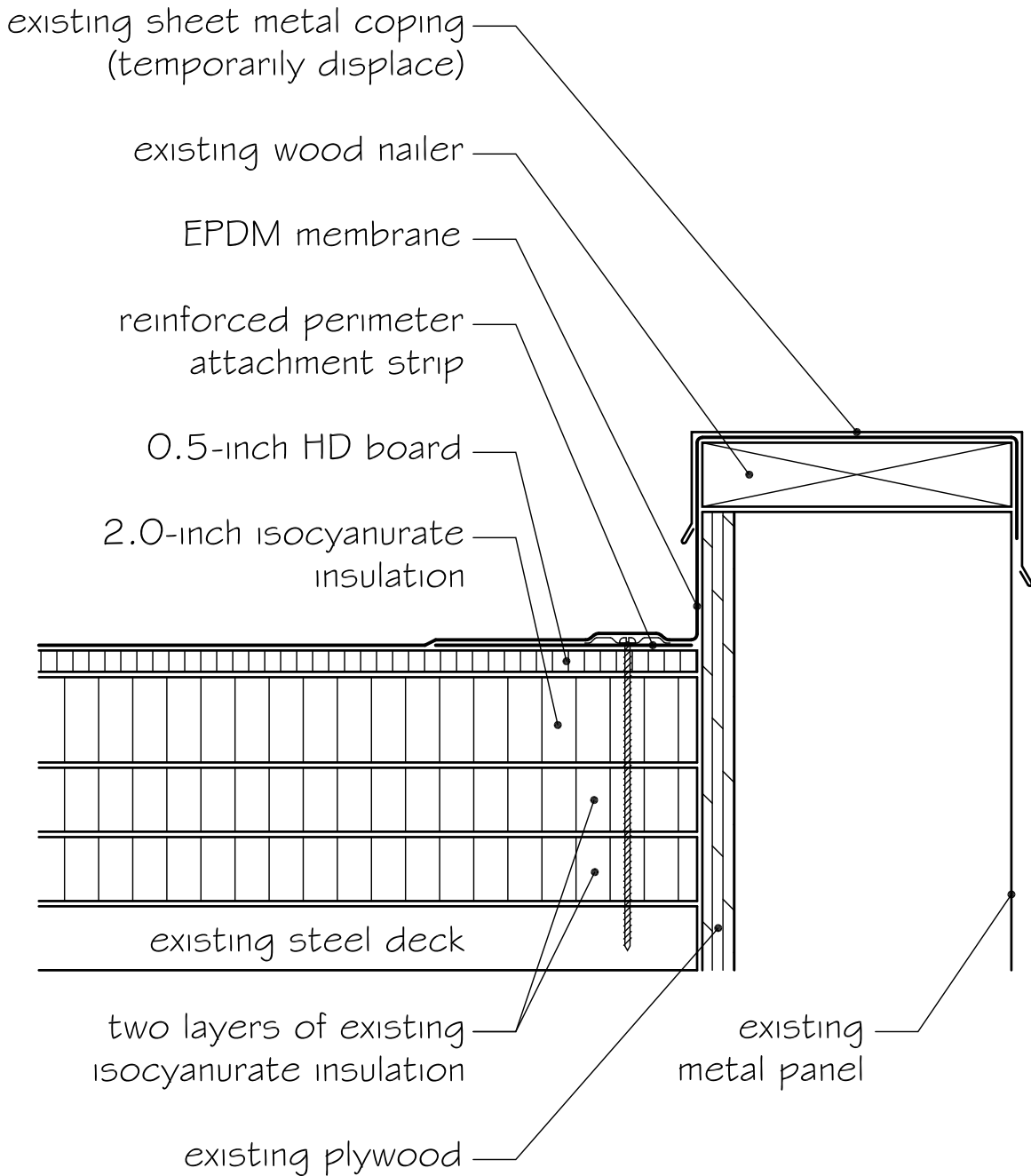
NOTE: components shown are new unless noted as existing



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<i>Date:</i>	12-6-22	<i>Checked By:</i>	MCB		



AREA G - PARAPET WALL
not to scale

NOTE: components shown are new unless noted as existing



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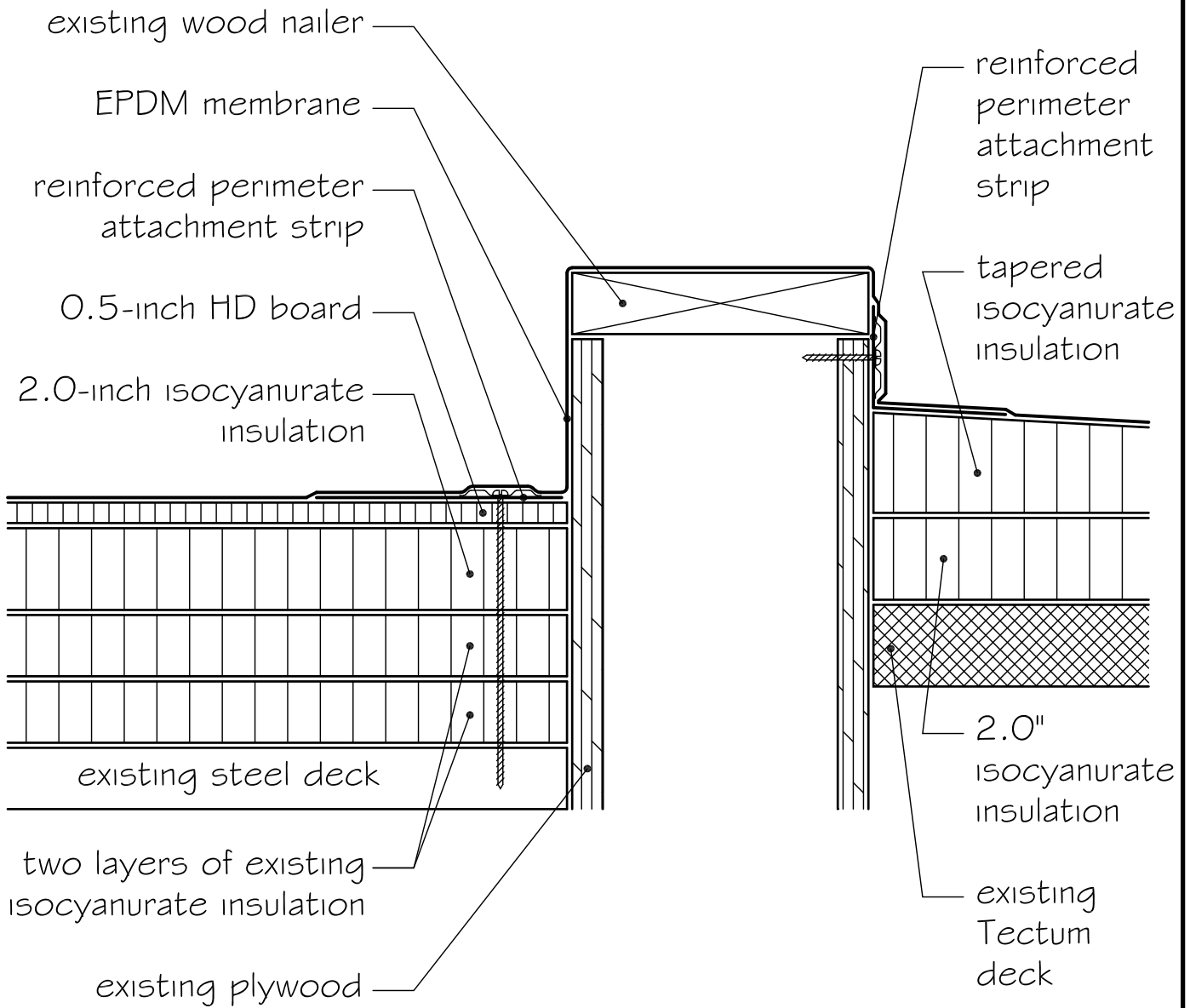
Drawn By: JDS

Detail No:

Date: 12-6-22

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INTERIOR PARAPET WALL
not to scale

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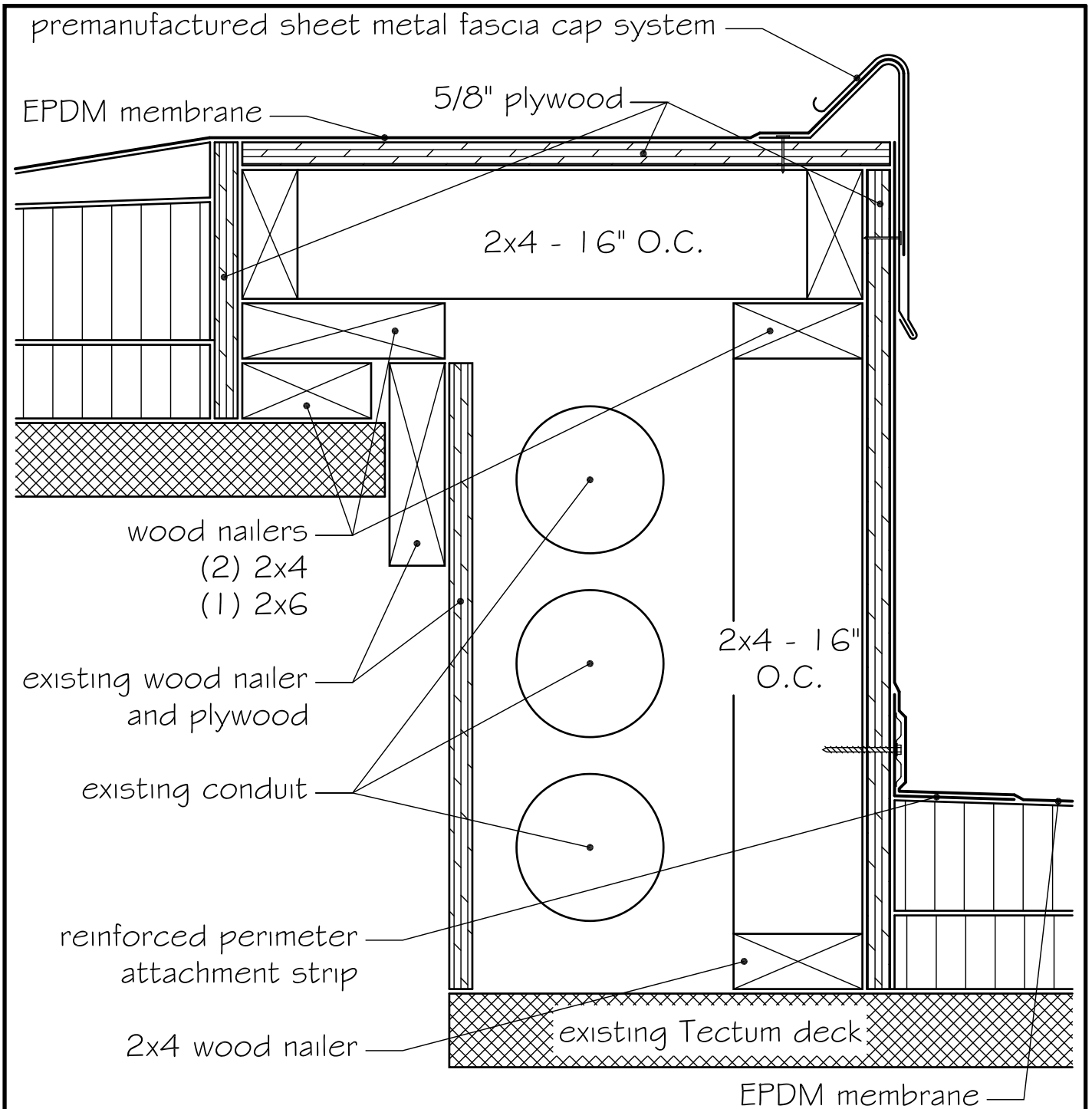
Drawn By: JDS

Detail No:

Date: 12-6-22

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AREA D - NEW PIPE CHASE
not to scale

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Project No: 22-080

Drawn By: APW

Detail No:

Date: 12-20-22

Checked By: MCB

17

ROOF EDGING AND PERIMETERS — DESIGN DATA

FIGURES 2-1 TO 2-8

Roof drainage systems should be designed so that water does not flow over the edges of built up roofs. For a roof that drains over the edge, the service life may be shortened, gravel scouring and staining from pitch drippage are more likely, and thermal cycles may be more adverse.

Research has shown that some roofing membranes may crack at the gravel-stop roof flange edges or joints. Roofing system problems are more common at laps. Roof edges should be designed to avoid or to control draining.

The preferred methods for preventing such draining are:

- a. Non-draining roof edge systems cap fascia with elevated roof edge. Figure 2-6.
- b. Draining roof edge systems, listed in order of preference:
 1. Scuppered edge with elevated fascia cap. Figure 1-29.
 2. Scuppered parapet wall. Figures 1-26 and 1-30.
 3. Scuppered edge with elevated gravel-stop. Figures 1-11, 1-28, and 1-29.
 4. Gravel-stop on flat built up roof. Figures 1-12 to 1-14.

The details in this list respond to concerns about water proofing and maintenance. Risk of roof ponding is an independent consideration. Basic alternatives for designing a roof edge-fascia system are outlined in Figures 2-1 to 2-4. Additional details are provided in Figures 2-5 to 2-8. Some details are repeated for emphasis. The details presented are not intended to preclude consideration of other details that have a known and acceptable service record.

General Design Guidelines:

- a. Wall Plate: Use raised edge nailer at roof edges minimum 2 × 6 in. (50 × 152 mm) to control drainage and to get gravel-stops out of standing water. Nailers that slope to the roof side are better than level ones.
- b. Gravel-stops:
 1. Use ¾ in. (19 mm) height minimum.

2. Use 30° to 45° included angle when brake forming. The 180° bend form is difficult to seal at lap joints and would normally be considered only for curved fascia.
 - c. Roof flanges: Install them on top of the roofing plies.

Additional sealing strips are required. When water drains over a gravel-stop into a gutter, the bottom roof ply is extended into the gutter unless the back edge of the gutter is continuously cleated and run under the roof plies. This diverts pitch drippage.

1. Width: ¾ in. (95 mm) minimum, 4¼ in. (108 mm) maximum, recessed ½ in. (13 mm) behind nailer edge.
2. Fastening: annular ring or barbed shank; minimum 1 in. (25 mm) long roofing nails ¾ in. (19 mm) minimum penetration into nailer spaced 3 in. (75 mm) OC in a staggered pattern; rows should be approximately ¾ in. (19 mm) from the edges of the roof flange, except with single ply roof, see Figure 2-1.
3. Joints: end lap 3 in. (100 mm) with a single lap. ¼ in. (6.4 mm) clearance between end butts with 12 in. (305 mm) backup plates, 6 in. (152 mm) cover plates or both. Use appropriate sealant below the flange and in the laps. 10 ft (3 m) maximum intervals between joints. Use fasteners that do not penetrate the flanges in backup plates and cover plates.
4. Corners: corners must be formed, mitered, lapped, notched, sealed, welded, or soldered as necessary to provide a continuous system that is not more susceptible to leaks than straight sections.

d. Fascia:

1. Material Thickness: Use Table 2-1, face limit dimensions to determine thickness relative to style and type of joints. 4 in. (100 mm) flat vertical height is the maximum for an uncleated or unlocked edge. Combinations of 4 to 12 in. (100 to 305 mm) (as shown in Figure 2-2) widths designated within the limits of Table 2-1 and details in Figure 2-1. Angles formed in the face add rigidity and reduce out-of-flat appearance.
2. Vertically and horizontally oriented joints: See Table 2-1 and Figures 2-2 to 2-5. Over 12 in. (254 mm) fascia height, joints that are used on metal wall systems or on roofs with pitches over 6 in. per ft (152 mm per 305 mm) are acceptable if they are compatible with end connections.



3. Stiffening: Forms of horizontal stiffening should drain rather than retain water. At joints, alignment should be maintained and openings in butts and laps should be avoided.
 - lapped 1 in. (25 mm) minimum, sealed and riveted 1 in. (25 mm) OC.
4. Drip edges: use these in the absence of an offset or in the presence of a cleat. Water will adhere to a horizontal surface that intersects a wetted vertical plane at a 90° angle.
5. Cleats: horizontal cleats should be continuous. Continuous means in lengths not to exceed 10 ft (3 m) with ¼ in. (6.4 mm) clearance between ends. Cleat end locations should not coincide with locations of vertical joints and seams if the gaps will be visible. Cleat gage must be at least fascia gage. An optional method is extend the cleat up to the top edge of the roof and turn a horizontal leg at a 90 degree angle over the top edge of the roof. This will add rigidity to the fascia. See Figures 2-1A and 2-1B for cleat detail.
6. Laps: Vertical laps of metal drip edges onto continuing vertical faces should be at least 1 in. (25 mm) to minimize wind-driven water entry. This is particularly important near absorbent materials such as wood.
7. Corners: Fascia corners must provide the same degree of waterproofing as straight sections and joints. They may be
 - formed (folded);
 - welded;
 - seam locked;
 - mitered, lapped, riveted 1 in (25 mm) on center and soldered;
8. Joint sealant: Joints should be sealed with a metal roofing grade of sealant. Do not use asphalt or bituminous base compounds that would weep out of the joints.
 - e. Soffit: See Figures 2-3, 2-4, and 2-7.

Metal soffit covers should be designed of solid, stamped, or perforated metal or fitted with intermittent vents as appropriate for the end use. Drip edges at fascia-to-soffit transitions can be folded to continue the same finish that is on the fascia. Because soffits are not subject to direct sunlight, less accommodation for expansion and contraction may be used. Use sufficient fastening to maintain flat surfaces and align joints. Specify exposed or concealed fasteners.

Research has shown that gravel-stop-fascia designs vary between localities because of local practices and climatic conditions. Architects should contact local sheet metal contractors for prevailing area practices. Generally, gravel-stop-fascia is formed in 10 ft (3 m) sections. Provision should be made for expansion between sections of gravel-stop-fascia (Figure 2-5).

Figure 2-1A illustrates a gravel-stop-fascia system installed on a raised 2 × 8 in. (50 × 203 mm) nailer which has been cut to form a cant. Figure 2-1B illustrates a gravel-stop-fascia system installed on a raised 2 × 6 in. (50 × 152 mm) nailer with a preformed tapered edge strip. In all cases, the metal roof flange of the gravel-stop is held back a minimum of ½ in. (13 mm) from the edge of the nailer.

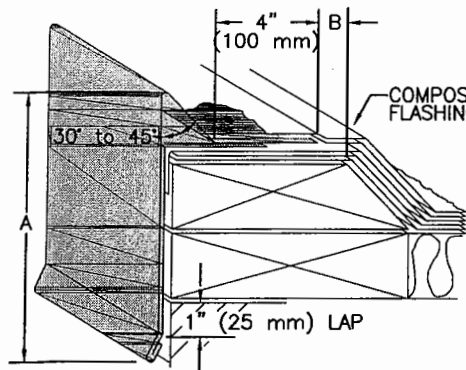


FIG 2-1A

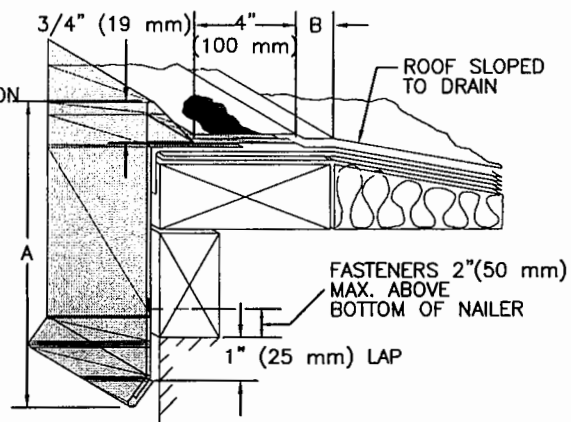
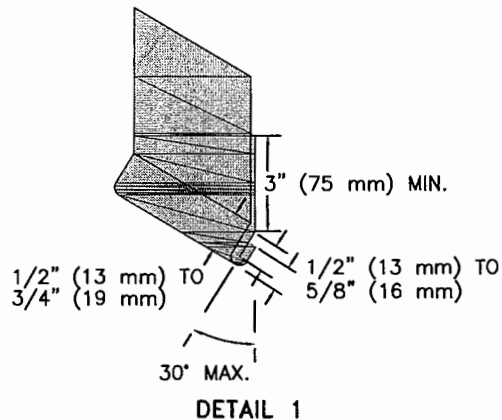
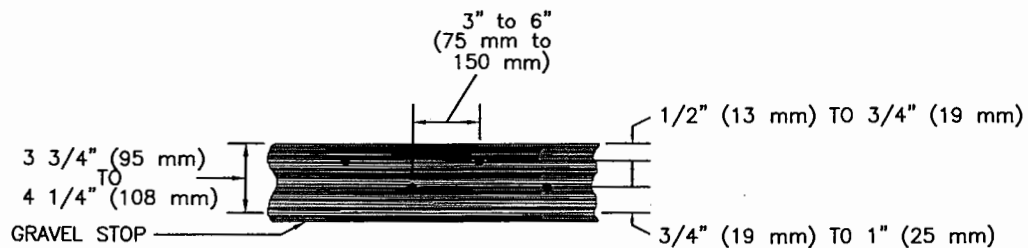


FIG 2-1B

A = 4" (127 mm) MAX. UNCLEFTED
 A = 12" (300 mm) MAX. CLEFTED
 B = 1/2" (13 mm) MIN.



DETAIL 1



THESE REQUIREMENTS VARIAS BY ROOF SYSTEM.
 REFER TO THE MEMBRANE MANUFACTURER'S INSTRUCTIONS.

BASIC FLANGE NAILING PATTERN

FIGURE 2-1 FORMED GRAVEL-STOP-FASCIA — DESIGN DATA

Metal Thickness (Nom.)				Joint (J) for Fascia Dimension of:	
Ss ga (mm)	Al in. (mm)	Cu oz. (mm)	Steel* ga (mm)	9" Max. (230 mm)	Over 9" to 12" (300 mm)
28 (0.38)	0.025 (.64)	12 (0.41)	26 (0.55)	J 1, 2, 4, 5, 9, 11, 11A, 12	J 8-12
26 (0.46)	0.032 (.81)	16 (0.55)	24 (0.70)	J 1, 2, 4, 5, 9, 11, 11A, 12	J 8-12
24 (0.58)	0.040 (1.0)	20 (0.69)	22 (0.85)	J 1, 2, 4, 5, 9, 11, 11A, 12	J 8-12
22 (0.74)	0.063 (1.6)	24 (0.82)	20 (1.0)	J 1, 2, 4, 5, 9, 11A, 12	J 1-11, 11A, 12
20 (0.89)	0.080 (2.0)	32 (0.92)	18 (1.3)	J 2, 4, 5, 11A, 12	J 1-7, 10, 11A, 12
18 (1.2)	0.100 (2.5)	48 (1.6)	16 (1.6)	J 2, 4, 5, 11A, 12	J 1-7, 10, 11A, 12
16 (1.5)	0.125 (3.2)		14 (2.0)	J 2, 4, 5, 11A, 12	J 2, 4, 5, 12
14 (1.9)			12 (2.8)	J 2, 4, 5, 11A, 12	J 2, 4, 5, 12
12 (2.7)			10 (3.5)	J 2, 4, 5, 11A, 12	J 2, 4, 5, 12

*Galvanized coated metal 1" = 25 mm

J1	J2	J3	J4	J5	J6	
4" LAP	BUTT + BACK-UP PLATE	4" JOGGLE (OFF-SET FLUSH)	BUTT + COVER PLATE	6" COVER + 12" BACKUP PLATES	T & G	
J7	J8	J9	J10	J11	J11A	J12
T & G FLUSH	STDG SEAM	1" DRIVE	3/4" HOOK SEAM	3/4" INSIDE SLIP (POCKET)	3/4" S SLIP	DBL S

Table 2-1 Gravel-Stop and Cap Fascia Design

NOTE:

See Appendix L for gage and other requirements when fascia must meet wind uplift specifications.

FORMED GRAVEL-STOP-FASCIA — JOINT SYSTEMS

FIGURE 2-5

Figure 2-5 illustrates three different joints for formed gravel-stop-fascia systems. Soldered or welded joints are not recommended, except at corners, because they offer no provision for expansion and contraction.

Figure 2-5A shows a gravel-stop installed with a $\frac{1}{4}$ in. (6.4 mm) opening between sections. This opening is covered by a 6 in. (152 mm) cover plate formed to the profile of the gravel-stop. The cover plate is embedded in compatible sealant, nailed through the opening between the gravel-stop sections, and loose locked to the drip edge.

Detail 1 shows the notch necessary in the concealed drip edge at a lap.

Figure 2-5B shows a lap joint for gravel-stop. The joint should be set in compatible sealant and lapped 4 in. (102 mm). Lap joints should not be used where the face exceeds 4 in. (102 mm).

Figure 2-5C shows a gravel-stop installed using a 6 in. min (152 mm) back-up plate. The back-up plate is nailed in place before the gravel-stop is installed. Mastic is applied, and the gravel-stop set in place with a $\frac{1}{4}$ in. opening between sections. The back-up plate must be formed to the exact profile of the gravel-stop. Adding a cover plate is an alternative (from Figure 2-5A).

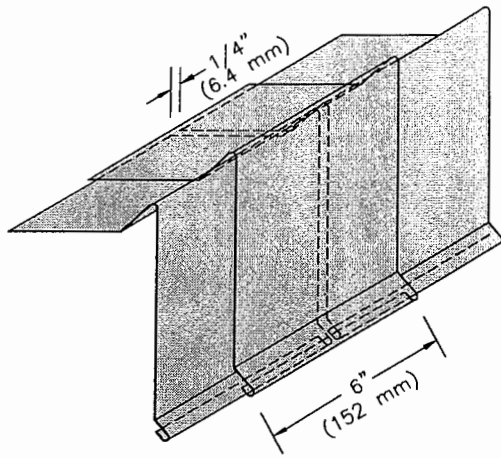


FIG 2-5A

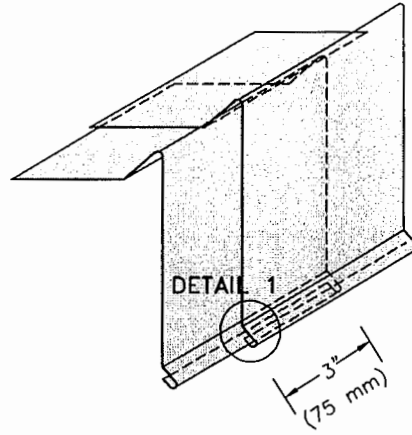
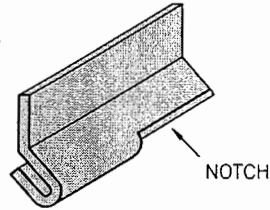


FIG 2-5B



DETAIL 1

ALL JOINT LAPS
TO BE SEALED

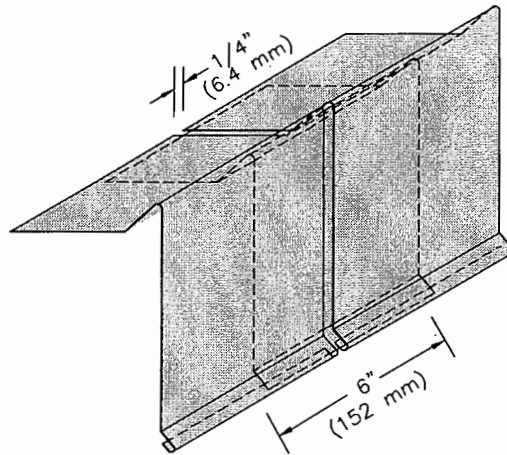


FIG 2-5C

FIGURE 2-5 FORMED GRAVEL-STOP-FASCIA — JOINT SYSTEMS

FORMED GRAVEL-STOP-FASCIA — SOFFIT INSTALLATION

FIGURE 2-7

Figure 2-7 illustrates various installations of fascia systems with soffits. Figure 2-7A shows a two-piece fascia system. The lower piece serves as a soffit closure and part of the fascia.

The lower piece is attached along its upper edge and through the soffit portion using fasteners and slotted holes. A drip edge is formed at the lower end of each piece.

Shown in Figure 2-7B is another fascia with a soffit

closure. In this system, a heavy-gage metal can be used for the fascia to maximize surface flatness. See Table 2-1 for face limits.

Figure 2-7C illustrates a two-piece fascia system. This system may be used on wide fascia. The soffit cover is attached using masonry anchors. The roof edges are designed for specific needs. Details of fascia design is given on Figure 2-4. Joints in the soffit may be lapped or butted over a back-up plate depending on the thickness of the soffit metal.

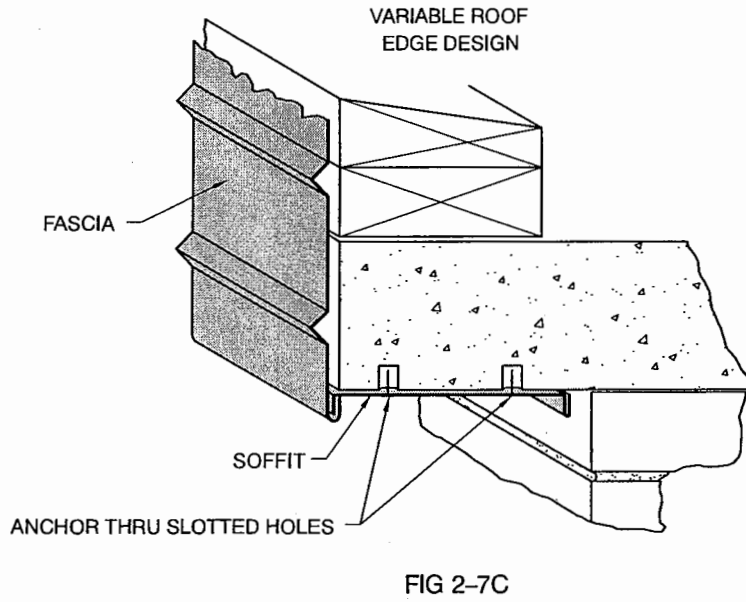
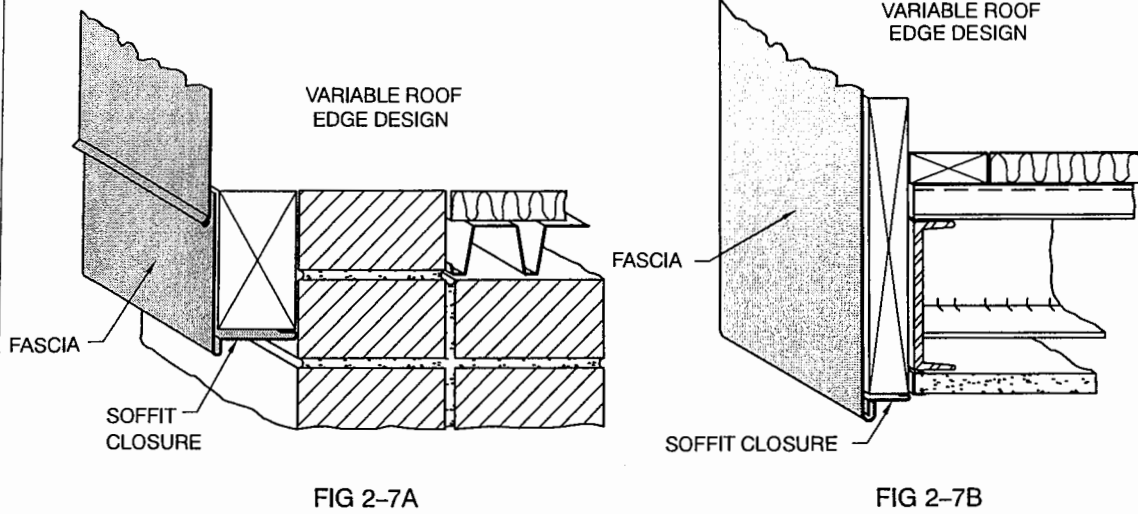


FIGURE 2-7 FORMED GRAVEL-STOP-FASCIA — SOFFIT INSTALLATION

METAL COPING (GENERAL)

The horizontal top surface of a wall is the most vulnerable point for water to penetrate. This is especially true of masonry walls. The most practical and attractive way

to waterproof this vulnerable spot is to cap the wall with formed metal coping.

FORMED METAL COPINGS — DESIGN DATA

Figure 3-1 shows a typical coping installed on a masonry wall. Continuous blocking that is sloped toward the interior roof side must be securely anchored to the top of the wall. An appropriate underlayment must go over the blocking past the wall-to-blocking joint and then the cleats and coping are fastened to the blocking.

Continuous cleats are used on the side away from the roof—the exterior face side. On the interior roof side, the copings can be fastened through oversized holes located 24 in. (610 mm) OC with screws and watertight washers. Copings can be installed with continuous cleats on both sides of the coping. However, a coping that can be snapped on may also have enough flexibility to either snap off or admit water in some circumstances.

The coping is generally formed in 10 ft (3 m) sections and joined to allow for longitudinal expansion. Corners on copings should be mitered, lap-seamed, and sealed. On wider copings, stiffening type joints should be specified.

Sample coping shapes are shown in Figure 3-4. These combinations of corners, joints, and edges are representative.

See Figure 3-5 to 3-9 for installations. Recommended gages for formed copings are shown in Table 3-1 and are based on copings that have continuous backing. Thicker metal would be necessary for intermittent support and joint selection would be more limited.

The final selection of a coping design involves study of the service, exposure, thermal expansion, material durability, forming capability, wind uplift, and maintenance needs.

FIGURE 3-1

All single lap joints should be 3 in. (76 mm) minimum width. All back-up plates should be 6 in. (152 mm) width. All cover plates should be 6 in. (152 mm) minimum width.

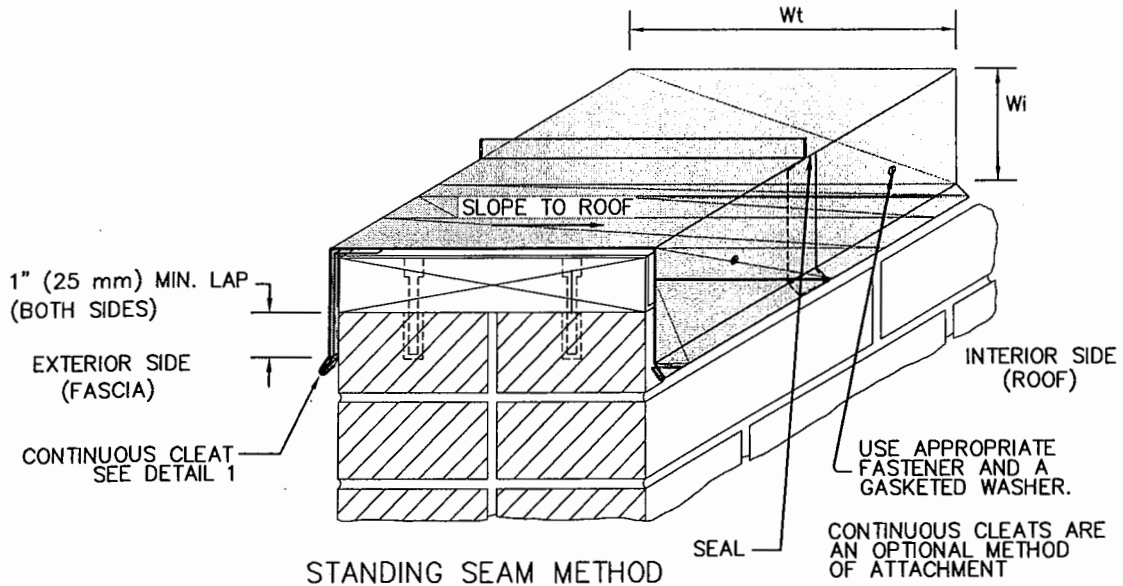
Caulking is NOT indicated along either of the lower edges, intentionally. The only place sealing should be applied to a coping system is at the overlap of certain types of expansion joints—primarily flat, overlapping type joints—and at mitered corners that use folded seam construction. Since the coping and wall will expand at different rates, if sealant were continuously applied along the lower coping edges that sealant would be unlikely to remain adhered to both the wall and coping on a long-term basis.

If it were possible to completely and successfully seal along both the inside and outside lower edges of a coping, moisture could not escape. After a rain, sun-driven vapor pressure would force moisture up the wall and condensate would form under the coping and underlayment, drain down the “legs” of the coping and accumulate anywhere the caulking created an effective dam.

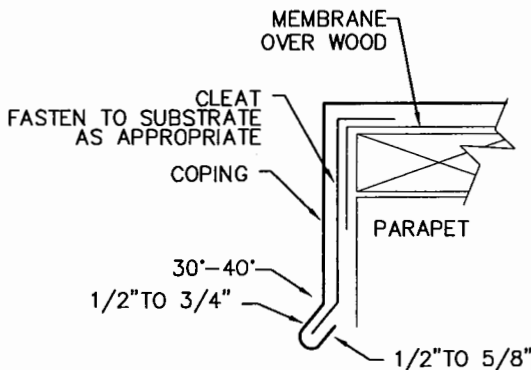
The most likely side of coping to be subject to wind-driven rain penetration is the outside edge but the continuous cleat on the outside edge is fastened against the wall and forms an effective block to wind-driven rain from that side.

If a designer requires that a sealant or sealing material be applied along a coping, between the wall and continuous cleat is the only appropriate location. Sealing the lower edge of copings or the cleats is not a recommended design practice.





USE APPROPRIATE FASTENER AND A GASKETED WASHER.
 CONTINUOUS CLEATS ARE AN OPTIONAL METHOD OF ATTACHMENT



DETAIL 1

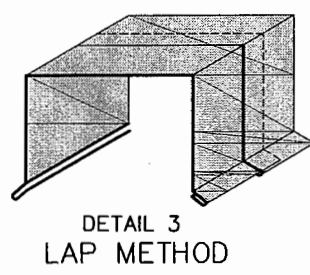
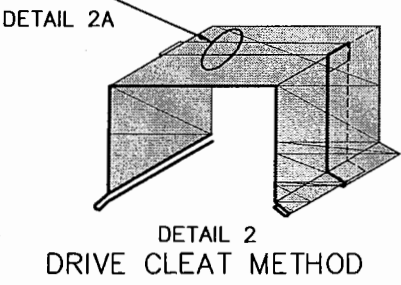
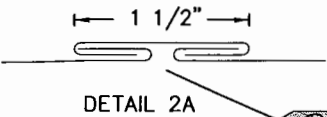


FIGURE 3-1 FORMED METAL COPINGS — DESIGN DATA



Metal Thickness (Nom.)				Joint (J) for Top Width (W _T)				Joint (J) for Interior / Exterior Fascia Dimension	
S/S gage (mm)	Al in. (mm)	Cu oz. (mm)	Steel* gage (mm)	6" Max. (150 mm)	Over 6" to 12" (300 mm)	Over 12" to 18" (450 mm)	Over 18" (460 mm)	9" Max. (230 mm)	Over 9" to 12" (300 mm)
28 (.38)	.025 (.64)	12 (.41)	26 (.55)	ALL	ALL	NONE	NONE	ALL	8-12
26 (.46)	.032 (.81)	16 (.55)	24 (.70)	ALL	ALL	5-12	8-11	ALL	8-12
24 (.58)	.040 (1.0)	20 (.69)	22 (.85)	ALL	ALL	5-12	5-9,12	ALL	8-12
22 (.74)	.063 (1.6)	24 (.82)	20 (1.0)	1-10,12	1-10,12	1-10,12	5-9,12	1-7,9,11,11A,12	1-7,9-12
20 (.89)	.080 (2.0)	32 (.92)	18 (1.3)	1-7,12	1-7,12	1-7,12	5-7,12	1-7,11A,12	1-7, 10-12
18 (1.2)	.100 (2.5)	48 (1.6)	16 (1.6)	1-7,12	1-7,12	1-7,12	5-7,12	1-7,11A,12	1-7, 10-12
16 (1.5)	.125 (3.2)		14 (2.0)	2,4,5,12	2,4,5,12	2,4,5,12	5-7,12	2, 4, 5, 11A, 12	2, 4, 5, 12
.075 (1.9)			12 (2.8)	2,4,12	2,4,12	2,4,12	5-7,12	2, 4, 5, 11A, 12	2, 3, 5, 12
.105 (2.7)			10 (3.5)	2,4,12	2,4,12	2,4,12	5-7,12	2, 4, 5, 11A, 12	2, 4, 5, 12

*Galvanized or coated 1" = 25 mm

J1	J2	J3	J4	J5	J6
3" LAP	BUTT + BACK-UP PLATE	4" JOGGLE (OFF-SET FLUSH)	BUTT + COVER PLATE	6" COVER + 6" BACKUP PLATES	T & G

J7	J8	J9	J10	J11	J11A	J12
T & G FLUSH	STDG SEAM	1" DRIVE	3/4" HOOK SEAM	3/4" INSIDE SLIP (POCKET)	3/4" S SLIP	DBL S

Table 3-1 Coping Design

NOTE:

Some cover plates slips and drives maybe fabricated with thickness lighter than the base coping material used. (J₂, J₄, J₅, J₆, J₇, J₉, J_{11A}, J₁₂)

SUPPLEMENTAL DESIGN DATA FOR TABLE 3-1

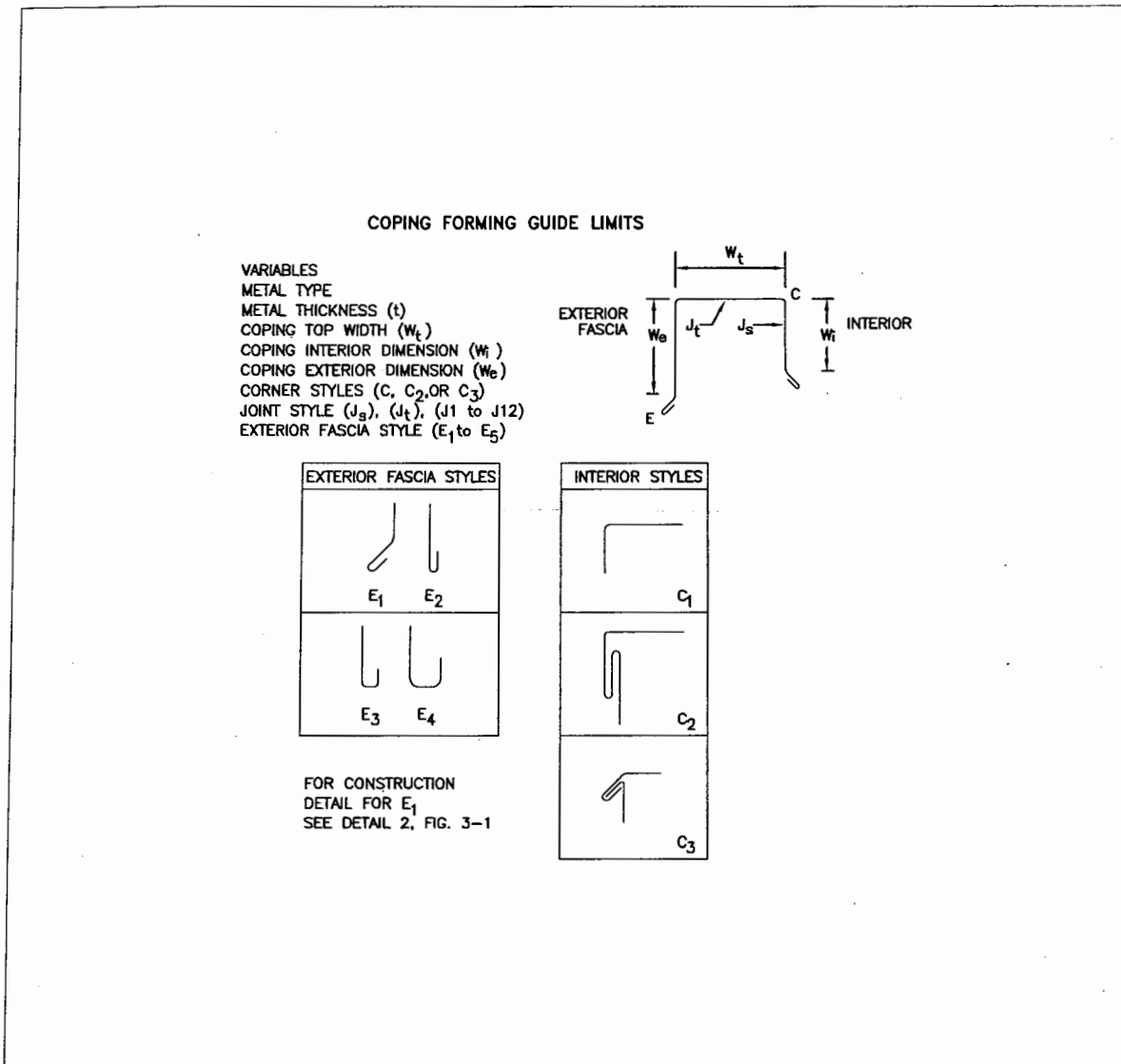
To use this Table 3-1, make a trial selection of material and general design configuration such as one of those shown in Figure 3-4. Then locate the column in Table 3-1 with the applicable coping top width and read down to the row for a trial or specified metal thickness. Finally, read the joint type numbers (from J1 to J12) that are acceptable for that width, material, and thickness.

For each width dimension, top or side, the thickness of a selected metal has certain limits of suitability (flatness, formability, joint sealing capability, accommodation of thermal expansion, wind pressure resistance, and ice and snow load resistance). The importance of these factors depends on whether they

are continuous or intermittent. Damage resistance to temporary loads imposed by service workers may also be a factor.

Joints should be installed with expansion and contraction allowances to avoid separation and buckling. The cover and backup plates are normally of the same metal thickness as the coping. However, the J9 drive, the J11A "S" slip, and the J12 double "S" may be thinner than the coping, particularly when the coping is 0.05 in. (1.3 mm) or more in thickness.

For fascia heights over 10 in. (254 mm), see gravel-stop fascia, parapet wall covering, and wall systems text and details.



COUNTER FLASHING SYSTEMS (GENERAL)

Careful consideration must be given to flashing systems where a roof joins a wall. The base flashing system must keep water from entering the building and must be designed to provide for building movement. Counter flashing serves to turn water from a wall onto the roof or base flashing.

Metal counter flashing should be used in conjunction with composition base flashings. Composition base flashing should be applied according to the roofing manufacturer's specification.

It is recommended that base flashings be applied over a cant and extended up the wall a minimum of 10 in. (254 mm) above the roof line. Metal counter flashing is installed so that a minimum of 4 in. (100 mm) of the base flashing is covered. Metal base flashings are used with shingle or metal roofs. Metal base flashing is not recommended for use with membrane roofing systems. A metal base flashing may be used over a composition

flashing as a protective cover in locations where the base flashing may be damaged by traffic.

Joints in flashing should be lapped 4 in. (100 mm).

Removable counter flashing is cost effective for work installation sequencing and for roofing systems repairs. All membrane roofing should have removable counter flashing.

All counter flashing receivers should be elevated 10 in. (254 mm) above the finished roof. The lower edge of metal counter flashing should be 1 in. (25 mm) minimum above a cant.

All reglets must be capable of supporting flashing.

In high wind areas, clips can be specified for the lower edge of the counter flashing. These would be visible on the edge.

COUNTER FLASHING SYSTEMS — INSTALLATION

Figure 4-4A illustrates the installation of a complete metal counter flashing system using a metal flashing receiver.

The counter flashing is notched and lapped at inside corners and joints, and seamed at outside corners. The flashing receiver is notched and lapped 3 in. (76 mm) at corners and joints.

After the counter flashing is installed, bend the receiver at a 45 degree angle to provide a drip edge.

This type of counter flashing may be removed with comparative ease when roofing is replaced.

Figure 4-4B shows an alternative receiver that is set as the wall is built. The counter flashing is easily inserted into a spring lock condition as shown in Detail 1.

Figures 4-4C and D illustrate other alternatives for using two-piece counter flashings on new or existing

FIGURE 4-4

construction. Figure 4-4C shows a snaplock receiver. Figure 4-4D shows a pocket receiver through which fasteners are installed at 24 in. (610 mm) maximum spacing after the counter flashing is inserted.

Figure 4-4E shows a method of installing a counter flashing in an existing masonry wall. Cut a reglet in the masonry joint to a depth of at least 1½ in. (38 mm). Insert the counter flashing into the reglet and hold it in place by spring action. See Detail 1. Then fill the reglet with a sealant. Notch and lap the counter flashing at corners and joints.

The recommended minimum gage for counter flashing shown in Figure 4-4 is 16 oz. (0.55 mm) copper, 26 ga (0.5512 mm) galvanized steel, or 26 ga (0.477 mm) stainless steel. Flashing receivers should be of 16 oz. (0.55 mm) copper, 26 ga (0.477 mm) galvanized steel, or 28 ga (0.396 mm) stainless steel.

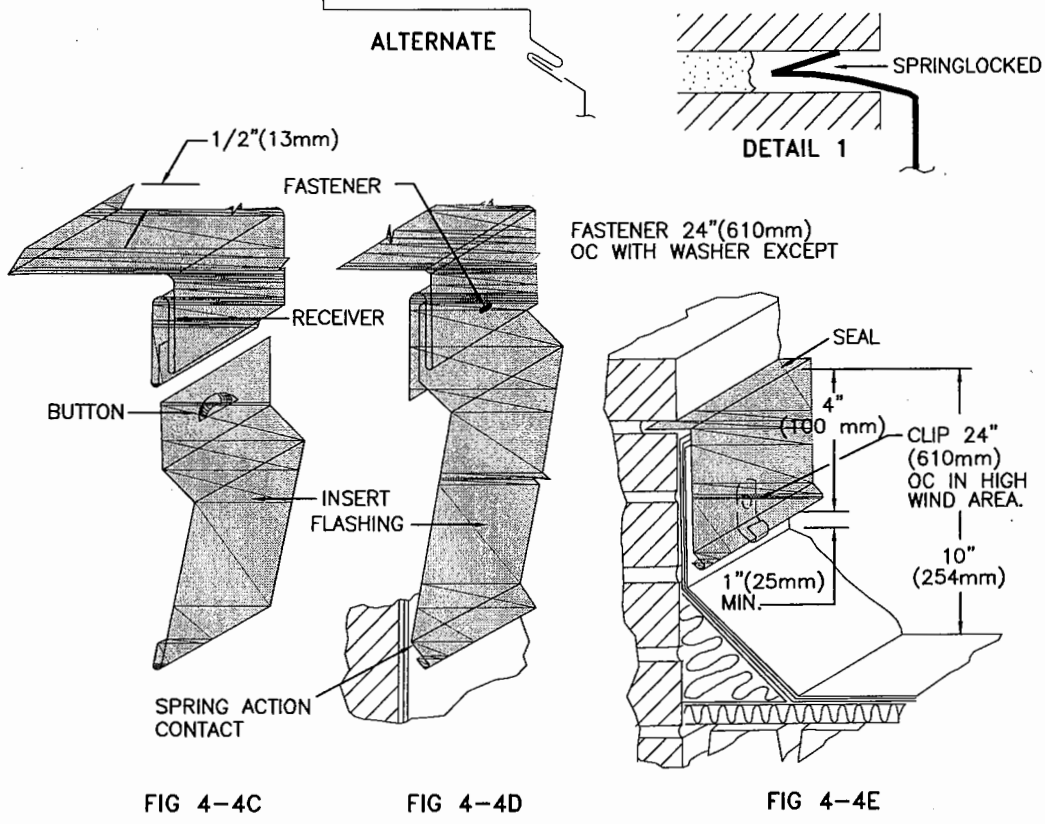
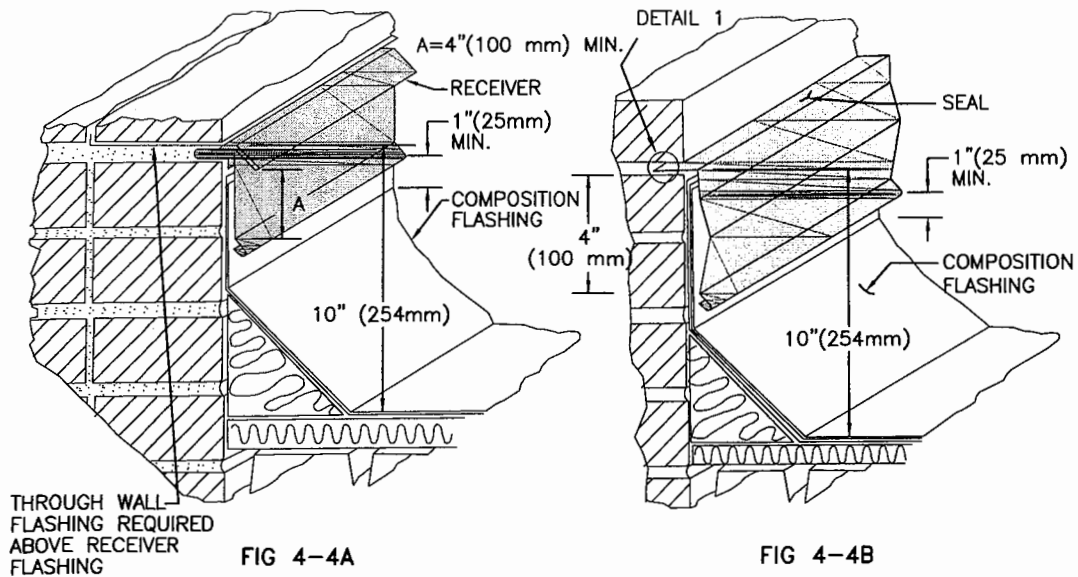


FIGURE 4-4 COUNTER FLASHING SYSTEMS — INSTALLATION



ROOF PENETRATION FLASHING — PIPES

Figure 8-9A illustrates a method for flashing a roof opening without a curb. This method is recommended only if the pipes are turned horizontally within 24 in. (610 mm) of the roof and the opening is not greater than 18 × 18 in. (460 × 460 mm).

The flashing is made in pieces with base portion being flanged 4 in. (100 mm) onto the roof. The flange is fastened through the roofing felts and is then stripped in by the roofer. The top section is a formed metal hood over the metal pipe. The pipes should be sloped away from the penetration.

The recommended minimum gage for flashing in Fig-

FIGURE 8-9

ure 8-9A is 16 oz. (0.55 mm) copper, 26 ga (0.477 mm) stainless steel, or 24 ga (0.607 mm) galvanized steel.

Figure 8-9B illustrates two methods of flashing a vent pipe. The flange extends 4 in. (100 mm) on the roof and is stripped in by the roofer. Turn the top of the flashing down inside the vent pipe. The flashing may be of a one-piece or a two-piece style. When a vent pipe extends above the roof so far that it is impractical to completely cover it with flashing (Figure 8-9B), it is recommended that it be flashed as shown in Figure 8-9C, minimum 2 in. (50 mm). The minimum height of the base flashing in Figures 8-9B and 8-9C is 8 in. (205 mm) above the roof's surface.

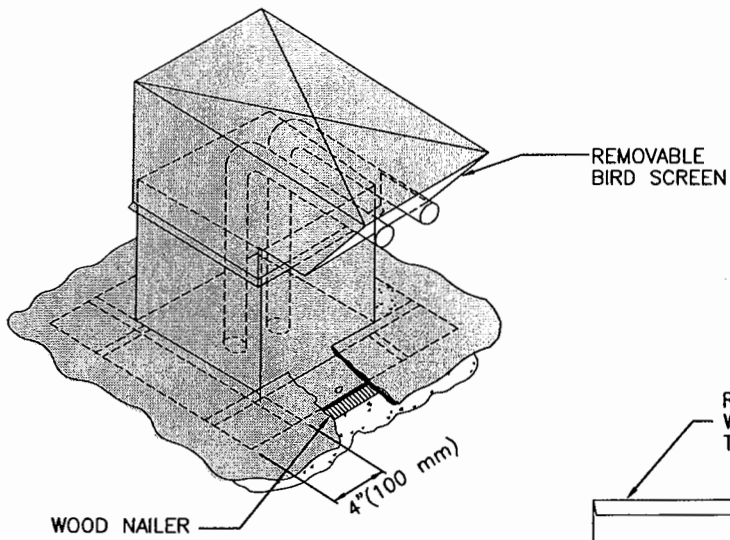
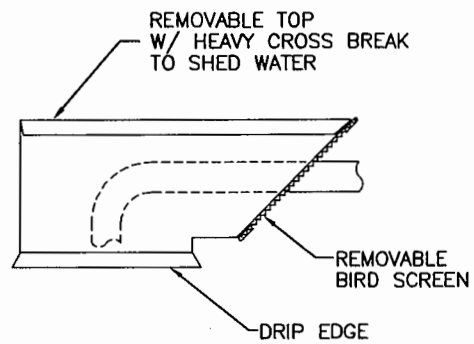


FIG 8-9A



TOP SECTION DETAIL

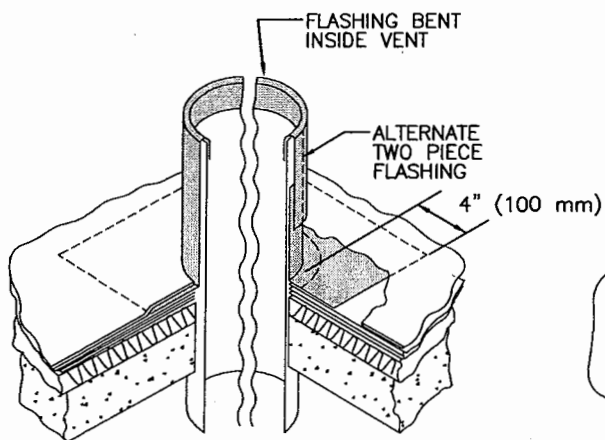


FIG 8-9B

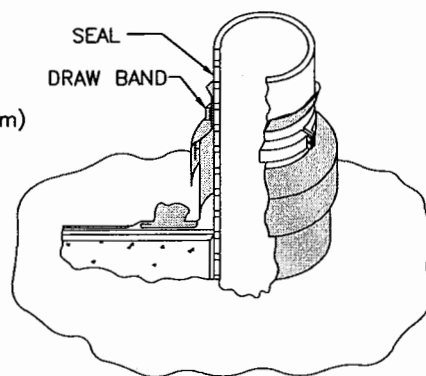


FIG 8-9C

FIGURE 8-9 ROOF PENETRATION FLASHING — PIPES

EQUIPMENT SUPPORT FLASHING

Figure 8-11A shows a method for flashing pipe stanchions. Attach a watertight counter flashing (umbrella) over a stripped-in metal base (roof jack) flashing on a concrete deck. The roof jack top should be 8 in. (203 mm) above the roof. The umbrella should lap the jack 4 in. (100 mm) and have ¼ in. (6.4 mm) minimum clearance.

Figure 8-11B illustrates a method for flashing equipment supports. Install composition base flashing over a cant and up 4 in. (100 mm) on the side of the support. Fabricate metal flashing to cap the support and extend 4 in. (100 mm) over the base flashing. Seam and solder all corners. This flashing may be used to cover columns that have been stubbed through the roof.

The bottom elevation of support structures and equipment supported should be selected by the designer with regard to access to the roof surface for maintenance and repair. Table 8-1 is a guide.

The designer should consider ease of access to the roof's surface for maintenance and repair when selecting the height of the equipment support structures. Consult Table 8-1.

Figure 8-11C illustrates the use of a pitch pan to flash a small penetration through the roofing where it is impossible to use other types of flashings.

Extend the flange onto the roof 4 in. (100 mm) and fasten it over the roofing felts. The flange is stripped in by the roofer. The sides should extend up from the roof a minimum of 4 in. (100 mm). All joints should be seamed and sealed.

A pitch pan should be 2 in. (50 mm) greater in length and width than the support it is flashing. It is filled by the roofer. A bonnet flashing should be used to cover a pitch pan. It is easier to fit this to a pipe stanchion than to other shapes of support.

Precaution: Pitch pans are not inherently maintenance free. Building managers should set up a program of routine inspection and maintenance.

Manufactured rubber boots that effectively seal against supports and shield the roof jacks are acceptable as umbrellas. Such products must resist ozone and ultraviolet rays and have a suitable service temperature.

The gage of metal used will depend on the size of the flashing. The recommended minimum gage is 16 oz. (0.55 mm) copper, 26 ga (0.477 mm) stainless steel, or 24 ga (0.607 mm) galvanized steel.

FIGURE 8-11

Width of Equipment		Height of Legs	
inches	mm	inches	mm
Up to 24	Up to 610	14	360
25 to 36	635 to 910	18	460
37 to 48	930 to 1220	24	610
49 to 60	1240 to 1520	30	760
60 and wider	1520 and wider	48	1220

Table 8-1 Rooftop Equipment Elevation

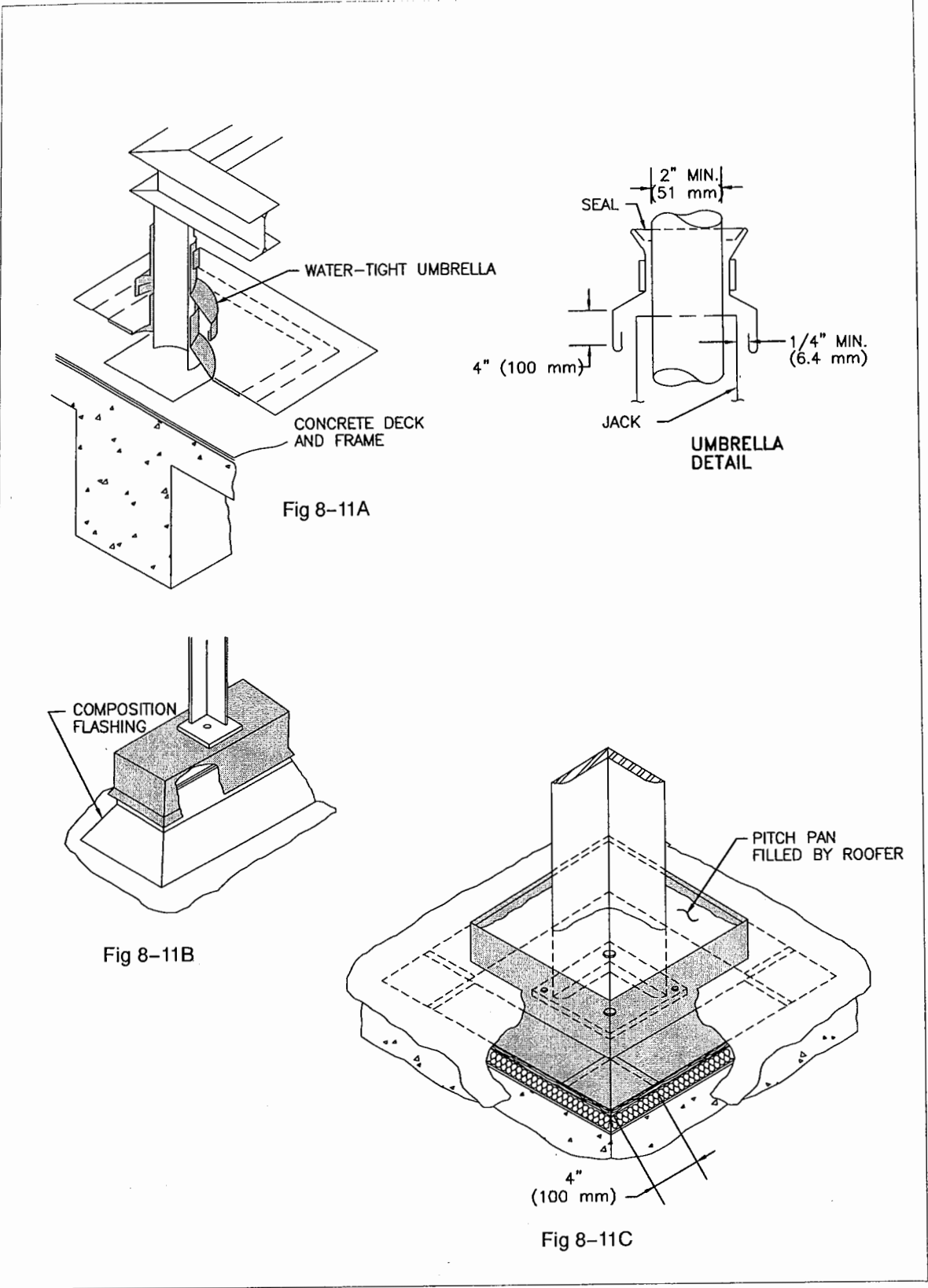


FIGURE 8-11 EQUIPMENT SUPPORT FLASHING