

**PROJECT MANUAL
FOR**



**Indian River County North RO Plant
Roof Replacement**

December 18, 2018

IRC PROJECT NUMBER 1802

REI PROJECT NUMBER 018TPA-011



FLORIDA ENGINEERS LICENSE #26860

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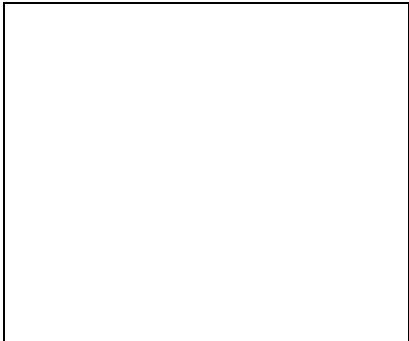
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SECTION 00 01 07

SEALS PAGE

PROFESSIONAL ENGINEER



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END OF SECTION 00 01 10

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LIST OF DRAWINGS

PART 1 GENERAL

The following drawings and details are included as part of the Contract Documents:

Drawing	Description	Date
R1	Roof Plan	08-10-2018
R2	Attachment Plan	08-10-2018
D1	Roof Details	08-10-2018
D2	Roof Details	08-10-2018

END OF SECTION 00 01 15

SECTION 00 60 00

PROJECT FORMS

PART 1 GENERAL

1.01 GENERAL

A. The following documents are included in the Project Manual:

1. Roof Manufacturer's Acknowledgement - Section 00 62 33
2. Contractors Five-Year Warranty - Section 00 65 36
3. Asbestos Free Warranty - Section 00 65 37

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 60 00

SECTION 00 62 33

ROOF MANUFACTURER'S ACKNOWLEDGMENT

Owner: Indian River County

Project Name: North RO Plant Roof Replacement

Project Address: 7751 58th Street, Vero Beach, Florida, 32967

Roofing Contractor: _____

Address: _____

Telephone: _____

Facsimile: _____

This is to advise the Owner that having thoroughly reviewed the Specifications and Drawings contained within the Project Manual dated **December 18, 2018** for the above-titled project, we acknowledge that the roof system(s) and flashing system(s) specified are suitable for use on this project. Having reviewed the project requirements in detail, the Manufacturer will provide a written response to the Engineer seven days prior to the bid date, if conflicts between the Manufacturer's requirements occur with the above listed documents.

1. The manufacturer certifies that the installer is approved, authorized, or licensed by manufacturer to install specified roof system and is eligible to receive the specified manufacturer's warranty.
2. The manufacturer will comply with the specified requirements for on-site technical support.

_____ is hereby designated as our Liaison on this project.
(Print or type name of Liaison)

Telephone

Facsimile

Roof Manufacturer's Company Name

Roof Manufacturer Representative's Signature

Date

Roof Manufacturer Representative's Name

Title

Roof Manufacturer's Address

Telephone

Facsimile

END OF SECTION 00 62 33

SECTION 00 65 36

CONTRACTOR'S FIVE-YEAR WARRANTY

Know all men by these presents, that we, (Contractor) _____, having installed roofing system, flashings and sheet metal on the Indian River County North RO Plant Roof Replacement Project under contract between Indian River County (Owner) and Contractor, warrant to the Owner with respect to said work that for a period of five (5) years from date of final completion, the work shall be absolutely watertight and free from any and all leaks, provided however the following are excluded from this Warranty:

- a. Defects or failures resulting from abuse by the Owner.
- b. Defect in design involving failure of (1) structural frame, (2) load bearing walls, and (3) foundations.
- c. Damages caused by fire, tornado, hail, hurricane, acts of God, wars, vandalism, riots or civil commotion.

We, Contractor, agree that should any leaks occur in the work we will perform emergency repairs within 24 hours notice and perform permanent repairs within a reasonable time in a manner to restore the work to a watertight condition by methods compatible to the system and acceptable under industry standards and general practice, all at no expense to the Owner.

We, Contractor, further agree that for a period of five (5) years from date of final completion referred to above, we will make repairs at no expense to the Owner to any defects which may develop in the work including but not limited to blisters, wrinkles, fish-mouths, ridges, splits and loose flashing in a manner compatible to the system and acceptable under industry standards and general practice as established by the Engineer.

Contractor shall attend two post construction field inspections: the first no earlier than twenty -three (23) months and no later than twenty-four (24) months after the date of final Completion and the second no earlier than fifty-nine (59) months and no later than sixty (60) months after the date of Final Completion. Contractor shall complete any corrective action requested by Owner, Engineer, or Manufacturer at no additional cost to the Owner.

Signature: _____ Title: _____

_____ State	
_____ County	
I, _____, a Notary Public for _____ County, _____ State, do hereby certify that _____ personally appeared before me this day and acknowledged the due execution of the foregoing instrument.	
Witness my hand and official seal, this _____ day of _____, 20_____.	
_____ Notary Public	(OFFICIAL SEAL)
My commission expires _____, 20_____.	

END OF SECTION 00 65 36

SECTION 00 65 37

ASBESTOS FREE WARRANTY

Owner: Indian River County

Project Name: North RO Plant Roof Replacement

Project Address: 7751 58th Street, Vero Beach, Florida, 32967

Project Manual Date: December 18, 2018

Date of Substantial Completion: _____

Know all men by these present that we, _____
(Contractor, Subcontractor, Material Supplier or Equipment Manufacturer)

having furnished labor, materials, equipment and/or supplies; removed existing roof system; installed new roof system and/or miscellaneous roof system components; from, to and/or on the above referenced Project under contract between the Owner and Contractor, warrant to Owner with respect to said work that no materials containing asbestos fibers were incorporated into the work, and that, to our knowledge and belief, no materials containing asbestos remain in or are covered by the work.

Exceptions: _____
If there are no exceptions, state "No Exceptions" here.

Signature: _____

Title: _____

_____ State
_____ County
I, _____, a Notary Public for _____ County, _____ State, do hereby certify that _____ personally appeared before me this day and acknowledged the due execution of the foregoing instrument.
Witness my hand and official seal, this _____ day of _____, 20_____.
_____ Notary Public
(OFFICIAL SEAL)
My commission expires _____, 20_____.

END OF SECTION 00 65 37

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Name: Indian River County North RO Plant Roof Replacement
- B. Project Address: 7751 58th Street, Vero Beach, Florida, 32967
- C. Owner: Indian River County
- D. Engineer: The Contract Documents, dated December 18, 2018, were prepared by REI Engineers, Inc.
- E. This work includes the provision of all labor, material, equipment, supervision and administration to integrate the work outlined in this project manual into the total building system such that no leakage into the system occurs. In general, the scope of work in the **Base Bid** will include:
 - 1. **Roof Sections A, B & C:** (Approximately 11,713 square feet): Remove and dispose of the existing roof system including flashings and sheet metal down to the existing structural deck; resecure the existing edge nailers and gutters to remain in place; adhere polyisocyanurate insulation system, provide adhere gypsum coverboard, fully adhere felt-back thermoplastic single ply membrane along with flashings and accessories and accessories and provide sheet metal flashings and trim to provide a complete, watertight, 20-year warrantable roof assembly.
 - 2. **Roof Sections D & E:** (Approximately 6,785 square feet): Remove and dispose of the existing roof system including flashings and sheet metal down to the existing structural deck; resecure the existing edge nailers to remain in place; install wall scupper drains, repair wall at abandoned scupper locations; install new counter flashing; adhere tapered polyisocyanurate insulation system, provide adhere gypsum coverboard, fully adhere felt-back thermoplastic single ply membrane along with flashings and accessories and accessories and provide sheet metal flashings and trim to provide a complete, watertight, 20-year warrantable roof assembly.
 - 3. **Roof Sections F:** (Approximately 1,465 square feet): Remove and dispose of the existing roof system including flashings and sheet metal down to the existing structural deck; resecure the existing edge nailers to remain in place; install wall scupper drains; repair wall at abandoned scupper locations; install new counter flashing; adhere polyisocyanurate insulation system, provide adhere gypsum coverboard, fully adhere felt-back thermoplastic single ply membrane along with flashings and accessories and provide sheet metal flashings and trim to provide a complete, watertight, 20-year warrantable roof assembly.
 - 4. Remove the existing lightning protection/grounding system prior to commencement of roof replacement work. Upon completion of flashing and sheet metal installation, all new or existing parts, components or materials will be reinstalled or installed to meet UL requirements at the time of initial installation.
- F. Asbestos Containing Roofing Materials (ACRM):
 - 1. It is the intention of these specifications that no asbestos bearing materials be

incorporated into the work. In the event the contractor should determine unanticipated asbestos bearing materials to be present in the existing building components, Contractor is to stop all work in the affected area, notify the Engineer and Owner, and provide temporary protection as required. Costs incurred, if any, due to the presence of hidden and/or unanticipated asbestos bearing materials will be authorized by Change Order to this contract.

- G. The contractor is responsible for all electrical, plumbing, mechanical, and other related trade work necessary to facilitate project operations. Contractor is responsible for re-locating any and all conduit, HVAC equipment, curbs, and/or plumbing necessary to comply with the requirements of these documents. All work shall conform to the requirements of the current Building Code approved in the State of the project location.
- H. General requirements and specific recommendations of the material manufacturers are included as part of these specifications. The manufacturers' specifications are the minimum standards required for the completed systems. Specific items listed herein may improve the standards required by the manufacturers and will take precedence where their compliance will not affect the manufacturers' guarantee or warranty provisions.

1.02 CONTRACT

- A. Project will be constructed under a single prime general construction contract.

1.03 SITE INVESTIGATION

- A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the Work, the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, ground water table or similar physical conditions at the site, the conformation and condition of the ground, the character, quality and quantity of surface and subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with all the available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the Work. Field measurements shall be taken at the site by the Contractor to verify all data and conditions affected by the Work.

1.04 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Section Identification: The Specifications use section numbers and titles to cross-reference Contract Documents. Sections in the Project Manual are in numeric sequence.; however, the sequence is incomplete. Consult the Table of Contents at the beginning of the Project Manual.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as

appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

- a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 11 00

SECTION 01 14 00

WORK RESTRICTIONS

GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for work sequence, work restrictions, occupancy requirements and use of premises.

1.02 WORK SEQUENCE

- A. The Work shall be conducted in the following sequences unless construction phases are otherwise specified.
 1. Construct Work in phases to accommodate the Owner's use; if applicable, of the premises during the construction period; coordinate the construction schedule and operations with the Owner and Engineer.
 2. Construct the Work in phases to provide for public convenience. Do not close off public use of facility until completion of one phase of construction will provide alternative usage.
 3. Construction shall be scheduled in such a manner that once work has commenced on one facility, the Contractor's work force shall remain at that facility continuously each work day through final completion at that facility.

1.03 OCCUPANCY REQUIREMENTS

- A. Owner Occupancy
 1. Owner will occupy the premises during the entire period of construction to conduct normal operations. Cooperate with Owner in all construction operations to minimize conflict, and to facilitate Owner usage.
 2. Contractor shall at all times conduct his operations as to ensure the least inconvenience and the greatest amount of safety and security for the Owner, his staff, and the general public.
 3. Control noise from operations so that building occupants are not affected.
 4. Control odors from air intakes so that building occupants are not affected.

1.04 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 1. Limits: Confine constructions operations to areas of work being renovated as approved by Engineer and Owner.
 2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 3. Move any stored materials and equipment that interfere with operations of the Owner.

B. Use of Existing Building

1. Maintain existing building in a weathertight condition throughout construction period.
2. Take every precaution against injuries to persons or damage to property.
3. Protect building, its contents, and its occupants during construction period.
4. The Contractor shall not overload or permit any part of the structure to be loaded with such weights as will endanger its safety or to cause excessive deflection. Materials placed on the roof prior to installation shall be equally distributed over the roof area.
5. Protect any existing surface improvements, such as pavements, curbs, sidewalks, lawn and landscaped areas, utilities, etc.
6. Repair to the Owner and Engineer's satisfaction, or to restore to a condition equal to that existing at the time of award of Contract, or to make restitution acceptable to the Owner, any and all damages to the building, its contents, or surface improvements resulting from, or attributable to, the work operation.

C. Transportation Facilities

1. Truck and equipment access:
 - a. Avoid traffic conflict with vehicles of the Owner's employees and customers, and avoid over-loading of street and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the designated areas.
 - b. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site.
2. Contractor's vehicles:
 - a. Require contractor's vehicles, vehicles belonging to employees of the contractor, and all other vehicles entering the Owner's property in performance of the work the contract, to use only the designated access route.
 - b. Do not permit such vehicles to park on any street or other area of the Owner's property except in the designated area.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 14 00

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Coordination.
3. Administrative and supervisory personnel.
4. Project meetings.
5. Weekly Reports

1.02 COORDINATION

A. Coordinate construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. The Contractor shall coordinate its operations with those included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Progress Reporting: The scheduling and sequence of all operations shall be carefully coordinated with the Owner and Engineer.

C. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-Construction conference.
7. Pre-installation conferences.
8. Project closeout activities.

1.03 PROJECT MEETINGS

A. Substantial Completion Inspection Meeting

1. Scheduled by Owner and Engineer upon written notification of substantial completion of work from the Contractor.
2. Attendance: Owner, Engineer, Contractor, material manufacturer.
3. Minimum Agenda: Walkover inspection; verification of substantial completion; identification of punch list items; identification of problems, which may impede issuance of warranties.
4. Refer to Section 01 77 00 for other requirements.

B. Final Inspection Meeting

1. Scheduled by Owner and Engineer upon written notification of final completion of work from the Contractor.
2. Attendance: Owner, Engineer, Contractor.
3. Minimum Agenda: Verification of final completion including the completion of the punch list items.
4. Refer to Section 01 77 00 for other requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 31 00

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.02 SUBMITTAL PROCEDURE

- A. General: The Contractor is responsible for providing the submittals to the Owner. Each submittal must be accepted in writing prior to commencement of work.
- B. Submission Requirements: Submit all required submittals electronically in pdf format to the Owner for review. The submittals will then be returned electronically to the Contractor with comments. Final submittals will require written responses to all Construction Document submittal comments.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as specified below. Time for review shall commence on Owner's receipt of submittal.
 - 1. Initial Review: Allow 7 work days for initial review of submittals.
 - 2. Allow 7 work days for processing each resubmittal.
 - 3. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- D. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals and provide letter describing in detail any proposed changes, substitutions, or deviations from the project or manufacturer's specifications. A written explanation of why substitutions should be considered is required and shall be included under the appropriate tab.
- E. Transmittal and Identification: Package submittals appropriately and include a title page and/or pdf bookmark for each numbered schedule of submittal item identified below. Owner will discard submittals received from sources other than Contractor. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
- F. Use for Construction: Use only final submittals with mark indicating action taken by Owner in connection with construction.

PART 2 PRODUCTS

2.01 SUBMITTALS

- A. General: Prepare and submit Submittals required herein and by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed

- data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Printed performance curves.
 - f. Operational range diagrams.
 - g. Compliance with recognized trade association standards.
 - h. Compliance with recognized testing agency standards.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Shopwork manufacturing instructions.
 - f. Templates and patterns.
 - g. Schedules.
 - h. Notation of coordination requirements.
 - i. Notation of dimensions established by field measurement.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
- D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed

by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- J. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- K. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal, check for compliance with the Contract Documents and note corrections and field dimensions prior to submitting to Engineer/Owner.

3.02 ENGINEER'S ACTION

- A. Submittals: Engineer/Owner will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal item with an action stamp and will mark stamp appropriately to indicate action taken.
- B. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.

1.02 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.
- C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.03 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer/Owner.

1.04 SUBMITTALS

- A. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.05 QUALITY ASSURANCE

- A. It is the intent under this contract that workmanship shall be of the best quality consistent with the materials and construction methods specified. The presence or absence of the Owner's or Engineer's representative shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the drawings and specifications. The Owner and Engineer shall have the authority to judge the quality and require replacement of unacceptable work or personnel at any time.
- B. All contractors shall cooperate in the execution of their work and shall plan their work in such manners as to avoid conflicting schedules or delay of work. If any part of a Contractor's work depends upon the work of another Contractor, defects, which may affect that

work, shall be reported to the Engineer/Owner in order that prompt inspection may be made and defects corrected. Commencement of work by a Contractor where such condition exists will constitute acceptance of the other Contractor's work as being satisfactory in all respects to receive the work commenced, except defects, which may later develop. Work of all trades under this contract shall be closely coordinated in such a manner as to obtain the best possible workmanship for the entire project. All components of the work shall be installed in accordance with the best practices of the particular trade. The General Contractor is responsible to advise the Owner sufficiently in advance of operations to allow for assignment of personnel.

- C. Materials or methods described by words which, when applied, have a well known technical or trade meaning will be held to refer to such recognized standard. Standard specifications or manufacturer's literature, when referenced, shall be of the latest revision or printing unless otherwise stated, and are intended to establish the minimum requirements acceptable.
- D. All materials shall be new, all materials and workmanship shall be in every respect in accordance with the best modern practice.
- E. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or accepted, such materials shall be delivered to the site in original packages or containers with seals unbroken and labels intact and shall not be opened until inspected and approved by the Engineer/Owner.
- F. The Contractor's Foreman or Superintendent to maintain one complete set of the contract documents and approved submittals on the job site.
- G. Contractor shall be responsible to correct deficiencies identified by Engineer/Owner and non-conforming work within 24 hours of receipt of notification, either verbally or written, and submit a plan of action for addressing the deficiencies and non-conforming work. Further tear-off or commencement of other work shall not occur until all deficiencies and non-conforming work are properly addressed.
- H. At any time during the construction and completion of work covered by these Specifications, if the conduct of any workman of the various crafts be determined unsuitable or a nuisance to the Owner or Engineer, or if the workman be considered incompetent or detrimental to the work, the Contractor shall order such party removed immediately from the grounds with the person not returning at any time during the course of work on the project.
- I. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
- J. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
- K. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- L. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of

manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.06 QUALITY CONTROL

- A. The authorized representatives and agents of Owner shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.
- B. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- C. Contractor's Responsibilities:
 - 1. Repair and protection of work and materials are Contractor's responsibility.
 - 2. Should any work or materials not conform with requirements of the Specifications or become damaged during the progress of the work, such work or materials shall be removed and replaced, together with any work disarranged by such alterations, at any time before completion and acceptance of the project. All such work shall be done at the expense of the Contractor.
 - 3. Contractor will coordinate documents with manufacturer and perform such testing, reporting, and communication incidental to provisions of the warranty procedures.
- D. Manufacturer's Field Services: During construction and until substantial completion, manufacturer's representative shall perform quality assurance site visits every ten working days to ensure materials are being properly installed and as required to obtain the specified warranty.
 - 1. The first site visit shall be performed within the first three (3) days of operations.
 - 2. Coordinate all site visits with Engineer. Submit reports of findings within one week of inspection. Payment applications will be rejected until applicable reports are received.
 - 3. Inspections to be performed by an employee of the selected manufacturer that is assigned full time to their technical services department. Sales personnel will not be acceptable for this function and may result in rejection of the work installed that does not fulfill this requirement.
 - 4. Manufacturer's final inspections shall be performed only with REI personnel in attendance. A minimum of seven days' written notice is required. Any manufacturer's final inspection conducted without REI personnel in attendance will be repeated at no additional cost to the Owner.
 - 5. Any violation of this requirement will result in the removal of that manufacturer for a period of not less than one year from the Engineer's accepted materials list.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 6. Security and protection for samples and for testing and inspecting equipment at Project site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Comply with the Contract Document requirements for Section 01 73 29-Cutting and Patching.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00

REFERENCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements relating to Referenced Standards.

1.02 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- J. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- K. "Project Site": Space available for performing construction activities. The extent of Pro-

ject site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.03 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

	Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr
FED-STD	Federal Standard (See FS)
FS	Federal Specification Available from National Institute of Building Sciences www.nibs.org

1.04 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org
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ACI	American Concrete Institute/ACI International www.aci-int.org
ACPA	American Concrete Pipe Association www.concrete-pipe.org
AGC	Associated General Contractors of America (The) www.agc.org
AHA	American Hardboard Association www.ahardbd.org
AI	Asphalt Institute www.asphaltinstitute.org
AIE	American Institute of Engineers www.aieonline.org
AISC	American Institute of Steel Construction www.aisc.org
AISI	American Iron and Steel Institute www.steel.org
AITC	American Institute of Timber Construction www.aitc-glulam.org
ALCA	Associated Landscape Contractors of America www.alca.org
ALSC	American Lumber Standard Committee www.alsc.org
ANLA	American Nursery & Landscape Association www.anla.org
ANSI	American National Standards Institute www.ansi.org
APA	APA - The Engineered Wood Association www.apawood.org
APA	Architectural Precast Association www.archprecast.org
ASCE	American Society of Civil Engineers www.asce.org
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org
ASTM International	ASTM International www.astm.org
AWI	Architectural Woodwork Institute www.awinet.org
AWPA	American Wood-Preservers' Association www.awpa.com
AWS	American Welding Society www.aws.org
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com
BIA	Brick Industry Association (The) www.bia.org
CCFSS	Center for Cold-Formed Steel Structures www.umn.edu/~ccfss

CDA	Copper Development Association Inc. www.copper.org
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org
CISPI	Cast Iron Soil Pipe Institute www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org
CPA	Composite Panel Association (Formerly: National Particleboard Association) www.pbmdf.com
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org
CRSI	Concrete Reinforcing Steel Institute www.crsi.org
CSI	Construction Specifications Institute (The) www.csinet.org
DHI	Door and Hardware Institute www.dhi.org
EIMA	EIFS Industry Members Association www.eifsfacts.com
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org
FMG (FM)	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com
GA	Gypsum Association www.gypsum.org
GANA	Glass Association of North America (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com/gana
HPVA	Hardwood Plywood & Veneer Association www.hpva.org
IGCC	Insulating Glass Certification Council www.igcc.org
IRC	Indian River County
LGSI	Light Gage Structural Institute www.loseke.com
MBMA	Metal Building Manufacturers Association www.mbma.com
MCA	Metal Construction Association www.metalconstruction.org
MFMA	Metal Framing Manufacturers Association
MIA	Marble Institute of America www.marble-institute.com
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org
NCMA	National Concrete Masonry Association www.ncma.org

NCPI	National Clay Pipe Institute www.ncpi.org
NECA	National Electrical Contractors Association www.necanet.org
NEMA	National Electrical Manufacturers Association www.nema.org
NETA	InterNational Electrical Testing Association www.netaworld.org
NFPA	National Fire Protection Association www.nfpa.org
NFRC	National Fenestration Rating Council www.nfrc.org
NGA	National Glass Association www.glass.org
NHLA	National Hardwood Lumber Association www.natlhardwood.org
NLGA	National Lumber Grades Authority www.nlga.org
NPA	National Particleboard Association (See CPA)
NRCA	National Roofing Contractors Association www.nrca.net
NRMCA	National Ready Mixed Concrete Association www.nrmca.org
NSA	National Stone Association www.aggregates.org
NTMA	National Terrazzo and Mosaic Association, Inc. www.ntma.com
NWWDA	National Wood Window and Door Association (See WDMA)
PCI	Precast/Prestressed Concrete Institute www.pci.org
PDCA	Painting and Decorating Contractors of America www.pdca.com
PDI	Plumbing & Drainage Institute www.pdionline.org
RCSC	Research Council on Structural Connections www.boltcouncil.org
RMA	Rubber Manufacturers Association www.rma.org
SDI	Steel Deck Institute www.sdi.org
SDI	Steel Door Institute www.steeldoor.org
SGCC	Safety Glazing Certification Council www.sgcc.org
SIGMA	Sealed Insulating Glass Manufacturers Association www.sigmaonline.org/sigma
SJI	Steel Joist Institute www.steeljoist.org

SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org
SPI	The Society of the Plastics Industry www.plasticsindustry.org
SPIB	Southern Pine Inspection Bureau (The) www.spib.org
SPRI	SPRI (Single Ply Roofing Institute) www.spri.org
SSINA	Specialty Steel Industry of North America www.ssina.com
SSMA	Steel Stud Manufacturers Association (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com
SSPC	SSPC: The Society for Protective Coatings www.sspc.org
SWI	Steel Window Institute www.steelwindows.com
TCA	Tile Council of America, Inc. www.tileusa.com
TPI	Truss Plate Institute
UL	Underwriters Laboratories Inc. www.ul.com
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com
WWPA	Western Wood Products Association www.wwpa.org

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. www.bocai.org
IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org
ICBO	International Conference of Building Officials www.icbo.org
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.intlcode.org
SBCCI	Southern Building Code Congress International, Inc. www.sbcci.org

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CPSC	Consumer Product Safety Commission www.cpsc.gov
EPA	Environmental Protection Agency www.epa.gov
OSHA	Occupational Safety & Health Administration www.osha.gov

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 42 00

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Engineer/Owner. Provide materials suitable for use intended.
- B. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide non-permanent bases for support.
- C. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- D. Water: Potable.
- E. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- F. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure and the requirements of the local Governing agency.
- G. Lamps and Light Fixtures: Provide GFCI protected general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- H. Scaffolds: Scaffolds should be built in their entirety and not left unfinished or in an unsafe condition. All scaffolds must be tagged to indicate the latest inspection. Scaffolds should be tied into the structure as close to a 3:1 ratio as possible and repeated tie-ins shall follow OSHA guidelines. All scaffolds shall have safe access with stairs being the first choice over a ladder. Scaffolds should include netting on upper levels if there is any possibility for materials to fall over the toe boards, per OSHA guidelines.

PART 3 EXECUTION

3.01 TEMPORARY UTILITIES

- A. Water Service: Water for construction purposes will be available from the Owner at no charge. Contractor shall operate exterior hose bids only with properly fitted handles which shall be removed at the end of each work day. Any damage to hose bids or hose bib stems shall be repaired by Contractor. Hose bibs shall not be operated with pliers.
- B. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
 - 1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

3.02 CONSTRUCTION FACILITIES

- A. Temporary construction facilities shall include the following:
 - 1. Field Office (if appropriate): prefabricated, mobile units or job-built construction with lockable entrances and serviceable finishes including lights and utilities.
 - 2. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities. Facilities will be located at sites approved by Owner.
 - a. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 - b. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
 - c. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
 - 3. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations at a location approved by the Owner. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements. Use of Owner's waste disposal facilities is not acceptable.
 - a. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

3.03 VEHICULAR ACCESS AND PARKING

- A. Parking for Contractor vehicles may be available only in the approved Set-up and Staging area. No other vehicle parking on site will be allowed.

3.04 TEMPORARY BARRIERS AND ENCLOSURES

- A. Contractor shall provide temporary barriers and enclosures for protection from exposure, foul weather, construction operations and other activities. Contractor is responsible for protecting buildings and grounds from damages during construction.
- B. Contractor shall provide environmental protection by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Contractor shall provide storm water controls sufficient to prevent flooding from heavy rain.

- D. Contractor shall provide 6' chain link fencing with lockable gates and mesh to completely enclose the materials storage and staging area.

3.05 TEMPORARY CONTROLS

- A. Contractor shall provide security controls to protect work and materials at the project site.

3.06 PROJECT SIGNS

- A. Contractor shall provide temporary signs to provide information to building occupants directing them away from construction operations.

END OF SECTION 01 50 00

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes procedural requirements for cutting and patching.

1.02 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.03 QUALITY ASSURANCE

- A. Engineer's Approval: Obtain approval of cutting and patching before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.
- B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio. Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations sealed by a licensed Engineer in the state of the project showing integration of reinforcement with original structure.
- C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
- D. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- F. Cutting and Patching Conference: If extensive cutting and patching is required, before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.04 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to

void existing warranties.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not

- hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend from one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
 5. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty and similar materials.

END OF SECTION 01 73 29

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The Owner has established that this Project shall include proactive measures for waste management participation by all parties to the contract.
 - 1. The purpose of this program is to ensure that during the course of the Project all diligent means are employed to pursue practical and economically feasible waste management and recycling options.
 - 2. Waste disposal to landfills shall be minimized.

1.02 DEFINITIONS

- A. Waste: Any material that has reached the end of its intended use. Waste includes salvageable, returnable, recyclable and reusable material.
- B. Construction waste: Solid wastes including, but not limited to, building materials, packaging materials, debris and trash resulting from construction operations.
- C. Salvage: To remove a waste material from the Project site to another site for resale or reuse by others.
- D. Hazardous waste: Any material or byproduct of construction that is regulated by the Environmental Protection Agency and that may not be disposed in any landfill or other waste end-source without adherence to applicable laws.
- E. Trash: Any product or material unable to be returned, reused, recycled or salvaged.
- F. Landfill: Any public or private business involved in the practice of trash disposal.
- G. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials in a legal manner.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Final Acceptance.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Final Acceptance.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.02 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Final Acceptance.
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - e. Remove debris and surface dust from roofs and walls.
 - f. Clean transparent materials and glass in windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - g. Remove labels that are not permanent.
 - h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess foreign substances.
 - j. Replace parts subject to unusual operating conditions.
 - k. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 74 00

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Warranties.

1.02 WARRANTIES

A. Thermoplastic Single Ply Roofing System warranty as outlined in Section 07 54 00.

B. Pre-finished Sheet Metal finish warranty as outlined in Section 07 62 00.

C. Contractor's five (5) year warranty on their company letterhead using sample contained in the Project Manual.

1. Contractor will be required to attend two post construction field inspections: the first no earlier than twenty-three (23) months and no later than twenty-four (24) months after the date of Final Completion and the second no earlier than fifty-nine (59) months and no later than sixty (60) months. Contractor shall complete any corrective action requested by Owner, Engineer, or Manufacturer at no additional cost to the Owner.

D. Contractor's Asbestos-Free Warranty on their company letterhead using sample contained in the Project Manual.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 77 00

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rough Carpentry work required to facilitate installation of new roof assembly including:
1. Provide pressure treated wood blocking and plywood sheathing.
 2. Re-securement of existing rough carpentry to remain in place.
 3. Removal and replacement of damaged, rotted or deteriorated rough carpentry with pressure treated rough carpentry to match existing.
 4. Removal and replacement of damaged, rotted or deteriorated wood plank/plywood deck with untreated wood plank/plywood deck to match existing.

1.02 RELATED DOCUMENTS

- | | | |
|----|----------------------------------|------------------|
| 1. | Preparation for Reroofing | Section 07 01 50 |
| 2. | Roof Insulation | Section 07 22 16 |
| 3. | Thermoplastic Single Ply Roofing | Section 07 54 00 |
| 4. | Sheet Metal Flashing and Trim | Section 07 62 00 |

1.03 REFERENCES

- A. Refer to the following references, current edition for specification compliance:
1. Florida Building Code (FBC)
 2. ASTM International
 3. American Wood-Preserver's Association (AWPA)
 - a. AWPA E12 - Standard Method of Determining the Corrosion of Metal in Contact with Wood.
 - b. AWPA M4 - Standard for the Care of Preservative Treated Wood Products.
 - c. AWPA P5 - Standard for Waterborne Preservatives.
 - d. AWPA P23 - Standard for Chromated Copper Arsenate Type C (CCA-C).
 - e. AWPA P25 - Standard for Inorganic Boron (SBX).
 - f. AWPA P26 - Standard for Alkaline Copper Quat Type A (ACQ-A).
 - g. AWPA P27 - Standard for Alkaline Copper Quat Type B (ACQ-B).
 - h. AWPA P28 - Standard for Alkaline Copper Quat Type C (ACQ-C).
 - i. AWPA P29 - Standard for Alkaline Copper Quat Type D (ACQ-D).
 - j. AWPA P47 - Standard for DCOI/Imidacloprid/Stabilizer, Waterborne (EL2).
 - k. AWPA P48 - Standard for Copper Azole Type C (CA-C).
 - l. AWPA T1 - Use Category System: Processing and Treatment Standard.
 - m. AWPA U1 - Use Category System: User Specification for Treated Wood.
 4. American Plywood Association (APA)
 5. American National Standard
 - a. ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
 6. Underwriters Laboratories, Inc. (UL)
 7. FM Global/Factory Mutual Research (FM)

1.04 DEFINITIONS

- A. Rough Carpentry includes carpentry work not specified as part of other Sections and

generally not exposed.

- B. KDAT: Kiln Dried After Treatment.

1.05

SUBMITTALS

- A. Refer to Section 01 33 00-Submittal Procedures for Submittals.
- B. Manufacturer's Product Data Sheets for all materials specified certifying material complies with this specification.

1.06

QUALITY ASSURANCE

- A. Contractor shall inspect wood to be installed for damage, warping, splits, and moisture content as defined by the applicable wood products industry standards. Materials that do not comply shall be rejected.
- B. Rough carpentry installation shall present a smooth, consistent substrate for roof system and flashing installation.
- C. Qualifications of workers: Provide sufficient, competent and skilled carpenters in accordance with accepted practices and supervisors who shall be present at all times during execution of this portion of the work, and who shall be thoroughly familiar with type of construction involved in this section and related work and techniques specified.
- D. Moisture Content:
 - 1. Treated wood products shall be KDAT.
 - 2. Treated lumber used in the roofing assembly shall not be stored or installed in a manner exposing it to rain.
 - 3. Moisture content of treated lumber shall be 19 percent or less before being covered/enclosed into roofing assembly.
 - 4. Contractor shall be responsible for ensuring lumber is delivered, stored and installed at 19% or less moisture content.
 - 5. Plywood shall be 18% or less before being covered/enclosed into roofing assembly.
- E. Each piece of treated lumber and plywood shall bear the stamp of the AWWPA Quality Mark, indicating compliance with the requirements of the AWWPA Quality Control Program.
- F. Lumber Standards: Comply with PS 20 and applicable rules of respective grading and inspecting agencies for species and products indicated.
- G. Plywood Product Standards: Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.
- H. Installation of all required new rough carpentry for roofing and flashing terminations to ensure plumb, uniform and level metal flashings.
- I. Rough carpentry installation shall ensure roof membrane flashing transitions are smooth for complete roof drainage and appearance.
- J. Installation of all fasteners and associated materials to secure rough carpentry as detailed and specified.

1.07

DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Store a minimum of four inches above ground on framework or blocking. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks. Cover with protective waterproof covering providing for adequate air circulation and ventilation
- B. Exposure to precipitation during shipping, storage or installation shall be avoided. If material does become wet, it shall be replaced or permitted to dry prior to covering or enclosure by other roofing, sheet metal or other construction materials (except for protection during construction).
- C. Immediately upon delivery to job site, place materials in area protected from weather.
- D. Do not store seasoned materials in wet or damp portions of building.
- E. Protect sheet materials from corners breaking and damaging surfaces, while unloading.

PART 2

PRODUCTS

2.01

MATERIALS

- A. Lumber: Shall Be No. 2 or better spruce or southern yellow pine. Shall be sound, thoroughly seasoned, dressed to nominal finish dimension, and free of warpage, cupping, and bowing. Dimensions shall be determined by job conditions or as indicated in detail drawings.
- B. Plywood Sheathing: Shall be structural 1 rated. Plywood shall be stamped APA RATED SHEATHING grade-C or better, and shall be manufactured with exterior glue (exposure 1). Plywood shall have a minimum thickness of 3/4 inch or as required to match existing.
- C. Preservative Treatment for Above Ground Use:
 - 1. Treatment: ACQ as manufactured for Viance in accordance with AWPA U1 and P5, P26, P27, P28, P29 as appropriate.
 - a. Use 0.15 lb/cu ft (2.4 kg/m³) of ACQ in accordance with AWPA U1: (UC3B) as appropriate.
 - 2. Treatment: Ecolife or EL2 as manufactured by Viance.
 - a. Use 0.019 lb/cu ft (0.3 kg/m³) of Ecolife or EL2 (+ 0.2 lb/cu ft MCS) in accordance with AWPA U1 (UC3B) as appropriate.
 - 3. Treat wood in the following locations:
 - a. In contact with roofing, flashing, or waterproofing.
 - b. In contact with masonry or concrete.
 - c. Within 18 inches (450 mm) of grade.
 - d. Exposed to weather.
 - e. Other locations indicated.

2.02 FASTENERS

- A. General:
 - 1. All fasteners shall be stainless steel or as approved by Engineer.
 - 2. Fasteners securing pressure treated lumber shall be manufactured for corrosion resistance and exposures associated with pressure treated wood applications.
 - 3. Nails shall not be used at roof edges to fasten rough carpentry, lumber, plywood, etc. Screws, anchors, and/or machine bolts shall be used to secure rough carpentry at roof perimeter edges.
 - 4. Masonry screws, spikes, and drive-pins shall not be used to fasten edge/perimeter nailers to concrete decks. Minimum 1/2" diameter anchors or bolts shall be used to secure roof edge nailers to concrete substrates.
- B. Wood to steel deck and light gage steel framing (16-ga. or less):
 - 1. Shall be #14-13 DP1, pancake or panhead, corrosion resistant, ASTM A153, FM Approved, self-drilling and self-tapping screw, length to provide minimum 3 pitches of thread through metal thicknesses. Acceptable manufacturers include:
 - a. ITW Buildex Teks
 - b. Concealor®
 - c. Blazer
 - d. SFS Intec
 - e. Engineers accepted equivalent.
- C. Wood to wood:
 - 1. Screws: No. 10 or greater, stainless steel wood screws with flat head, or insulation screws. Length to embed into base substrate a minimum of 1-1/2".
 - 2. Nails: 8, 10 or 16 penny, stainless steel, ring shank nails. Length to embed into base substrate a minimum 1-1/2". Acceptable manufacturers include:

- a. Maze Nails
 - b. Anchor Staple and Nail
 - c. Swan Secure Products
 - d. Manasquan Premium Fasteners
 - e. Engineers accepted equivalent.
- D. Wood to brick, concrete block, other masonry units, and solid concrete substrates:
- 1. Epoxy adhesive anchoring system: Minimum 1/2 inch diameter, corrosion resistant threaded rods supplied by the anchoring system manufacturer, length as required to provide minimum embedment as required by fastener manufacturer based upon substrate being secured. Screen for substrate provided by fastener manufacturer. Corrosion resistant nut and 1-1/2" diameter flat washer. Acceptable manufacturers include:
 - a. Hilti Hit Hy-10 Plus
 - b. Powers Fasteners, Inc. AC100 Anchoring System
 - c. ITW Ramset Epcon C6 Fast Curing Epoxy
 - d. Engineers accepted equivalent
- E. Wood to solid concrete substrates:
- 1. Masonry screws, 1/4 inch minimum diameter, Type 410 stainless steel with flat head. Length to provide minimum 1" embedment into substrate. Acceptable manufacturers include:
 - a. Tapcon by ITW Buildex,
 - b. KWIK-CON II by Hilti
 - c. Powers Fasteners Tapper +
 - d. Engineers accepted equivalent.
 - 2. Sleeve-Type, or Wedge-Type, Expansion Anchor: Minimum 1/2 inch diameter, Type 304 or 316 Stainless Steel, Expansion Anchor Bolt Assembly of length as required to provide minimum embedment as required by fastener manufacturer based upon substrate being secured. Acceptable manufacturers include:
 - a. Lok/Bolt, Power Bolt or Power-Stud by Powers Fasteners
 - b. Redi-Bolt, Dynabolt or Trubolt by Red Head Anchoring Systems
 - c. Kwik Bolt by Hilti
 - d. Engineers accepted equivalent.
- F. Wood to structural steel (greater than 12-GA.):
- 1. #12-24 DP5 (for steel thickness up to 1/2") or DP4 (for steel thickness from 1/8" to 3/8"), flat or hex head, corrosion resistant, self-drilling/self-tapping fastener of length to provide minimum 3 pitches of thread through metal thicknesses. Acceptable manufacturers include:
 - a. ITW Buildex Tekes
 - b. SFS Intec
 - c. Blazer
 - d. Engineers accepted equivalent
- G. Toggle Bolt: Shall be 1/4" diameter toggle bolt consisting of machine screw and spring wing

toggle with flat mushroom head, length as required by conditions.

- H. Washers: Fasteners heads for screws, anchors and bolts terminating at the surface of nailers shall be provided with a minimum 5/8 inch diameter, stainless steel or similar corrosion resistance flat washer provided by fastener manufacturer, unless washer is provided from factory as part of the fastener assembly.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor shall inspect substrates to receive rough carpentry, and ensure substrates are in satisfactory condition prior to installation of rough carpentry.
- B. Contractor shall inspect all new and existing rough carpentry including fasteners for material condition before proceeding with installation. Deteriorated, rotted, damaged, split, warped, twisted or wet materials shall be removed and replaced with specified materials. Refer to Section 01 22 00-Unit Prices.
- C. Contractor shall remove old cants, tapered edge strips, debris, old fasteners, etc. that interfere with the installation of new rough carpentry.
- D. Contractor shall notify Engineer in writing of unsatisfactory conditions.
- E. Commencement of work signifies Contractor's acceptance of substrates. Any defects in roofing work resulting from such accepted substrates shall be corrected at no additional expense to the Owner.

3.02 PREPARATION

- A. Steel/Metal Substrates:
 - 1. Any pressure treated wood to contact steel or metal shall have the steel/metal coated with a heavy coating of asphalt primer.
- B. Roof Deck and Structure:
 - 1. Roof deck and structure shall be dried and broomed and/or vacuumed clean of debris and foreign matter prior to installation of the new rough carpentry.
 - 2. Contractor shall adjust substrates to receive rough carpentry to ensure completed rough carpentry installation is acceptable for roofing and sheet metal flashings.
 - 3. Steel decking shall be coated with a uniform, heavy application of asphalt primer, or separated by membrane or other acceptable means to prevent contact between steel and treated wood products.
 - 4. Treated lumber shall not make direct contact with light gage steel decking.
- C. Masonry Walls:
 - 1. Adhesive anchors:
 - a. Contractor shall follow adhesive anchor manufacturer's published instructions for preparation and installation.
 - b. Pre-drill hole or clean-out existing gap/hole for adhesive anchors.
 - c. Use compressed air to blow-out all dust and moisture. Dust and moisture

will result in failure of anchors and shall be removed before installing adhesive anchors.

2. Grouted anchors:
 - a. Contractor shall follow grout manufacturers published instructions for preparation and installation.
 - b. Clean masonry cavity and install grout stop to prevent grout from entering below the desired cavity area.

3.03 INSTALLATION

- A. Remove existing damaged or deteriorated wood blocking, nailers, and curbs and replace with new material of same dimensions.
- B. Re-secure all existing wood nailers at roof edges that are to remain. Fastener type and spacing shall comply with this specification.
- C. Install new wood blocking, nailers, and curbs to achieve a minimum eight inch flashing height above the roof membrane. Wood nailers at perimeter roof edges and expansion joints shall be installed to match insulation height. Maintain constant nailer height at perimeter edges.
- D. Wood blocking and nailers shall be installed concurrently with roof system installation. Removal of insulation and/or folding back of roof membrane to install wood blocking and nailers at a later date is not acceptable.
- E. Set rough carpentry to required levels and lines, with members plumb, true to line, material cut to fit, and braced to hold work in proper position. Use a belt sander to remove any obtrusive surface irregularities. Drive nails and spikes home; and pull bolt nuts tight with heads and washers in close contact with the wood.
- F. Fit rough carpentry to other construction; scribe and cope for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction. All joints between wood shall be installed for a smooth transition.
- G. Attachment:
 1. The Contractor shall consult the fastener manufacturer's published literature and follow the recommended requirements for pre-drilling, cleaning, placement and compatibility of substrates. Follow manufacturer's requirements for fasteners spacing, substrate preparation and substrate embedment where not specified.
 2. Securely attach rough carpentry work to substrate with fasteners. Anchor to resist a minimum force of 300 lbs/lineal foot in any direction.
 3. Rough carpentry attachment shall meet the requirements herein and that of the current FM Loss Prevention Data Sheet 1-49, Perimeter Flashing.
 4. Install bolts flush with the top surface of nailers where possible to avoid countersinking. Bolt bottom nailers then fasten upper nailers where possible. Countersink bolts, nuts and screws flush with wood surfaces only as detailed.
 5. Install fasteners without splitting wood. Pre-drill where necessary. Split or damaged wood shall be removed, or repaired and/or re-secured to provide acceptable conditions.
 6. For anchors, pre-drill concrete and masonry units to prevent damage or cracking of the masonry. Consult fastener manufacturer's published guides. Damaged

masonry shall be repaired, and fasteners shall be removed and re-installed in an acceptable location.

7. Fastener spacing: Fasteners shall be staggered 1/3 the board width and installed within 6" of each end.

- a. Bolts, adhesive anchors, wedge and sleeve anchors, and machine bolts securing nailers shall be spaced 48 inches on center, staggered and an additional fastener within 6 inches of each end of nailer to prevent boards from twisting at board joints. Secure at 24" on center in corners (Zone 3) of the roof area.
- b. Screws and 1/4 inch diameter anchors securing wood to concrete or masonry units shall be spaced 12 inches on center maximum, staggered, with fasteners installed at each end of nailer lengths to prevent wood from twisting at board joints.
- c. Screws securing wood to wood shall be installed 12 inches apart, staggered, with two screws installed within 6 inches of each end of nailer lengths to prevent wood from twisting at board joints.
- d. Screws securing wood to steel decking shall be 12 inches apart.
- e. Self-drilling, and/or pre-drilled self-tapping screws securing wood to structural steel shall be spaced 12 inches apart, staggered, with one screw within 6 inches of each end of nailer lengths to prevent wood from twisting at board joints.
- f. Nails securing wood to wood shall be spaced 12 inches apart, staggered, with two nails installed within 6 inches of each end of nailer lengths to prevent wood from twisting at board joints.

8. Plywood Deck Securement:

- a. Nail plywood sheathing with 8d ring shank (0.131 inch X 2-1/2 inches) nails or screws at 4 inches on center along the edges of plywood and 6 inches on center along the intermediate roof framing.

H. Select fasteners of size and length that will not be exposed from the building interior and/or from the ground, or remove protruding fasteners, paint or finish to eliminate exposure.

I. Thickness of wood nailers shall be flush with adjacent insulation and other materials. Additional fasteners shall be installed to ensure nailers are flush.

J. Unless otherwise detailed, plywood used as blocking or shim shall be installed below dimensional lumber such that the fastener head terminates at the dimensional lumber surface.

K. Wood nailers at roof perimeters, expansion joints, roof area dividers, etc. shall not be less than 3 feet long.

L. When multiple nailers are installed stacked two high or more, offset nailers no less than 12" such that joints at nailer end do not line-up vertically.

M. Each end of nailers shall be fastened with additional fasteners to ensure a smooth transition at butted joints, and to prevent warping and/or twisting.

N. Shims:

1. The Contractor shall add plywood and lumber shims as required for the specified

height and thickness.

2. Shims shall make full contact with stacked rough carpentry. Partial shim contact, and small shim pieces spaced apart are not acceptable.
3. Plywood used as blocking or shim shall be installed below dimensional lumber such that the fastener head terminates at the dimensional lumber surface.

O. Curbs:

1. Adjust wood curbs to support rooftop piping, ducts, equipment, etc.
2. Raise equipment to provide required flashing height for roofing.

3.04 CLEAN-UP

- A. The Contractor shall ensure the site and building are cleaned to meet pre-construction conditions, as accepted by the Owner.
- B. The site and building shall be free of saw dust from pressure treated lumber, fasteners and other debris.
- C. Damages to the building, grounds, equipment and site shall be repaired or replaced by the Contractor to meet pre-construction conditions, as accepted by the Owner.

END OF SECTION 06 10 00

SECTION 07 01 50

PREPARATION FOR REROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparatory work to be completed prior to roof installation including but not limited to:
1. Removal of existing roof assemblies down to the structural deck.
 2. Soil pipe extensions.
 3. Raising of mechanical units/HVAC units to meet the required minimum flashing height.
 4. Installation and/or modification of through wall scupper drains.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section, including but not limited to:
- | | |
|-------------------------------------|------------------|
| 1. Rough Carpentry | Section 06 10 00 |
| 2. Roof Insulation | Section 07 22 16 |
| 3. Thermoplastic Single Ply Roofing | Section 07 54 00 |

1.03 DEFINITIONS

- A. Removal: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain property of the Owner.
- B. Existing to remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.
- C. Material ownership: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site.

1.04 EXISTING ROOF ASSEMBLIES*

- A. Roof Sections A & C
1. Multi-ply built-up roofing membrane with a granule surfaced membrane cap sheet installed in hot asphalt
 2. 1/2" perlite insulation
 3. 1-1/2" adhered polyisocyanurate insulation
 4. Hollow core concrete deck
- B. Roof Section B
1. Multi-ply built-up roofing membrane with a granule surfaced membrane cap sheet installed in hot asphalt
 2. 1/2" wood fiber insulation

3. 1-1/2" adhered polyisocyanurate insulation
4. Hollow core concrete deck

C. Roof Section D

1. Multi-ply built-up roofing membrane with a granule surfaced membrane cap sheet installed in hot asphalt
2. 1/2" perlite insulation
3. 1-1/2" adhered polyisocyanurate insulation
4. Hollow core concrete deck

D. Roof Sections E & F

1. Multi-ply built-up roofing membrane with a granule surfaced membrane cap sheet installed in hot asphalt
2. 1/2" wood fiber insulation
3. 3" adhered polyisocyanurate insulation
4. Hollow core concrete deck

*Roof system composition is based on random sampling. Contractor is responsible for verification of roof system composition.

1.05 SUBMITTALS

- A. Refer to Section 01 33 00-Submittal Procedures for Submittals.
- B. Manufacturer's Product Data Sheets for all materials specified certifying material complies with this specification.

1.06 QUALITY ASSURANCE

- A. Qualifications: Previous experience removing existing roof systems.
- B. Requirements: Contractor to comply with governing EPA regulations and hauling/disposal regulations of authorities having jurisdiction.

1.07 SCHEDULING

- A. Conduct demolition so that Owner's operations will not be disrupted. Provide 72 hours notification to Owner of activities that will affect Owner's operations.

1.08 WARRANTIES

- A. Any damage to existing items under warranty shall be repaired/replaced with materials acceptable to the Warrantor.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel Plates for Concrete Deck Openings of size to extend a minimum of 6" beyond opening on each side of thickness as indicated in Contract Drawings.
 1. Deck opening up to 8" in any one direction: 18 gauge

2. Deck opening from 8" to 13" in any one direction: 16 gauge
3. Deck opening from 13" to 24" in any one direction: 1/8" thick
4. Deck opening greater than 24" in any one direction: Steel deck or plate as determined by Engineer

B. Soil Pipe Extensions (OMG Tubos):

1. Acceptable Manufacturer:
 - a. OMG Tubos
 - b. Engineers accepted equivalent
2. Soil Pipe Extension: Solid-wall PVC fitting consisting of pipe and splice sleeve inserts, configured for insertion and sealing to existing plumbing vent piping, sized to fit inside diameter of plumbing vent piping, enabling extension of piping to field-determined height:
 - a. Material: Solid-wall PVC, white.
 - b. Splice Sleeve Insert:
 - i. 6 inches Length at both ends of precut extension.
 - ii. Outside Diameter to be 1/4" less than outside diameter of soil pipe.
 - c. Length:
 - i. Overall Length: 28 inches.
 - ii. Net Usable Length: 16 inches excluding Splice Sleeve Inserts.
 - d. Sealant: Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT, and acceptable to roofing membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Survey existing conditions to determine extent of demolition.
- B. Record the conditions of items to be removed/reinstalled and items to be removed/salvaged.
- C. Contractor shall not remove any element that may result in structural deficiency or collapse of any part of the structure or adjacent structures during demolition.
- D. Contractor to inspect substrate for soundness and notify Engineer in writing of any deficiencies. Commencement of work signifies Contractor's acceptance of site conditions.

3.02 UTILITIES/SERVICES

- A. Maintain existing utilities that are to remain in service and protect them against damage during selective site demolition unless authorized in writing by the Owner and authorities having jurisdiction.

1. Locate all conduits and equipment attached to the underside of the decking prior to reroofing. Insulation fastener locations are not to disturb existing conduits or interior components/equipment.
2. If utilities serving occupied portions of the site must be shut down, temporary services shall be provided.
3. Provide 72 hours notice to Owner if shut down is required.
4. Where services are to be removed, relocated or abandoned, provide necessary bypass connections to remaining occupied buildings and areas.

3.03 PREPARATION

- A. Do not begin demolition until utilities have been disconnected/sealed and have been verified as such in writing.
- B. Do not close off or obstruct streets, walks or other adjacent occupied facilities without permission from Owner and authorities having jurisdiction.
- C. Provide safe conditions for pedestrians. Erect temporary protection such as walkways, fences, railings and canopies as required by OSHA and other governing authorities.
- D. Provide protection for adjacent building, appurtenances and landscaping to remain. Erect temporary fencing around trees to remain.
- E. Provide temporary weather protection as required to prevent water leakage and damaged to exterior or interior of adjacent structures.

3.04 POLLUTION CONTROLS

- A. Use water, mist, temporary enclosures and other suitable methods to limit the spread of dust and dirt. Comply with local EPA regulations.
 1. Do not use water where damage may occur or where hazardous conditions would be created such as ice or flooding.

3.05 REMOVALS

- A. Demolish and remove existing construction only to the extent required by new construction.
- B. Remove all existing roofing, roof insulation, membrane and sheet metal and discard.
- C. Remove or correct any obstruction which might interfere with the proper application of new materials.
- D. Lift or remove all existing equipment so that existing flashings can be totally removed and new flashings installed.
- E. Lift existing sheet metal flashings to remain to remove all existing materials.
- F. Remove debris from existing materials to provide clean, dry substrate.
- G. Demolish asphalt, concrete and masonry in small sections. Cut concrete and masonry at juncture with construction to remain using powered masonry saw, core drill or hand tools. Do not use powered impact tools.

- H. Remove and transport debris in a manner that will prevent damage/spills to adjacent buildings and areas.
- I. Dispose of demolished items and materials on a daily basis. On-site storage of removed items is not permitted.
- J. Transport demolished materials off-site and dispose of materials in a legal manner.
- K. Perform progress inspections to detect hazards resulting from demolition activities.

3.06 FLASHING HEIGHTS

- A. Permanently raise roof top equipment as required to achieve 8” minimum flashing height.
- B. Provide additional wood blocking to top of parapet walls and expansion joints to achieve minimum 8” flashing height.
- C. Extend all existing sanitary vents to height required by the applicable Plumbing Code, but no less than 8 inches and no more than 12 inches above the finished roof system.
 - 1. Preparation (OMG Tubos)
 - a. Remove existing flashing from plumbing vent piping to extent required to enable installation of new plumbing vent pipe extensions and completion of flashings.
 - b. Clean plumbing vent piping to ensure that joint surfaces are clean, dry, and free from contamination including dirt, oils, grease, tar, wax, rust, and other substances that may inhibit adhesive or sealant performance.
 - 2. Installation
 - a. Insert end of plumbing vent pipe extension into existing plumbing vent piping.
 - i. Verify circumference of existing plumbing vent piping and plumbing vent pipe extension is appropriate to achieve secure, rigid installation.
 - ii. Mark plumbing vent pipe extension at required height above finished roof surface level, and cut to required length.
 - iii. Apply adhesive or sealant to plumbing vent piping as appropriate to existing pipe material and plumbing vent pipe extension, and mate plumbing vent pipe extension to existing piping. Apply ad

3.07 STEEL PLATE INSTALLATION

- A. Mechanically attach deck repair plates to concrete deck with approved fasteners 6” on center or a minimum of 2 fasteners per side.

3.08 COUNTERFLASHING PREPARATION

- A. Saw reglet to a maximum depth of 1-1/4 inches in a straight line to allow proper installation of new counterflashings. Utilize all procedures necessary including, but not limited to, saw guides to ensure straight, clean reglets.

3.09 SCUPPER DRAIN INSTALLATION

- A. Locate bottom of scupper drain at the surface of the roof system adjacent to the nearest roof drain (excluding sump).
- B. Locate bottom of overflow scupper drain 2 inches above surface of the roof system adjacent to the nearest roof drain (excluding sump).
- C. Remove existing masonry and store for reuse if in good condition. Reinstall masonry units to extent possible. Provide new brick or concrete masonry units to match existing.
- D. Extend opening through entire thickness of parapet. Take precautions to avoid damaging adjacent wall surfaces.
- E. Provide finished openings as indicated.
- F. Install veneer materials of same type, size and finish to match existing. Set units in full beds of mortar to match adjacent joints in thickness. Tool joints to match.
- G. Repair exterior finish to match adjacent surfaces.

3.10 CLEANING

- A. Inspect the site daily and clean up debris and hazards at the end of each day. Adjacent roads, drives and walkways shall remain in operation and free from construction materials debris.
- B. Clean adjacent structures of dust dirt and debris. Return adjacent areas to original conditions to the satisfaction of the Owner.

END OF SECTION 07 01 50

SECTION 07 22 16

ROOF INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof Sections A, B & C: Prepare existing concrete deck and adhere base layer insulation system. Then adhere attach gypsum overlayment.
- B. Roof Section D & E: Prepare existing concrete deck and adhere R-20 tapered insulation system. Then adhere attach gypsum overlayment.
- C. Roof Section F: Prepare existing concrete deck and adhere tapered insulation system. Then adhere attach gypsum overlayment.

1.02 RELATED DOCUMENTS

- | | | |
|----|----------------------------------|------------------|
| 1. | Rough Carpentry | Section 06 10 00 |
| 2. | Preparation for Reroofing | Section 07 01 50 |
| 3. | Thermoplastic Single Ply Roofing | Section 07 54 00 |

1.03 REFERENCES

- A. Refer to the following references for specification compliance:
 - 1. FBC Building Code
 - 2. National Roofing Contractors Association – NRCA
 - 3. FM Global
 - 4. Underwriters Laboratories, Inc. – UL
 - 5. ASHRAE Standard 90.1

1.04 DESCRIPTION

- A. R Value (Roof Section D Only)
 - 1. The minimum continuous “R-value” for the above deck insulation system shall be 20 and in accordance with the current Energy Conservation Code and ASHRAE 90.1.
 - 2. R value to be based on Long-Term Thermal Resistance (LTTR) for polyisocyanurate insulation and manufacturer’s published data for all other insulation components, as tested in accordance with ASTM C177, C236, C518 or C976.

1.05 SUBMITTALS

- A. Refer to Section 01 33 00-Submittal Procedures for requirements.
- B. Manufacturer’s Product Data Sheets for all materials specified certifying material complies with all specified requirements.
- C. Tapered insulation plan from material supplier with minimum R-value for each roof area.

- D. Latest edition of the Manufacturer's current material specifications and installation instructions.

1.06 QUALITY ASSURANCE

- A. Insulation to be installed in accordance with their respective manufacturer's requirements.
- B. Insulation(s) not bearing UL label at point of delivery shall be rejected.
- C. Insulation damaged or wetted before, during, or after installation shall be removed from the job site no later than the next working day from the day such damage or moisture contamination is noted.
- D. Wind Design: Install insulation system to meet the required wind uplift pressures as specified on contract drawings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Material shall be delivered in the manufacturer's original sealed and labeled shrouds and in quantities to allow continuity application.
- B. Storage: Materials shall be stored out of direct exposure to the elements on pallets or dunnage at least 4 inches above ground level at site location acceptable to Owner.
 - 1. Utilize tarps that will completely cover materials to prevent moisture contamination. Remove or slit factory shrouds and/or visqueen; do not use these materials as tarps.
 - 2. Install vapor retarders under material storage areas located on the ground.
 - 3. Remove damaged or deteriorated materials from the job site.
- C. Handling: Material shall be handled in such a manner to preclude damage and contamination with moisture or foreign matter.

1.08 PROJECT CONDITIONS

- A. Insulation shall not be applied during precipitation. Contractor assumes all responsibility for starting installation in the event there is a probability of precipitation occurring during application.
- B. Contractor will take necessary action to restrict dust, asphalt, and debris from entering the structure.
- C. No more roofing will be removed than can be replaced with insulation, membrane and base flashings in the same day to create a watertight installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Insulation Boards:
 - 1. Roof Insulation System (Roof Sections A, B & C):
 - a. Shall be rigid polyisocyanurate roof insulation board with factory applied

coated polymer bonded glass fiber mat facers on the top and bottom. Boards to comply with ASTM C1289 Type II, Class 2, Grade 2 and meet the following requirements:

- b. Curing time shall be 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
- c. Dimensional stability shall be 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
- d. Maximum permissible insulation board size for mechanical attachment is 4' x 8' and for foam adhesive and hot asphalt attachment is 4' x 4'. Field cutting of larger boards is not acceptable.
- e. Thickness shall be a minimum of 1.5 inches.

2. Tapered Insulation System (Roof Sections D & E):

- a. Shall be rigid polyisocyanurate roof insulation board with factory applied coated polymer bonded glass fiber mat facers on the top and bottom. Boards to comply with ASTM C1289 Type II, Class 2, Grade 2 and meet the following requirements:
- b. Curing time shall be 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
- c. Dimensional stability shall be 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
- d. Board size shall be 4 foot by 4 foot.
- e. Slope shall be 1/4" per foot
- f. Minimum thickness shall be two layers of 2" insulation
- g. Fill Insulation: Shall be rigid polyisocyanurate meeting the above requirements with board size of 4 foot by 4 foot and thickness of 2".
- h. Crickets and Saddles: Shall be rigid polyisocyanurate meeting the above requirements with a board size of 4 foot by 4 foot and 1/2" per foot slope.

3. Tapered Insulation System (Roof Section F):

- a. Shall be rigid polyisocyanurate roof insulation board with factory applied coated polymer bonded glass fiber mat facers on the top and bottom. Boards to comply with ASTM C1289 Type II, Class 2, Grade 2 and meet the following requirements:
- b. Curing time shall be 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
- c. Dimensional stability shall be 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
- d. Board size shall be 4 foot by 4 foot.
- e. Slope shall be 1/4" per foot
- f. Maximum thickness shall be 1.5 inches.
- g. Fill Insulation: Shall be rigid polyisocyanurate meeting the above requirements with board size of 4 foot by 4 foot and thickness of 2".
- h. Crickets and Saddles: Shall be rigid polyisocyanurate meeting the above requirements with a board size of 4 foot by 4 foot and 1/2" per foot slope.

4. Cover Board: Shall be cover board approved by roof system manufacturer. Board Size shall be 4' by 8' and minimum thickness shall be as listed below or as required by roof system manufacturer. Acceptable products include:
 - a. Georgia Pacific 1/2" DensDeck Prime Roof Board
 5. Tapered Edge Strip: Shall be a closed-cell polyisocyanurate foam core integrally bonded to non-asphaltic, fiber-reinforced organic felt or inorganic coated-glass facers. Fabricated with "zero edge" to provide transitions as required by field conditions:
 - a. Shall be installed at edges to make transitions as detailed in Contract Drawings.
 - b. Use 2" by 24" tapered edge strips to form crickets in front of curbs wider than 12" and to provide slope transition at the outside of drainage sumps.
 - c. Use 1.5" x 12".
- B. Insulation Attachment Materials:
1. Foam Adhesive: Shall be a one or two part, VOC compliant, moisture-cured polyurethane foamable adhesive designed as roof insulation adhesive and approved by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor to inspect substrate for soundness and notify Engineer in writing of any deficiencies.
- B. Commencement of work signifies Contractor's acceptance of substrate. Any defects in roofing work resulting from such accepted substrates shall be corrected to Owner's satisfaction at no additional expense.

3.02 PREPARATION

- A. General
 1. Roof deck to be dry and broomed clean of debris and foreign matter prior to installation of insulation system.

3.03 APPLICATION

- A. General
 1. Application shall be in accordance with the insulation/membrane manufacturer's instructions and these specifications.
 2. All insulation to be in full sheets, carefully fitted and pushed against adjoining sheets to form tight joints. Gaps exceeding 1/4 inch will not be accepted.
 3. Insulation and overlayment boards that must be cut to fit shall be saw cut or knife-cut in a straight line, not broken. Chalk lines shall be used to cut insulation. Uneven or broken edges are not acceptable.
 4. Remove insulation dust and debris that develops during insulation cutting operations.

5. Joints between successive and adjacent layers of insulation to be offset a minimum of six (6") inches.
6. Stagger joints of gypsum overlayment/overlayment insulation one (1') foot (vertically and laterally) to ensure that joints do not coincide with joints from the previous or adjacent layer.
7. Crickets, saddles and tapered edge strips shall be installed before the overlayment insulation.
8. Adhere cant strips and tapered edge strips at transitions, terminations and/or penetrations as detailed or required in ribbons of foam adhesive or a full mopping of hot asphalt to ensure smooth transitions are provided for the roof membrane and flashings.
9. Provide necessary modifications to insulation system or nailers at roof edges as required to ensure a flush and smooth transition is provided for the roof membrane and flashing.
10. Field modifications of insulation, tapered insulation, tapered edge strips and cants shall be made by the Contractor where required to accommodate roof and flashing conditions, prevent water dams and ponding water. Ponding water at scuppers and cricket valleys shall not be accepted.
11. Provide necessary modifications to prevent standing water which is defined as 1/4" of water in a 4-square foot or larger area 24 hours or more after precipitation.

B. Self-Adhered Vapor Retarder

1. Install in accordance with manufacturer's recommendations.
2. Primer Application: The substrate must be clean, dry and free of dust, grease or other contaminants. Shake well before using. Apply to clean and dry surfaces with a paint brush, roller or sprayer. Application rates will vary depending on substrate. Vapor retarder must be installed on the same day as the primer application. Acceptable substrates for primer application include wood, concrete, gypsum boards and decks. Allow primer to dry completely.
3. Vapor Retarder Application Over Steel, Wood or Concrete Deck: Install over a clean and dry substrate. In concrete applications allow concrete to cure for at least 7 days. Do not install when it is raining, snowing, or on wet/humid surfaces. Install in temperatures 32-degree F (0 degree C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks. On metal decks use a metal plate (6 x 42 inches - 15 x 106 cm) to support the membrane end lap between metal flutes ensuring a complete end lap seal.
 - a. Begin application at the bottom of the slope. Unroll vapor retarder onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 inches (75 mm) lengthwise following the reference line and by 6 inches (150 mm) at each end. Stagger end laps by at least 12 inches (300 mm). Do not immediately remove the silicone release sheet.
 - b. Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold tight and peel back the release sheet by pulling diagonally.
 - c. Use a 75 lb. (34 kg) roller to press sheet down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

C. Tapered Insulation

1. Install tapered insulation system to provide positive slope for complete roof drainage.
2. Crickets shall be sized as shown in the Contract Drawings. Modifications shall be provided to ensure positive slope and prevent standing water along the cricket valley.
 - a. Minimum length to width ratio shall be 2:1. Fabricate partial crickets with dimensions which would result in a minimum length to width ratio of 2:1 if they were extended to full size.
 - b. Unless otherwise noted, fabricate all crickets from tapered stock as required to provide the specified minimum slope. For example, when roof slope is indicated as 1/4" per foot minimum, fabricate crickets with slope of 1/2" per foot minimum.
 - c. Construct crickets on up slope side of all curbs to ensure positive drainage.
 - d. Install tapered edge strips at cricket edges to provide a smooth transition between the cricket and insulation system below.
3. Insulation boards may require mechanical fasteners and stress plates at slope transition of crickets to minimize bridging.

D. Roof Drainage:

1. Drainage sumps shall be installed as detailed.
2. The Contractor shall be responsible for carefully laying out the tapered insulation, sumps, drain bowls and scuppers to ensure the finished roof provides complete drainage with no standing water.
3. Contractor shall fabricate miter-cut sumps at scuppers to provide smooth transitions between the insulation system and the drains/scuppers.
4. Sumps shall ensure complete roof drainage and prevent water dams.
5. Contractor shall adjust insulation, drains and scuppers to ensure complete roof drainage and satisfactory substrates for membrane and flashings.
6. Drain sump components shall be fastened to the deck using specified insulation fasteners or adhesives.
7. Circular sumps and sumps that do not provide smooth transition or that create standing water at the drains shall be rejected and shall require removal and replacement.

E. Foam Adhesive Application

1. Adhesive beads shall be positioned and spaced at a minimum as indicated in the Contract Drawings. Comply with the requirements of the membrane manufacturer's tested assembly for adhesive spacing and positioning.
2. Adhesive beads shall be sized in accordance with the adhesive manufacturer's guidelines.
3. Insulation boards shall be placed onto the beads and immediately "walked" and/or "weighted" into place. Insulation boards must be placed into the adhesive in strict accordance with the adhesive manufacturer's guidelines.
4. Ensure full adhesion of all layers of insulation and take whatever steps necessary to achieve full adhesion, including but not limited to temporary ballasting of insulation until adhesive sets.

END OF SECTION 07 22 16

SECTION 07 54 00

THERMOPLASTIC SINGLE-PLY ROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Install a fully adhered fleece back thermoplastic membrane and flashings to provide a permanently watertight system.

1.02 RELATED DOCUMENTS

- | | | |
|----|-------------------------------|------------------|
| 1. | Rough Carpentry | Section 06 10 00 |
| 2. | Preparation for Reroofing | Section 07 01 50 |
| 3. | Roof Insulation | Section 07 22 16 |
| 4. | Sheet Metal Flashing and Trim | Section 07 62 00 |
| 5. | Roof Accessories | Section 07 72 00 |

1.03 REFERENCES

- A. Refer to the following references, current edition for specification compliance:
 - 1. FBC Building Code
 - 2. ASTM International
 - 3. National Roofing Contractors Association (NRCA)
 - 4. Underwriters Laboratory (UL)
 - 5. FM Global
 - 6. Single Ply Roofing Institute

1.04 SUBMITTALS

- A. Refer to Section 01 33 00-Submittal Procedures for Submittals.
- B. Latest edition of the Manufacturer's current material specifications and installation instructions.
- C. Manufacturer's Product Data Sheets for all materials specified certifying material complies with all specified requirements.
- D. Submit documentation of approved, tested roof system to meet the specified requirements for the following:
 - 1. Wind uplift pressures
 - 2. UL Fire Resistance Rating

1.05 DELIVERY, STORAGE AND HANDLING

- A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
- B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- C. Membrane rolls shall be stored lying down on pallets and fully protected from the

weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

- D. All adhesives shall be stored at temperatures approved for the product.
- E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- F. All materials which are determined to be damaged by the Engineer or membrane manufacturer are to be removed from the job site and replaced at no cost to the Owner.

1.06 PROJECT CONDITIONS

- A. Roofing shall not be applied during precipitation. Contractor assumes all responsibility for starting installation in the event there is a probability of precipitation occurring during application.
- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.
- C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
- G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A protection layer of plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
- H. Prior to and during application, all dirt, debris and dust shall be removed from surfaces, either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- I. Contaminants, such as grease, fats, oils, and solvents, shall not be allowed to come into contact with the roofing membrane. All rooftop contamination that is anticipated or that is occurring shall be reported to the Engineer and membrane manufacturer to determine the corrective steps to be taken.

- J. If any unusual or concealed condition is discovered, the contractor shall stop work, notify Owner of such condition immediately, and in writing within 24 hours.
- K. The roofing membrane shall not be installed under the following conditions without consulting the membrane manufacturer's technical department for precautionary steps:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
 - 3. The wall/deck intersection permits air entry into the wall flashing area.
- L. Precautions shall be taken when using membrane adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

1.07 QUALITY ASSURANCE

- A. Manufacturer Requirements:
 - 1. Manufacturer must have written contractor/installer approval program.
 - 2. Products manufactured by other manufacturers and private labeled are not acceptable.
 - 3. See materials section for general product description and specified requirements.
- B. Contractor Requirements:
 - 1. This roofing system shall be applied only by a Contractor authorized by the membrane manufacturer prior to bid.
 - 2. Application of the roofing system shall be accomplished by a primary roofing contractor, his roofing foreman, and sufficient applicator technicians who all have been trained and approved by the manufacturer of the single ply roofing system. Contractor to submit evidence of qualification from the manufacturer.
- C. Upon completion of the installation an inspection shall be made by a representative of the membrane manufacturer to review the installed roof system and list all deficiencies.
- D. There shall be no deviation made from the Contract Documents or the approved shop drawings without prior written approval by the Engineer.
- E. All work shall be completed by personnel trained and authorized by the membrane manufacturer.
- F. Contractor to provide manufacturer written verification indicating all seams have been probed and are watertight.
- G. Install roofing system to meet UL 790 Class A Fire Rating.
- H. Wind Design:
 - 1. Install roofing system to meet or exceed the wind uplift pressures listed on contract drawings.

1.08 WARRANTIES

- A. **Manufacturer's Guarantee:** Manufacturer's standard form, non pro-rated, without monetary limitation or deductibles, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks or breaches in the primary roof membrane causing moisture to enter the substrate below (even if visible leaks are not observed inside the facility). Warranty to remain in effect for wind speeds up to 72 mph. Warranties requiring the Owner's signature will not be acceptable.
1. Warranty to include but not be limited to membrane, insulation, adhesives, fasteners, sealants, flashings, polymer clad sheet metal, etc.
 2. Warranty Period: Twenty years from date of Substantial Completion.
 3. Manufacturer's Representative shall attend two post construction field inspections: the first no earlier than twenty -three (23) months and no later than twenty-four (24) months after the date of Substantial Completion and the second no earlier than fifty-nine (59) months and no later than sixty (60) months. Submit a written report within seven (7) days of the site visits to the Engineer listing observations, conditions and any recommended repairs or remedial action.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Membrane materials shall be manufactured by the following:

1. Sika Sarnafil
2. Fibertite

2.02 MEMBRANE MATERIALS

- A. Fully Adhered Membrane and Components:

1. Membrane (fleeceback)
 - a. Sika Sarnafil 60 mil G410 Feltback
 - b. Fibertite 45 mil SM-FB
2. Membrane Adhesive: Shall be membrane manufacturer's solvent based adhesive. Water based adhesive shall not be utilized in temperatures below 40 degrees F.
 - a. Solvent Based
 - i. Sika Sarnafil Sarnacol 2170
 - ii. Fibertite FTR 290 (fleeceback)

2.03 RELATED MATERIALS

- A. Flashing/Stripping Membrane: Shall be a non fleeceback, thermoplastic membrane reinforced with fiberglass. Utilize asphalt resistant flashing membrane where in contact with residual asphaltic materials or as required by the manufacturer.
1. Sika Sarnafil 60 mil G410
 2. Fibertite 60 mil SM
- B. Asphalt Resistant Flashing/Asphalt Resistant Stripping Membrane: Shall be a 60-mil minimum thickness non fleeceback, asphalt resistant, thermoplastic membrane reinforced

with fiberglass or polyester.

- C. Flashing Adhesive: Shall be membrane manufacturer's solvent based adhesive.
 - 1. Sika Sarnafil Sarnacol 2170
 - 2. Fibertite FTR 190e
- D. Fluid Applied Flashing: Shall be roof system manufacturer's approved, reinforced, PMMA liquid applied flashing:
 - 1. Sika Sarnafil Liquid Flashing
 - 2. Fibertite – as approved by manufacturer.
- E. T-joint Patch: Shall be membrane manufacturer's circular patch welded over T-joints formed by overlapping thick membranes.
- F. Corner Flashing: Shall be membrane manufacturer's pre-formed inside and outside flashing corners that are heat-welded to membrane or polymer clad metal base flashings.
- G. Pipe Flashing: Shall be membrane manufacturer's pre-formed pipe boot flashing that is heat-welded to membrane and secured with a stainless steel draw band and sealant.
- H. Termination Bar: Shall be manufacturer's 1/8" by 1" mill finish extruded aluminum bar with pre-punched slotted holes.
- I. Counterflashing Bar: Shall be a prefabricated extruded aluminum metal counterflashing and termination bar. 0.10"-0.12" thick bar with 2-1/4" profile, pre-drilled holes 8" on center and sealant kick out at top edge.
- J. Sealant: Shall be manufacturer's multi-purpose sealant.
- K. Fasteners:
 - 1. Flashing Membrane Termination Screws: #12 stainless steel hex or pan head screws with length to penetrate substrate a minimum of 1-1/2".
 - 2. Concrete and Masonry Flashing Membrane Termination Anchors:
 - a. 1/4" diameter metal based expansion anchor with stainless steel pin of length to penetrate substrate a minimum of 1-1/2".
 - b. Masonry screws, approved by membrane manufacturer, 1/4 inch minimum diameter, corrosion resistant, with Phillips flat head. Length to provide minimum 1-1/2" embedment into substrate.
 - 3. Steel Deck Fasteners and Plates: stainless steel pan head screw approved by membrane manufacturer of length to penetrate top flange of steel deck a
- L. Primary Membrane Cleaner: Shall be a high quality solvent cleaner provided by membrane manufacturer and approved by engineer for use as a general membrane cleaner.
- M. Pre-weld Cleaner: Shall be a high quality solvent based seam cleaner with moderate evaporation rate provided by membrane manufacturer.
- N. Walkway Pad: Shall be walkway pad by manufacturer of membrane.
- O. Pre-Fabricated Expansion Joint: Shall be manufacturer's approved pre-fabricated expansion joint made with polyester reinforced membrane, neoprene foam and

galvanized metal.

- P. Polymer Clad Metal: Refer to Section 07 62 00-Sheet Metal Flashing and Trim

PART 3 EXECUTION

3.01 SUBSTRATE PREPARATION

- A. Verify that the substrate is dry, clean, smooth, and free of loose material, oil, grease, or other foreign matter. Sharp ridges and other projections and accumulations of bitumen shall be removed to ensure a smooth surface before roofing.
- B. Asphalt roofing substrates shall be removed, covered, or flashed using compatible, approved materials. PVC shall not come in contact with substrates containing asphalt materials.
- C. Any deteriorated substrate shall be repaired.
- D. Beginning installation means acceptance of prepared substrate.
- E. Provide necessary protection from adhesive vapors to prevent interaction with foamed plastic insulation.

3.02 MEMBRANE INSTALLATION

- A. The surface of the insulation or substrate shall be inspected prior to installation of the roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.
- B. Over the properly installed and prepared substrate, membrane adhesive shall be spread in accordance with the manufacturer's instructions and application rates utilizing equipment as required by the manufacturer.
 - 1. Do not allow adhesive to skin-over or surface-dry prior to installation of roof membrane.
 - 2. Adhesive application rates shall comply with the manufacturer's published requirements.
 - 3. The Applicator shall count the amount of pails of adhesive used per area per day to verify conformance to the specified adhesive rate.
 - 4. No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.
 - 5. Notched squeegees shall be replaced each day or as notches are reduced below ¼".
- C. The roof membrane shall be unrolled into the adhesive. Adjacent rolls overlap previous rolls by 3 inches (75 mm). This process is repeated throughout the roof area. Immediately after placement of membrane, each roll shall be pressed firmly into place with the manufacturer's recommended roller by frequent rolling in two directions.
- D. Weld membrane coverstrips at all fleeceback membrane seams without a factory selvage edge.

3.03 MEMBRANE TERMINATION

- A. Terminate membrane at all walls as shown in the contract drawings.

1. Roof Deck: Membrane shall be mechanically terminated using approved fasteners and plates six (6) inches on center.
 2. Wood Wall Substrate: Membrane shall be turned up wall one inch and mechanically terminated using approved screws eight (8) inches on center with a termination bar.
 3. Concrete/Masonry Wall Substrate: Membrane shall be turned up wall one inch and mechanically terminated using approved anchors eight (8) inches on center with a termination bar.
- B. Terminate membrane at all penetrations as shown in the contract drawings.
1. Membrane shall be fastened six inches on center or a minimum of four (4) fasteners per penetration into the structural deck using fasteners and plates as approved by the membrane manufacturer for the deck substrate.
- C. Membrane shall extend over roof edge a minimum of 2" below the perimeter wood blocking. If fleecback membrane is utilized, trim membrane flush with outside edge of roof and hot-air weld a non fleecback flashing membrane to extend over the roof edge.

3.04 FLASHING INSTALLATION

- A. General
1. All flashings shall be installed concurrently with the roof membrane as the job progresses.
 2. No temporary flashings shall be allowed without the prior written approval of the Engineer and Manufacturer. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Contractor's expense.
 3. Seams shall not be "taped" as temporary measure but shall be fully completed before the end of each day.
 4. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.
 5. Where substrates are incompatible with adhesives and PVC materials, the Contractor shall remove the incompatible materials and replace it with a compatible substrate, or install compatible PVC flashing materials.
 6. Use caution to ensure adhesive fumes are not drawn into the building.
- B. Adhesive for Flashing Membrane
1. Over the properly installed and prepared flashing substrate, flashing adhesive shall be applied according to instructions found on the Product Data Sheet. The membrane adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies.
 2. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
 3. No adhesive shall be applied in seam areas that are to be welded.
- C. All flashings shall mechanically terminated a minimum of 8 inches above the finished roofing surface using approved fasteners and counterflashing bar unless otherwise indicated in the Contract Drawings. Flashing heights less than 8" shall be accepted in writing by the Manufacturer's Technical Department.
- D. All flashing membranes shall be consistently adhered to substrates. All interior and

exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the (roof) membrane.

- E. All flashings shall be hot-air welded at their joints and at their connections with the (roof) membrane.
- F. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Manufacturer's Technical Department for securement methods.
- G. Corners shall be flashed using the membrane manufacturer's pre-formed corners.
- H. Polymer Clad sheet metal incorporated into the roofing system shall be sealed off with a heat welded stripping ply. The stripping ply shall extend four inches beyond sheet metal onto roof membrane and fit closely to edge of sheet metal.
- I. Scupper Roof Drain/Overflow Scupper Roof Drain
 - 1. Mechanically attach membrane 6" on center into structural deck around drainage sump. Fully adhere flashing membrane and hot-air weld to membrane a minimum of 2 inches.
 - 2. Install scupper roof drain according to manufacturer's installation instructions and provide stripping membrane hot-air welded to flange of scupper roof drain extending onto flashing membrane.
 - 3. Refer to Section 22 14 00.
- J. Soil Pipe/Pipe Penetration:
 - 1. Provide field wrapped pipe penetration flashing or manufacturer's pre-fabricated pipe boot as shown in detail drawing.
 - 2. Apply aluminum tape to penetration if asphalt contamination is present.
 - 3. Horizontal flashing membrane shall be hot-air welded a minimum of four inches onto the membrane.
 - 4. Vertical flashing membrane shall be fully adhered to pipe penetration and extend a minimum of 1.5" horizontal at the base of penetration. Hot-air weld vertical flashing membrane to horizontal flashing membrane.
 - 5. Install stainless steel draw band and sealant or hot-air weld flashing cap to terminate top edge of pipe flashing.

3.05 HOT-AIR WELDING OF SEAM OVERLAPS

- A. General
 - 1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
 - 2. Welding equipment shall be provided by or approved by the membrane manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a membrane manufacturer's technical representative prior to welding.
 - 3. All membrane to be welded shall be clean and dry.
- B. Hand-Welding
 - 1. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

2. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
3. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1½ inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the ¾ inch (20 mm) wide nozzle shall be used.

C. Machine Welding

1. Machine welded seams are achieved by the use of automatic welding equipment. When using this equipment, instructions from the manufacturer shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator to locations as directed by the Engineer or membrane manufacturer's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.06 WALKWAY PAD INSTALLATION

- A. Roofing membrane to receive walkway pad shall be clean and dry.
- B. Place chalk lines on sheet to indicate location of Walkway.
- C. Apply a continuous coat of membrane adhesive to the sheet and the back of walkway pad in accordance with membrane manufacturer's technical requirements and press walkway pad into place with a water-filled, foam-covered lawn roller.
- D. Clean the membrane in areas to be welded. Hot-air weld the entire perimeter of the walkway to the roofing membrane.
- E. Check all welds with a rounded screwdriver. Re-weld any inconsistencies.
- F. Important: Check all existing membrane seams that are to be covered by walkway with rounded screwdriver and re-weld any inconsistencies before walkway installation.
- G. Provide walk pads where indicated in Contract Drawings and at the following locations:
 1. Around roof hatches.
 2. At base and top of fixed wall access ladders.
 3. Around HVAC units.

3.07 TEMPORARY CUT-OFF

- A. All flashings shall be installed concurrently, with the membrane in order to maintain a watertight condition as the work progresses.
- B. When a break in the day's work occurs in the central area of the project install a temporary watertight seal. An 8" strip of flashing membrane shall be welded 4" to the new field membrane. The remaining 4" of flashing membrane shall be sealed to the deck and/or the substrate so that water will not be allowed to travel under the new or existing membrane. The edge of the membrane shall be sealed in a continuous heavy application of pourable sealer of 6 inch width. When work resumes, the contaminated membrane shall be removed and disposed of. None of these materials shall be reused in the new work.
- C. If inclement weather occurs while a temporary water stop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition.
- D. If any water is allowed to enter under the newly-completed system, the affected area shall be removed and replaced at the Contractor's expense.

3.08 CLEANING AND PROTECTION

- A. The Contractor shall be responsible for protecting the roof from construction related damages during the Work.
- B. The Contractor shall ensure trash and debris is removed from the roof daily.
- C. Metal scraps, nails, screws and other sharp damaging debris shall be kept off of the roof membrane surface during construction.
- D. The Contractor shall clean off/remove excess adhesive, sealant, stains and residue on the membrane and flashing surfaces.
- E. The Contractor shall repair or remove and replace damaged membrane, flashings and other membrane components. Repairs shall be approved by the Engineer and be in accordance with the membrane manufacturers repair instruction to comply with the specified warranty.
- F. The Contractor shall remove temporary coverings and masking protection from adjacent work areas upon completion.

END OF SECTION 07 54 00

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fabrication and installation of new sheet metal flashings and trim to provide a permanently watertight condition.

1.02 RELATED DOCUMENTS

- | | | |
|----|----------------------------------|------------------|
| 1. | Rough Carpentry | Section 06 10 00 |
| 2. | Thermoplastic Single Ply Roofing | Section 07 54 00 |

1.03 REFERENCES

- A. Refer to the following references for specification compliance:
1. FBC Building Code
 2. ASTM International
 3. National Roofing Contractors Association (NRCA)
 4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - a. Architectural Sheet Metal Manual, Seventh Edition – January, 2012
 5. ANSI/SPRI ES-1

1.04 SUBMITTALS

- A. Refer to Section 01 33 00-Product Submittals for Submittals.
- B. Manufacturer's Product Data Sheets for all materials specified certifying material complies with all specified requirements.
- C. Pre-finished sheet metal and sealant color chart.
- D. Shop Drawings for any transitions and/or terminations not depicted in Contract Drawings.

1.05 MOCK-UPS

- A. Provide mock-ups of the following sheet metal components prior to fabrication of the components:
1. Coping: Provide minimum 10' length of coping mock-up including any applicable fascia covers. Mock-up shall include at least one seam of the configuration specified.
 2. Gravel Stop/Metal Edge and Fascia Cover: Provide minimum 10' length of gravel stop/metal edge and fascia cover. Include at least one lap of each component.
 3. Expansion Joint:: Provide minimum 10' length of expansion joint cover and cleat mock-up. Mock-up shall include at least one seam of the configuration specified.
 4. Wall Expansion Joint: Provide minimum 10' length of expansion joint cover and cleat mock-up. Mock-up shall include at least one seam of the configuration

specified. Provide mock-up of any receiver and/or counter flashing components as part of the detail.

1.06 QUALITY ASSURANCE

- A. Installation shall comply with the Contract Drawings. References to figures are from SMACNA Architectural Sheet Metal Manual, Seventh Edition – January, 2012.
- B. Ensure work is free of leaks in all weather conditions.
- C. Fabricate metal edge (where no gutter is present) and coping in accordance with ANSI/SPRI ES-1 requirements.
- D. Workmanship shall be first-class in every respect. The sheet metal work shall be assembled and secured in accordance with these specifications, the manufacturer's requirements and referenced standards.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- B. Storage: Store materials within areas designated or approved by the Owner. Ensure materials remain dry, covered and not in contact with the ground.
- C. Handling: Handle material in such manner as to preclude damage and contamination with moisture or foreign matter.

1.08 PROJECT CONDITIONS

- A. Environmental: Protect building and its components from the elements at all times during the project.
- B. Coordination and Scheduling: Coordinate all phases of work to allow continuity of work without delays.

1.09 WARRANTY

- A. Contractor to provide the pre-finished sheet metal manufacturer's thirty (30) year finish warranty from the date of substantial completion.
- B. Provide certification of air-dried kynar paint or powder coating for specified materials.

PART 2 PRODUCTS

2.01 PRE-FINISHED STEEL

- A. Galvalume coated steel meeting or exceeding AZ50 per ASTM A792. Manufacturer's smooth finish, pre-finished color coatings consisting of full strength 70% Kynar 500 fluorocarbon (Polyvinylidene Fluoride PVF2) coating over a urethane primer on the finish side, with primer and a wash coat on the reverse. All measurements per NCCA Technical Bulletin II-4 or ASTM D1005. A strippable plastic film should protect the finish during fabrication and installation. Manufacturer's standard or special color to be selected by Owner.

1. 24 gauge
 - a. Slip Flashing
 - b. Receiver Flashing
 - c. Counterflashing
 - d. Expansion Joint Cover
 - e. Expansion Joint Cleat
 - f. Coping
 - g. Fascia Cover
 - h. Metal Edge

2.02 GALVALUME

- A. Galvalume coated steel meeting or exceeding AZ50 per ASTM A792

1. 22 gauge
 - a. Continuous Cleat

2.03 GALVANIZED STEEL

- A. ASTM, A 653, AISI G90 galvanized steel, mill finish.

1. 22 gauge
 - a. Continuous Cleat

2.04 STAINLESS STEEL

- A. 26 gauge, Type 304 as tested in accordance with ASTM A 167.

1. Scupper Roof Drain
2. Overflow Scupper Roof Drain
3. Flange/Sleeve
4. Watertight Umbrella
5. Multiple Pipe Enclosure Components
 - a. Pipe Enclosure Flashing
 - b. Closure Cap
6. Pitch Pan
7. Splash Pan

- B. Compression Bar: 1/4" X 1.5" stainless steel flat bar.

2.05 POLYMER CLAD METAL (PVC)

- A. Polymer Clad Metal – Heat-weldable, 24 gauge, AISI G90 galvanized steel sheet with a 20-mil unsupported thermoplastic membrane coating to match the flashing membrane composition laminated on one side. Polymer-Clad metal shall be manufactured by, and included in the warranty of, the single-ply membrane Manufacturer. Color shall be selected by Owner.

1. Flange/Sleeve

2. Metal Edge
3. Scupper Drain Flange

2.06 FASTENERS

- A. Roofing Nails: 11 or 12 gauge stainless steel ring shank roofing nails with diamond point, minimum 3/8" diameter head and length as required to penetrate substrate a minimum of 1-1/4".
- B. Screws:
 1. Sheet metal to wood attachment (exposed): #12 stainless steel, 5/16 HWH with length to penetrate substrate a minimum of 1-1/2". Provide with bonded EPDM washer or washer specified below.
 2. Sheet metal to wood attachment (concealed): #10 stainless steel, low profile pancake head with length to penetrate substrate a minimum of 1-1/2".
 3. Sheet metal to light gauge steel attachment: #14-13 DP1 stainless steel low profile pancake head of length as required for three threads to penetrate metal substrate or min. 1" penetration through wood substrates.
 4. Sheet metal to sheet metal attachment (exposed): 1/4" x 7/8" carbon steel, self-drilling point, self-tapping, zinc alloy hex head screws with bonded EPDM tubular washer under head of fastener; screw heads to match color of wall panel by means of factory applied coating.
- C. Concrete and Masonry Anchors: 1/4" diameter metal based expansion anchor with stainless steel pin of length to penetrate substrate a minimum of 1-1/2".
- D. Washers: Shall be stainless steel with neoprene gasket backing. Shall be 9/16" diameter for use with #12 screws and 5/8" diameter for use with 1/4" diameter concrete and masonry anchors.
- E. Rivets: #44 stainless steel rivets with stainless steel mandrel. Length of rivet to properly fasten particular sheet metal components. Rivets shall be factory painted to match adjacent sheet metal.

2.07 RELATED MATERIALS

- A. Sheet Metal Underlayment: 40-mil minimum thickness sheet; slip-resistant surfacing, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; suitable for high temperature applications up to 250 degrees. Acceptable products include:
 1. Mid-States Asphalt Quik-Stick HT
 2. Grace Ice and Water Shield HT
 3. Carlisle WIP 300 HT
- B. PVC Flashing: 20 mil corrosion resistant, waterproof PVC flashing.
- C. Compressible Insulation: Un-faced friction-fit fiberglass building insulation, cut to fit from 3-1/2"x 15"x48" batts.
- D. Polyurethane Sealant: One-component elastomeric gun grade polyurethane sealant conforming to ASTM C 920, Type S, Grade NS, Class 25, and use NT, M, A, G, or O as required by substrate conditions. Color to match adjacent materials.

- E. Silicone Sealant: Shall be a one-component, non-sag, neutral cure, low-modulus, UV resistant, high performance silicone sealant. Shall meet ASTM C 920, Type S, Grade NS, Class 100, Use M, G, A or O. Color to match adjacent materials.
- F. Sealant Tape: Minimum ½” wide non-skinning butyl sealant tape.
- G. Butyl Sealant: Shall be gun grade, non-skinning, non-hardening, flexible blend of butyl rubber and polyisobutylene sealant.
- H. Aluminum Tape: Pressure-sensitive, 2” wide aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as bond breaker under the metal edge cover plates.
- I. Backer Rod: Closed-cell polyethylene or polyurethane rods sized approximately 25% larger than joint opening.
- J. Solder: 80-20 lead-TIN alloy conforming to ASTM B32.
- K. Flux: Muriatic acid killed with zinc or an accepted brand of commercial soldering flux designed for use with 80-20 solder.
- L. Non-Shrink Grout: High early strength, non-rusting non-shrink grout conforming to ASTM C 1107 Grade C (modified for rapid-setting grout) such as 747 Rapid Setting Grout as manufactured by ThoRoc (ChemRex), Multi Purpose Non-Shrink Grout as manufactured by US Mix, or Sikagrout 212 as manufactured by Sika.
- M. Pourable Sealer: Two part pourable polyurethane sealant conforming to ASTM D 429, and designed to seal around penetrations.
- N. Prefabricated Flexible Conduit Penetration Flashings: One-piece non insulated Aluminum Liquid Tight Flexible Conduit Flashings; MEF-2A standard 12” (305 mm) high flashing; 0.109” (2.7mm) mill finish 6061-T4 aluminum; to CSA B272-93; with EPDM End Cap as manufactured by Thaler Metal Industries Ltd. (www.thalermetal.com, or 800-576-1200) or Engineer accepted equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Coordinate with other work for correct sequencing of items which make up the entire system.
- B. Ensure substrates are installed, secured and modified to accommodate sheet metal flashings.
- C. Deficiencies associated with the sheet metal substrates shall be reported to Engineer before beginning sheet metal work. All such deficiencies shall be corrected before installing sheet metal flashings.

3.02 INSTALLATION

- A. General:
 - 1. All joints to be locked and sealed or soldered.

2. Provide for thermal movement (expansion and contraction) of all exposed sheet metal.
3. Where dissimilar metals contact, galvanic action shall be prevented by means of heavy coat of asphalt paint.
4. All metal flanges shall be installed on top of membrane and adhered as indicated in detail drawings. Metal flanges connected to the roof shall be installed per membrane manufacturer's specifications and the requirements herein.
5. Various sheet metal sections shall be uniform with corners, joints and angles mitered, sealed and secured.
6. Exposed edges shall be returned (hemmed); both for strength and appearance, and sheet metal shall be fitted closely and neatly.
7. Provide cleats or stiffeners and other reinforcements to make all sections rigid and substantial.
8. Sheet metal shall be fabricated, supported, cleated, fastened and joined to prevent warping, "oil canning", and buckling.
9. All sheet metal details shall provide for redundancy including but not limited to sheet metal underlayment and/or sealants. This secondary protection shall be installed, sealed and lapped to ensure a redundant layer of protection will shed moisture infiltration in the sheet metal fails.

B. Sheet Metal Underlayment:

1. Fully adhere to substrates where indicated in Contract Drawings.
2. Lap adjoining sections a minimum of 3" and fully adhere.
3. Shall extend beyond wood blocking a minimum of 1" at roof edges and parapet walls.
4. At roof edges and parapet walls, sheet metal underlayment shall be installed concurrently with roof membrane and flashing installation. Temporary weather protection utilizing other materials is not acceptable when sheet metal underlayment is specified.

C. Fasteners: Shall be size and type required.

1. All fasteners to be rust resistant and compatible with materials to be joined.
2. All exposed fasteners shall be stainless steel screws with washers fastened through 5/16" predrilled oversized holes.
3. All exposed fasteners into concrete or masonry shall be metal based expansion anchor with stainless steel pin with washers fastened through 11/32" predrilled oversized holes.
4. All exposed fasteners shall have factory painted heads to match the sheet metal color.
5. Exposed horizontal surface fasteners are not acceptable.

D. Scupper Roof Drain

1. Provide prefabricated scupper roof drain as indicated in detail drawing. Install copper/lead flashing in full bed of roof sealant. Form flashing to conform to substrate and extend a minimum of 1" beyond clamping ring.
2. Provide flange which extends a minimum of 4" on top and sides of scupper, and extends a minimum of 4" out onto the horizontal membrane. Set all flanges in a full bead of roof sealant.
3. Strip-in flange as specified in Contract Drawings.
4. Refer to Section 22 14 00.

E. Overflow Scupper Roof Drain

1. Provide prefabricated overflow scupper roof drain as indicated in detail drawing. Install copper/lead flashing in full bed of roof sealant. Form flashing to conform to substrate and extend a minimum of 1" beyond clamping ring.
2. Provide flange which extends a minimum of 4" on top and sides of scupper, and extends a minimum of 4" out onto the horizontal membrane. Set all flanges in a full bead of roof sealant.
3. Strip-in flange as specified in Contract Drawings.
4. Refer to Section 22 14 00.

F. Soil Pipe

1. Provide Prefabricated Pipe Penetration Flashing as shown in detail drawing with a 4" minimum flange.
2. Set flange in a full bed of roofing cement over base ply and strip in as specified.
3. Provide separate flashing cap extending a minimum of 1" down inside pipe, and a minimum of 3" down outside the pipe.
4. Clean and solder all seams.

G. Pipe Penetration

1. Fabricate flange/sleeve and umbrellas as shown in detail drawings. Refer to SMACNA Architectural Sheet Metal Manual Figure 8-9C.
2. Provide a 4" minimum flange attached and stripped in as indicated in the Contract Drawings.
3. Install watertight umbrella with stainless steel draw band and sealant properly tooled to ensure adhesion and slope to shed water.
4. Vertical leg of umbrella flashing shall extend a minimum of 2" below the sleeve top and be positioned as low as possible on the sleeve.
5. Clean and solder all seams.

H. Slip Flashing for Curbs

1. Fabricate slip flashing at curbs as shown in detail drawings in 10' lengths.
2. Slip flashing shall extend a minimum of 2 inches below base flashing termination and shall fit tightly against curb.
3. Secure slip flashing 12" on center of a minimum of two fasteners per side of the curb.
4. Notch and lap ends of adjoining sections not less than 4"; apply sealant tape between sections.
5. Lap miters at corners a minimum of 1 inch and apply sealant between laps. Rivet at 2" on center.

I. Equipment Support

1. Wrap top of equipment support with sheet metal underlayment to extend two inches below base flashing termination.
2. Fabricate equipment support cap at curbs as shown in detail drawings in one continuous piece of sheet metal and secure at eighteen inches on center.

J. Reglet Mounted Two-Piece Receiver and Counterflashing

1. Fabricate receiver and counterflashing as shown in detail drawings in 10' lengths.

2. Install receiver flashing into saw-cut reglet and secure with soft metal wedges at 18" on center set deep into joint or surface mount at 12" on center.
3. Install sealant properly tooled to ensure adhesion and slope to shed water in saw-cut reglet. Sealant shall completely cover soft metal wedges.
4. Install counterflashing as indicated in detail drawings and secure to receiver flashing 12 inches on center. Stagger receiver anchors/wedges with counterflashing fasteners.
5. Counterflashing shall extend a minimum of 1.5 inches below base flashing termination.
6. Notch and lap ends of adjoining sheet metal sections not less than 4"; apply sealant tape between sections.
7. Lap miters at corners a minimum of 1 inch and apply sealant between laps. Rivet at 2" on center.

K. Surface Mounted Two-Piece Receiver and Counterflashing

1. Fabricate receiver and counterflashing as shown in detail drawings in 10' lengths.
2. Install receiver flashing surface mounted at 12" on center.
3. Install sealant in kick-out and manually tool concave to ensure proper adhesion and slope to shed water as indicated in detail drawings.
4. Install counterflashing as indicated in detail drawings and secure to receiver flashing 12 inches on center. Stagger receiver anchors with counter flashing fasteners.
5. Counterflashing shall extend a minimum of 1.5 inches below base flashing termination.
6. Notch and lap ends of adjoining sheet metal sections not less than 4"; apply sealant between sections.
7. Lap miters at corners a minimum of 1 inch and apply sealant between laps. Rivet at 2" on center.

L. Expansion Joint

1. Fabricate expansion joint cover and cleat as shown in detail drawing in 10' lengths. Refer to SMACNA Architectural Sheet Metal Manual Figure 5-5A.
2. Prior to installation of expansion joint cover, install compressible insulation in PVC flashing envelope.
3. Install sheet metal underlayment up and over expansion joint extending a minimum of 2" down below the top of the expansion curb on both sides.
4. Install flashing membrane up and over expansion joint extending a minimum of 2" down below the top of the expansion curb and hot-air welded to flashing membrane as indicated in detail drawings. Allow flashing membrane to dip into expansion cavity approximately to allow for expansion.
5. Provide continuous expansion joint cleat fastened to the expansion curb 8" on center.
6. Lock expansion joint cover onto cleat and fasten remaining vertical leg of cover to wood blocking 12" on center.
7. Notch and lap ends of adjoining expansion joint cleat sheet metal sections not less than 4"; apply sealant tape between sections.
8. Provide drive seam at adjoining expansion joint cover sections. Turn cover ends back a minimum of 1" onto itself. Allow 1/4" space between coping sections for expansion and contraction and install sealant. Refer to SMACNA Architectural Sheet Metal Manual Figure 3-2, type 4.
9. Provide one piece expansion joint cover section at four way and tee intersections. Refer to SMACNA Architectural Sheet Metal Manual Figure 5-2.

10. Provide expansion joint end closure at roof edges. Refer to SMACNA Architectural Sheet Metal Manual Figure 5-3.

M. Wall Expansion Joint

1. Fabricate expansion joint cover and cleat as shown in detail drawing in 10' lengths. Refer to SMACNA Architectural Sheet Metal Manual Figure 5-6B.
2. Prior to installation of expansion joint cover, install compressible insulation in PVC flashing envelope.
3. Install sheet metal underlayment adhered to vertical substrate and extending a minimum of 2" down below the top of the expansion joint curb.
4. Install flashing membrane adhered to vertical substrate and extending a minimum of 2" down below the top of the expansion joint curb hot-air welded to the flashing membrane as indicated in detail drawings. Install flashing membrane to allow room for expansion.
5. Provide continuous cleat fastened to the expansion joint curb 8" on center.
6. Lock expansion joint cover onto cleat and fasten to wall substrate 12" on center.
7. Notch and lap ends of adjoining expansion joint cleat sheet metal sections not less than 4"; apply sealant tape between sections.
8. Notch and lap ends of adjoining expansion joint cover sheet metal sections not less than 6" and apply two beads of sealant between sections. Center 8" wide cover plate over exposed edge of sheet metal and apply sealant to each side of lap. Rivet cover plate at 2" on center to one side of lap only.

N. Fascia Cover

1. Provide fascia cover secured to wood blocking 12" on center where indicated in detail drawings.
2. Notch and lap ends of adjoining fascia cover sheet metal sections not less than 4"; apply sealant tape or two beads of butyl sealant between sections.

O. Parapet Wall

1. Fabricate coping in 10' lengths. Width of coping shall be fabricated to be a maximum of 1/2" wider than the width of the wall; Contractor is responsible to field verify parapet wall width prior to sheet metal fabrication. Refer to SMACNA Architectural Sheet Metal Manual Figure 3-4A.
2. Install tapered edge strip mechanically attached or set in foam adhesive to top of wood blocking.
3. Install flashing membrane up and over parapet extending a minimum of 1" below wood blocking.
4. Install continuous cleat fastened to substrate 6" on center in vertical leg. Locate fasteners no greater than 2" from the bottom hem.
5. Lock outside face of coping onto continuous cleat and secure inside face as follows:
 - a. For coping widths up to and including 12 inches, secure with screws through waterproof washers and oversized holes at 18 inches on center.
 - b. For coping widths greater than 12 inches, secure inside face with continuous cleats. Secure cleat through vertical face of cleat to blocking with fasteners at 6 inches on center. Locate fasteners no greater than 2 inches from the bottom hem.

6. Provide drive seam at adjoining coping sections. Turn cover ends back a minimum of 1" onto itself. Allow ¼" space between coping sections for expansion and contraction and install sealant. Refer to SMACNA Architectural Sheet Metal Manual Figure 3-2, type 4.
7. Provide one piece coping section at four way and tee intersections.
8. Turn coping ends up a minimum of 2" at elevation walls and cover termination with surface mounted counterflashing.

P. Metal Edge (Thermoplastic)

1. Fabricate metal edge as shown in detail drawings in 10' lengths. Refer to SMACNA Architectural Sheet Metal Manual Figure 2-1 except for continuous cleat dimensions which shall be as shown in Contract Drawings.
 - a. Fabricate without vertical gravel stop at drainage edges and ¾ inch vertical gravel stop at non-drainage edges.
2. Terminate membrane at roof edge and hot-air weld flashing membrane strip to extend down the outside vertical face over the wall.
3. Provide sealant tape at base of flashing membrane on outside of wall to prevent moisture infiltration.
4. Install a continuous cleat over fascia cover as indicated in detail drawings fastened to substrate 6" on center. Locate fasteners no greater than 2" from the bottom hem.
5. Lock metal edge onto continuous cleat and secure flange of metal edge to wood blocking 3" on center staggered and not within ½" from inside edge and ¾" from outside edge.
6. Strip flange of metal edge with hot-air welded stripping membrane as specified in the Contract Drawings.
7. Hand tong all of metal edge onto continuous cleat.
8. Metal Edge Joints:
 - a. Leave a 1/4" opening between metal edge sections. Install two roofing nails in the end of the flange, and one roofing nail in the end of the vertical face of each metal edge section.
 - b. Center aluminum tape over entire joint opening (flange and face).
 - c. Hot-air weld 4" wide strip of stripping membrane over entire joint.
 - d. Strip in flange of metal edge as described above.
 - e. Center 6" wide cover plate over joint locking onto notched drip edges of metal edge sections. Refer to SMACNA Architectural Sheet Metal Manual Figure 2-5A, and Figure 2-5, Detail 1.
 - f. Strip flange of cover plate with hot-air welded flashing membrane. Flashing membrane shall extend 2" beyond the cover plate flange on 3 interior sides.

Q. Gutters

1. Fabricate to profile shown in Contract Drawings. Refer to SMACNA Architectural Sheet Metal Manual Figure 1.2 Style D.
2. Gutters shall be continuous, roll formed from coil stock on site or formed in 10' lengths.
 - a. Joints in gutters must be lapped a minimum of 1 inch, riveted 1 inch on center. Install sealant tape between gutter sections and sealant at

exposed inside edge and on rivets. Lap joints in the direction of water flow.

3. Terminate membrane at roof edge and hot-air weld flashing membrane strip to extend down the outside vertical face of wall.
4. Provide butt type expansion joints in gutters at spacing appropriate for the type material used to fabricate gutters. Refer to SMACNA Architectural Sheet Metal Manual Figure 1-7. Maximum length of gutters shall be 50'.
5. Provide downspout outlet tubes in downspout locations. Refer to SMACNA Architectural Sheet Metal Manual Figure 1-33B and Detail 1. Gutter outlet tubes to be tabbed a minimum of 1", set in a full bead of sealant and secured to gutter with a minimum of two rivets per tab.
6. Provide primed and painted brackets and spacers as shown in detail drawings. Evenly stagger the placement of brackets and spacers. Spacing shall be 36" on center for both brackets and spacers.
7. Spacers shall be riveted to both sides of the gutter only.
8. Brackets shall be secured with two stainless steel fasteners to the wood blocking.
9. Leading edge of gutter to be a minimum of 1" below the back edge as shown in detail drawing.
10. Hang gutters level.
11. Metal Edge: Refer to Metal Edge installation indicated above.

R. Splash Pans

1. Where downspouts discharge onto adjacent roof; provide splash pans on 18" by 30" walk pads.
2. Splash pan shall be fabricated to meet SMACNA Architectural Sheet Metal Manual Figure 1-36, Alternate Section with 2 v-grooves.

S. Multiple Pipe Penetration

1. Fabricate pitch pan, pipe enclosure flashing, and closure cap as shown in detail drawings. Refer to SMACNA Architectural Sheet Metal Manual Figure 8-8B or 8-9A depending upon direction of pipes.
2. Size pitch pan minimum 2" larger than the penetration on all sides. Provide a 4" minimum flange and double walls with minimum depth of 6".
3. Strip-in flange of pitch pan as indicated in the Contract Drawings.
4. Install 2" wide aluminum tape around all sides of pitch pan extending 1/2" above top edge.
5. Fill pitch pan with non-shrink grout to a depth of 2" from the top of the tape.
6. Fill pitch pan with pourable sealer to the top of the tape. Slope to shed water.
7. Secure pipe enclosure flashing and cap as indicated in detail drawings.
8. Clean and solder all seams.

T. Base Flashing Closure

1. Install new closures where base flashings abruptly end.
2. Completely solder or seal all joints to be watertight.
3. Install closures over membrane and under finish ply of base flashing.
4. Extend closures up under counterflashings or copings.
5. Install closures to completely seal ends of base flashings, membrane and cants as well as end joints of edge metal.

U. Polymer Clad Base Flashing

1. Fabricate as shown in detail drawings in 10' lengths.
2. Leave a 1/4" opening between sheet metal sections.
3. Center aluminum tape over entire joint opening.
4. Hot-air weld 4" wide strip of stripping membrane over entire joint.
5. Strip flange of base flashing as indicated in the Contract Drawings.

3.03 CLEANING AND PROTECTION

- A. All sheet metal work shall be thoroughly cleaned of all asphalt, flux, scrapes and dust.
- B. Scratches through the metal finish shall be replaced to the Owner's satisfaction.

END OF SECTION 07 62 00

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnish and install roof accessory assemblies as indicated and required by the Contract Drawings:
 - 1. Provide pipe supports for all rooftop conduit, gas lines, electrical lines, condensation lines, etc.
 - 2. Provide PVC pipe to route condensation from HVAC p-traps to nearest drainage point.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section, including but not limited to:
 - 1. Thermoplastic Single Ply Roofing Section 07 54 00

1.03 SUBMITTALS

- A. Refer to Section 01 33 00-Submittals.
- B. Latest edition of the Manufacturer's current material specifications and installation instructions.
- C. Manufacturer's Product Data Sheets for all materials specified certifying material complies with all specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Deliver materials to site in Manufacturer's original unopened packaging with labels intact.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with Manufacturer's instructions.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify all dimensions required.

1.06 WARRANTIES

- A. All roof accessories provided through roof system manufacturer shall be included in the specified roof system manufacturer's warranty.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe Support: Smooth EPDM rubber pipe support sized to fit the diameter of the pipe being supported and height adjustable. Acceptable products include:
 - 1. Olympic Olyflow PipeGuard
 - 2. Erico Caddy Pyramid EZ Series
 - 3. Portable Pipe Hangers
 - 4. Miro Industries

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsurfaces to receive Work and report detrimental conditions in writing to Architect. Commencement of Work will be construed as acceptance of subsurfaces.
- B. Coordination: Coordinate with other Work which affects, connects with, or will be concealed by this Work

3.02 INSTALLATION

- A. Pipe Supports
 - 1. Provide pipe supports at all rooftop gas, electrical conduit and condensation lines with a 5' maximum spacing.
 - 2. Provide new PVC condensation lines with integral P-trap on HVAC units.
 - 3. Route condensation lines to nearest drainage point (i.e. roof drain, gutter, or scupper).

3.03 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises.

END OF SECTION 07 72 00

SECTION 22 14 00
STORM DRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water test of scupper roof drains/below grade storm drainage leaders.
- B. Replacement of existing scupper roof drain/ overflow scupper roof drain components.
- C. Provide scupper roof drains approved by roof system manufacturer.
- D. Provide scupper roof drains/ scupper overflow roof drains and associated plumbing where indicated in Contract Drawings.

1.02 RELATED DOCUMENTS

- 1. Thermoplastic Single Ply Roofing Section 07 54 00
- 2. Sheet Metal Flashing and Trim Section 07 62 00

1.03 REFERENCES

- A. Refer to the following references for specification compliance:
 - 1. FBC Building Code
 - 2. ASTM International
 - a. ASTM A 74 Specification for Cast Iron Soil Pipe and Fittings Hub and Spigot.
 - b. ASTM A 888 Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Application.
 - c. ASTM C 564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - d. ASTM C 1277 Specification for Shielded Couplings joining hubless cast iron soil pipe and fittings.
 - e. ASTM D 2665 Specification for PVC Plastic Drain, Waste and Vent Pipe and Fittings.
 - f. ASTM D 2564 Solvent Cements for PVC Pipe and Fittings.
 - 3. American Society of Mechanical Engineers – ASME
 - a. ASME A112.21.2 Roof Drains
 - 4. International Association Plumbing & Mechanical Officials – IAPMO

1.04 SUBMITTALS

- A. Refer to Section 01 33 00-Submittal Procedures for Submittals.
- B. Manufacturer’s Product Data Sheets for all materials specified certifying material complies with all specified requirements.
- C. Shop Drawings: Include plans, elevations, sections and details.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Materials shall be delivered in the manufacturer's original sealed and labeled packaging.
- B. Storage: Materials shall be stored as directed by Owner and Engineer, to prevent damage. Storage shall not encumber Owner's operations.
- C. Handling: Materials shall be handled in such a manner as to prevent damage and contamination.

1.06 JOB CONDITIONS

- A. Environmental Requirements:
 - 1. Roof drains and associated plumbing shall be installed during periods of no precipitation to prevent water from entering the building.
 - 2. The Contractor shall be responsible for all necessary precautions to prevent damage to the building and contents during roof drain and associated plumbing installations.
 - 3. Comply with applicable rules and regulations of Authorities Having Jurisdiction pertaining to storm sewage systems.
- B. Protection:
 - 1. Contractor shall ensure roof drainage systems remain in service, and shall be restored fully operational before leaving the site.
 - 2. Contractor shall protect building interior and exterior surfaces during construction.

1.07 QUALITY ASSURANCE

- A. Contractor shall ensure plumbing systems and components are installed by licensed, qualified personnel.
- B. Contractor shall ensure roof drains, couplings, piping, supports, fixtures, pipe hangers, fasteners, fittings, etc. are installed in compliance with the referenced plumbing code, and shall be installed in accordance with the component manufacturer's published guidelines and instructions, and referenced standards.
- C. Contractor shall be responsible for field testing of completed storm drain systems as required by the referenced plumbing code.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Scupper Roof Drain: Premanufactured scupper roof drain with stainless steel components including body, PVC coated, 4-inch no hub outlet, and strainer dome. Provide stainless steel bolts for securement of flange. Acceptable Scupper Roof Drain Manufacturers include Thunder Bird Products or Engineer's accepted equivalent.
- B. Overflow Scupper Roof Drain: Premanufactured scupper roof drain with stainless steel components including body, PVC coated, 4-inch no hub outlet, 2" high water dam and

strainer dome. Provide stainless steel bolts for securement of flange. Acceptable Scupper Roof Drain Manufacturers include Thunder Bird Products or Engineer's accepted equivalent.

C. Above-grade PVC Piping and Fittings:

1. PVC Schedule 40 Solid Wall and PVC DWV (Drain, Waste and Vent) Fittings, conforming to ASTM D 2665. Pipe and fittings shall conform to ANSI/National Sanitation Foundation Standard No. 14, Plastics Piping System Components & Related Materials.

D. Pipe Hangers & Clamps: Carbon steel, galvanized finish. Clamps, rods and associated components shall be sized for attachment to structural supports for pipe material and type, sizes as published by the hanger/clamp manufacturer. Meeting Federal Specification A-A-1192A, WW-H-171 and MSS SP-69, for Type specified:

1. Riser clamps Type 8 or Type 42.
2. Adjustable Clevis Hangers, Type 1 for 100 ft. or less.
3. Adjustable Roller Hangers, Type 44/43 for 100 ft. or more.
4. Acceptable manufacturers include Empire Industries, Inc., Anvil International, Inc., Globe Pipe Hanger Products, Inc., Hilti, Inc., Erico, Inc. or Engineer's accepted equivalent.

E. Fasteners and Anchors:

1. Screws: #12 hot dipped galvanized or stainless steel hex or pan head screws with length as required to penetrate substrate a minimum of 1-1/2".
2. Metal based expansion anchor with stainless still pin or screw, minimum 1/4 inch diameter. Length as required to provide minimum 1" embedment into substrate, or as required by the fastener manufacturer to achieve required withdrawal load. Acceptable manufacturers include Zamac Nailin by Powers Fasteners, Nailcon by ITW Buildex, HIT Anchors by Hilti, Hammer-Set Anchors by Red Head or engineers accepted equivalent.
3. Masonry screws, 1/4 inch minimum diameter, Type 410 stainless steel. Length as required to provide minimum 1" embedment into substrate, or as required by the fastener manufacturer to achieve required withdrawal load. Acceptable manufacturers include Tapcon by ITW Buildex, KWIK-CON II by Hilti or engineers accepted equivalent.

F. Pipe Supports:

1. Steel angle: Minimum 3 x 3 x 1/4" steel angle meeting ASTM A36, maximum deflection determined by span/360.

PART 3 EXECUTION

3.01 INSPECTION

- A. A pre-job conference including the Engineer, Contractor, and the Owner's representative shall be conducted prior to the installation of roof drains and associated piping and plumbing fixtures.
- B. Contractor shall verify that conditions are acceptable to begin the installation.

- C. Contractor shall be responsible for daily inspection of the plumbing installation to ensure conditions remain satisfactory.

3.02 PREPARATION

- A. The Contractor shall inspect all existing building components and conditions before proceeding with plumbing installation.
- B. Where decking is to be cut for new drains, the building interior shall be inspected for utilities, structural members and occupancy conditions to ensure conditions are satisfactory to proceed.
- C. Where new piping is to be installed, the Contractor shall inspect the piping route and hanger attachment points to ensure conditions are satisfactory to install piping and all associated plumbing fixtures for the completed drainage system.
- D. Route piping to maintain working spaces around electrical equipment by NEC.
- E. Piping and fixtures shall not be routed to interfere with the service of in-place equipment and systems.
- F. Do not close off or obstruct streets, walks or other adjacent occupied facilities without permission from Owner, Engineer, and Authorities Having Jurisdiction.

3.03 EXISTING SCUPPER ROOF DRAINS AND LEADERS

- A. Prior to commencement of any work on the project the Contractor shall inspect each existing scupper roof drain/below grade storm drain leader for damage and water flow.
 - 1. Each scupper roof drain/leader shall be water tested for proper flow utilizing a minimum 3/4-inch hose. Water shall flow into the line under maximum pressure available for a period of not less than 15 minutes.
 - 2. Inspection and testing operation shall precede any roofing tear-off. If deficiencies or damages are observed, Contractor shall record the deficiency on a Roof Plan and forward to the Engineer. The Engineer will notify the Owner's Maintenance Department accordingly. Contractor shall allow 48 hours after notification for any corrective work by the Owner.
 - 3. If no deficiencies or damages are reported to the Owner prior to commencement of work, Contractor shall assume full responsibility for the condition and operation of the drains/leaders.
 - 4. Contractor shall install temporary drain plugs while performing any work at or near the scupper roof drains. Drain plugs shall be removed at the end of each work day.
- B. Contractor shall be responsible for installing drain plugs during roofing activities to prevent foreign materials from entering drainage system. Drain plugs shall be removed at the end of each work day to maintain drains in fully operational condition.
- C. Clamping flanges and bolts at scupper roof drains shall be fully reinstalled at the end of each working day.
- D. Drain piping clogged by construction debris shall be repaired by the Contractor at no cost to the Owner.

- E. Scupper roof drain lowering
 - 1. Inspect all existing scupper drains for elevation relative to top surface of roof deck.
 - 2. Adjusted vertical portion of drain leader and lower scupper drain so flange is located where indicated in Contract Drawings.

3.04 SCUPPER ROOF DRAIN AND ABOVE GRADE PIPE INSTALLATION

- A. Scupper roof drains, piping and all associated plumbing shall be installed to meet applicable requirements of the local plumbing, building and fire code.
- B. Cast iron piping and fittings shall be cut and installed in accordance with CISPI Pipe and Fittings Handbook, and the pipe manufacturer's published instructions.
- C. Scupper drains and all associated components shall be installed in accordance with the drain manufacturer's published instructions.
- D. Pipe clamps and hangers shall be installed of size and type as specified and by clamp and hanger manufacturer's published requirements based upon drain pipe size, support type.
 - 1. Minimum size of round rods supporting the pipe hangers shall be of the following for pipe size and spacing:
 - a. 3/8" to 2" pipe = 3/8" rod
 - b. 2-1/2" to 3" pipe = 1/2" rod
 - c. 4" to 5" pipe = 5/8" rod
 - d. 6" pipe = 3/4" rod
 - e. 8" through 12" pipe = 7/8" rod
 - f. 14" through 16" = 1" rod
- E. Pipes shall be rigidly supported to the building structure by adjustable hangers. The use of hooks, chain, wire, or perforated steel straps shall not be permitted. Welding to existing fixtures and structure shall not be permitted. The spacing of hangers shall be as indicated by the pipe manufacturer's published instructions, the CISPI Pipe and Fittings Handbook, and the following:
 - 1. PVC Piping Maximum Spacing
 - a. Spacing as indicated in pipe manufacturer's published literature, no less than two hangers per pipe section.
 - b. Install pipe hangers at each change of direction.
- F. Hangers shall be installed within 18 inches of hubless couplings.
- G. Horizontal piping shall be sloped no less than 1/8:12 or noted on drawings.
- H. Hanger rods shall be galvanized carbon steel per ASTM A301, Grade B, threaded per ANSI B1.1 course thread series, Class 2A fit. Hanger rods shall have minimum 6" threaded ends. Double nut all hangers or use safety tab.
- I. Hanger rods shall be installed vertically. No offset in hanger rods will be permitted.
- J. Horizontal drain piping shall be provided with sway bracing in accordance with Building

Code.

- K. Pipe shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing, properly clearing all openings and equipment. Cutting or weakening of structural members to install piping is not permitted.
- L. Vertical pipe shall be supported no greater than 10 ft. apart, and additional vertical supports shall be installed for each piping type and size, and at fittings.
- M. Horizontal pipe supports consisting of angle or channel shall be rigidly secured to the existing structural steel using bolts and nuts or clamps, not welded.
- N. Provide pipe insulation and wrap in accordance with manufacturer's installation instructions.
- O. The interior piping and underside of drain bowl shall be insulated.
- P. Where piping must penetrate through fire resistant walls, the penetration shall be protected per the referenced building code, meeting requirements of ASTM E 119 and ASTM E 814. Fire stop materials shall be UL listed and/or FM Approved.
- Q. Exterior vertical (downspout) piping shall not be PVC. Cast iron piping, schedule 40 galvanized steel pipe, or other approved piping may be used.
- R. Each day Contractor shall inspect the work. Corrective action shall be taken to repair damage or deficiencies before the end of the work day.

3.05 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball of cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping on watertight joints.
 - 3. Replace defective piping using new materials and repeat inspections.
 - 4. Reinspect and repeat procedure until results are satisfactory.

3.06 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

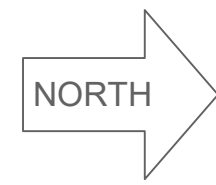
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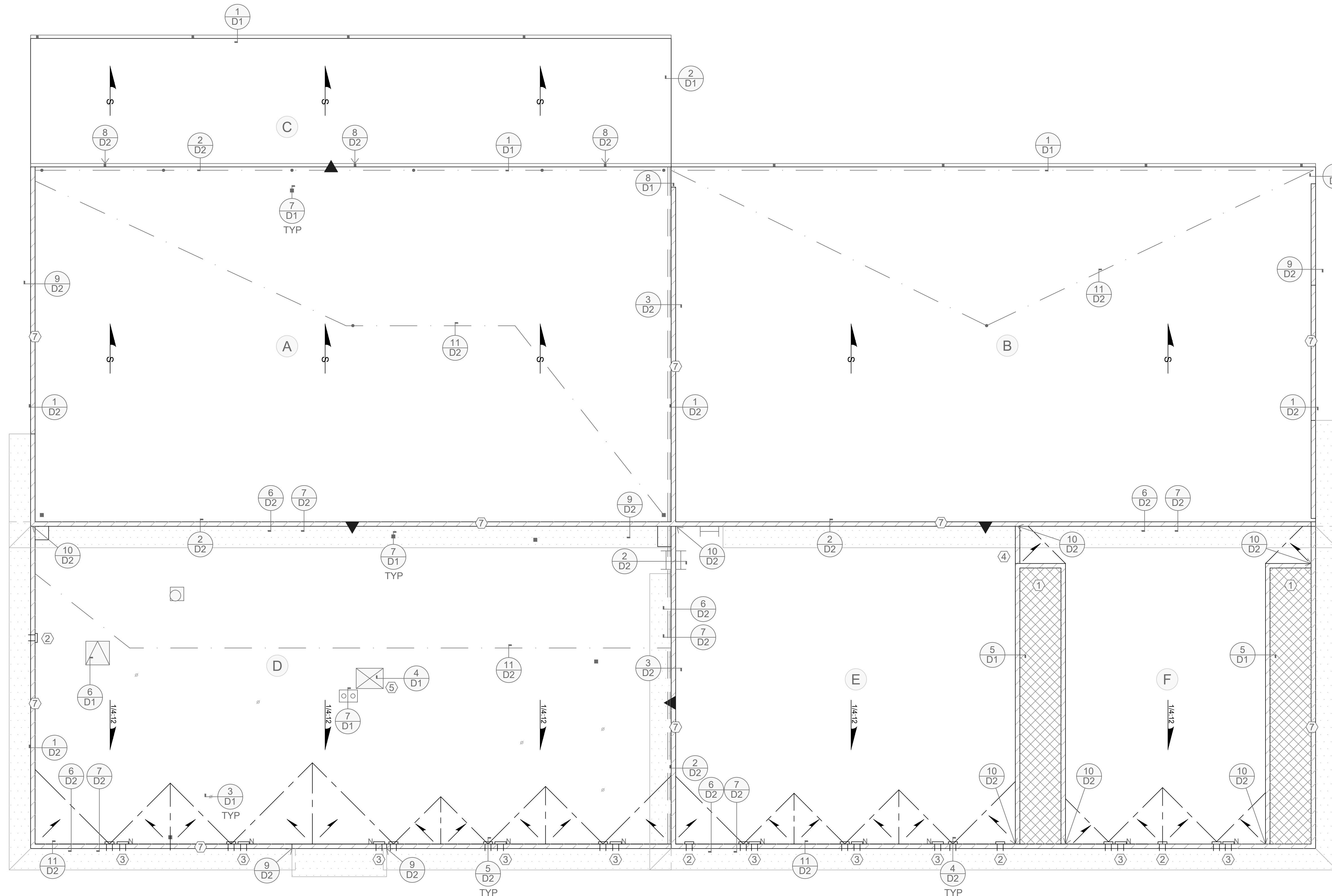
10150 HIGHLAND MANOR DR
SUITE 200
TAMPA, FL 33610
813.944.2137

ROOFING, WATERPROOFING
AND BUILDING ENVELOPE
ENGINEERS & CONSULTANTS
CERTIFICATE NO. C-1520

INDIAN RIVER COUNTY NORTH RO PLANT ROOF REPLACEMENT
7751 58TH AVE
VERO BEACH, FLORIDA 32967



KEY	
	NOT IN CONTRACT
	MANSARD ROOF
	ROOF EDGE
	RIDGE/VALLEY
	LIGHTNING CABLE
	ROOF PARAPET
	WALL EXPANSION JOINT
	GUTTER/DOWNSPOUT
	STRUCTURAL SLOPE
	INSULATION SLOPE
	ROOF SECTION DESIGNATION
	DETAIL NUMBERS
	SOIL STACK
	SCUPPER DRAIN LOCATION
	NEW SCUPPER DRAIN LOCATION
	MULTIPLE PIPE PENETRATION
	PITCH PAN
	ROOF LADDER
	KEY NOTES
	ELEVATION CHANGE
	CURB
	ROOF HATCH
	LIGHTNING AIR TERMINAL



NOTES:

- ① DIESEL GENERATOR VENTS NOT INCLUDED IN ROOF REPLACEMENT SCOPE.
- ② REMOVE EXISTING SCUPPER AND REPAIR WALL OPENING.
- ③ PROVIDE NEW OVERFLOW SCUPPER
- ④ PROVIDE NEW KNEE WALL WITH 8-INCH MINIMUM FLASHING HEIGHT
- ⑤ PROVIDE NEW ENGINEERED HVAC CURB
- ⑥ RAISE ALL CURBS TO MINIMUM OF 8-INCH MINIMUM FLASHING HEIGHT
- ⑦ EXISTING LIGHTNING PROTECTION SYSTEM MOUNTED TO PARAPET WALLS

*CONTRACTOR TO VERIFY FOR BIDDING PURPOSES

ROOF SECTOR	SQUARE FOOTAGE*
A	4,940
B	4,972
C	1,801
D	4,423
E	2,362
F	1,465
TOTAL	19,963

REVISION # REVISION DATE

①	
②	
③	
④	
⑤	

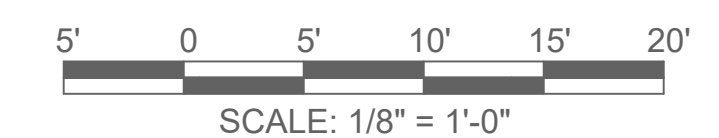
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DATE: 12.18.2018

SHEET DESCRIPTION:
ROOF PLAN

REI PROJECT NO: 018TPA-011

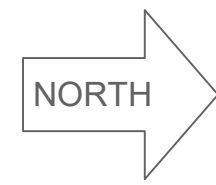
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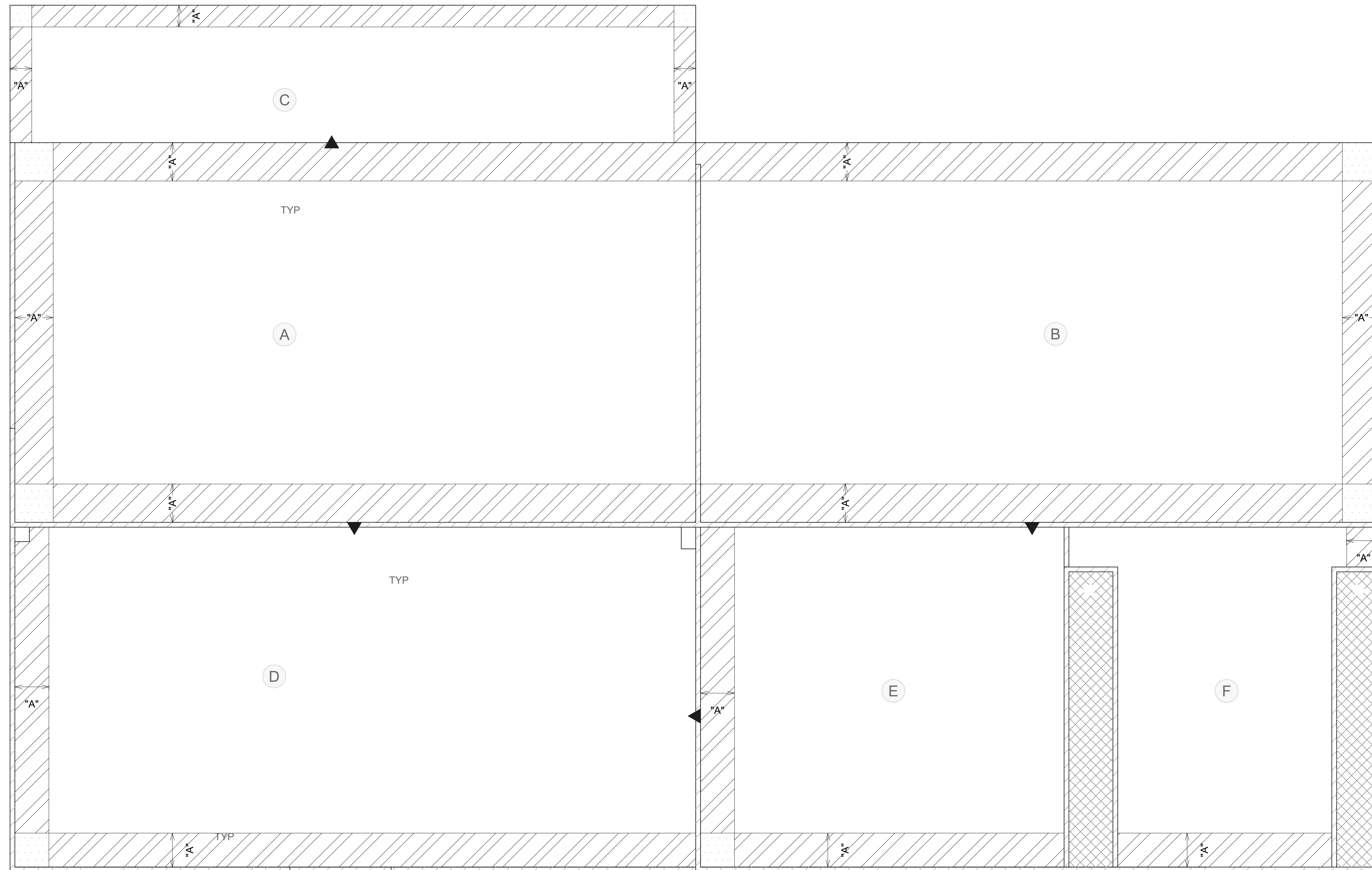


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ROOFING, WATERPROOFING
AND BUILDING ENVELOPE
ENGINEERS & CONSULTANTS
CERTIFICATE NO. C-1520



KEY	
	NOT IN CONTRACT
	ROOF EDGE
	ROOF PARAPET
	ROOF SECTION DESIGNATION
	KEY NOTES



INDIAN RIVER COUNTY NORTH RO PLANT ROOF REPLACEMENT
7751 58TH AVE
VERO BEACH, FLORIDA 32967

WIND DESIGN DATA:				
	SECTOR A & B	SECTOR C	SECTOR D	SECTORS E & F
ULTIMATE DESIGN WIND SPEED:	170 MPH	170 MPH	170 MPH	170 MPH
RISK CATEGORY:	IV	IV	IV	IV
MEAN ROOF HT (H):	25 FT	10 FT	12 FT	17 FT
EXPOSURE CATEGORY:	C	C	C	C
ENCLOSURE CLASSIFICATION:	ENCLOSED	ENCLOSED	ENCLOSED	ENCLOSED
SERVICE WIND PRESSURES COMPONENTS AND CLADDING (PSF):				
ZONE 1:	-45.6	-37.8	-41.0	-38.8
ZONE 2:	-52.7	-63.4	-47.4	-65.1
ZONE 3:	-70.6	-95.4	-63.4	-98.0
ZONE SIZE (A):	5.3 FT	3 FT	4.7 FT	4.7 FT

- FIELD
- PERIMETER
- CORNER

NOTES:

- ① MANSARD ROOFS NOT SHOWN FOR CLARITY.
- ② ROOF DETAIL LOCATIONS NOT SHOWN FOR CLARITY.

REVISION # REVISION DATE

1	
2	
3	
4	

SCALE:

1/8" = 1'

DATE:

12.18.2018

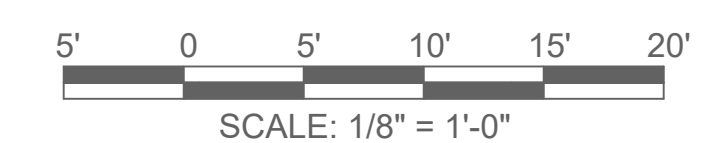
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ATTACHMENT PLAN

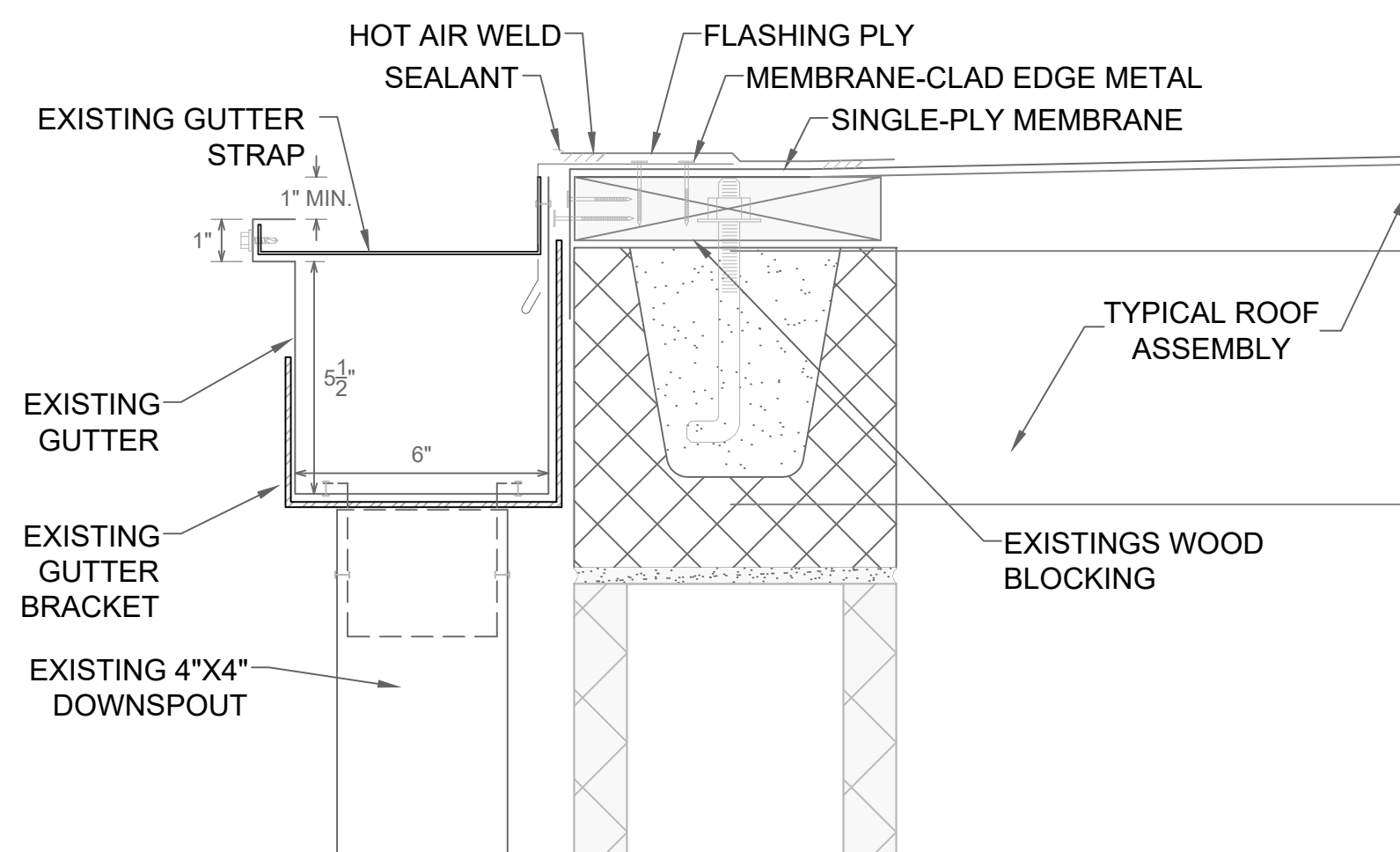
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018TPA-011

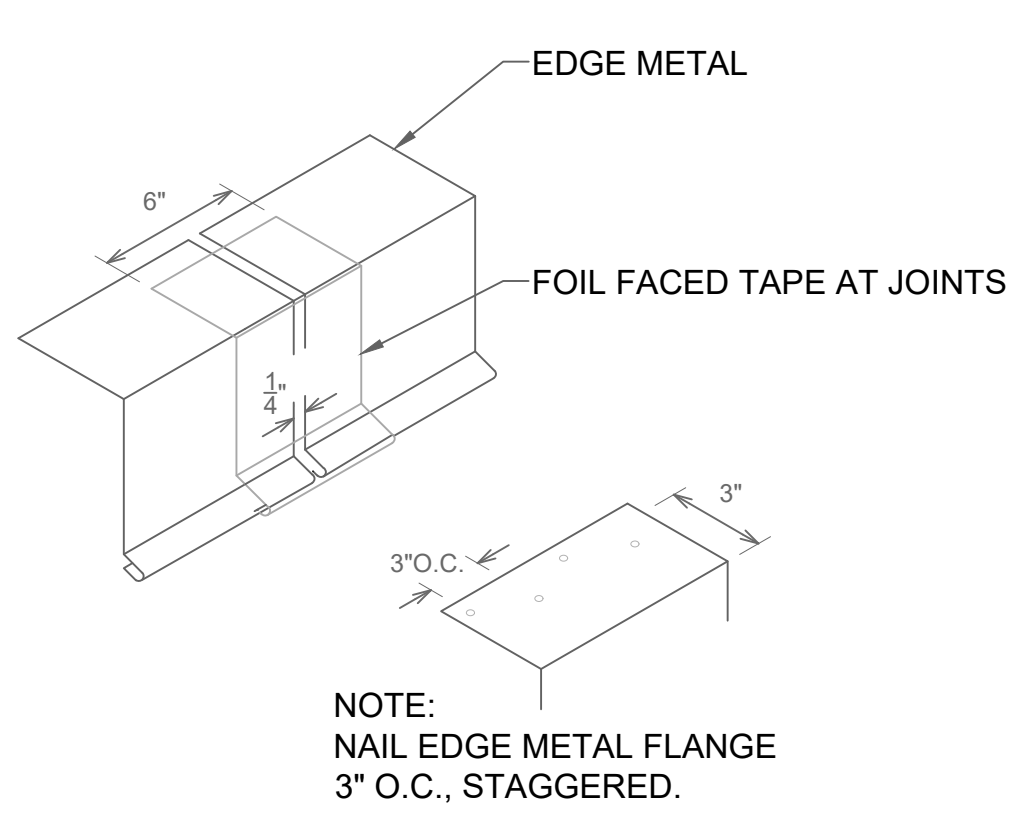
SHEET:

R2

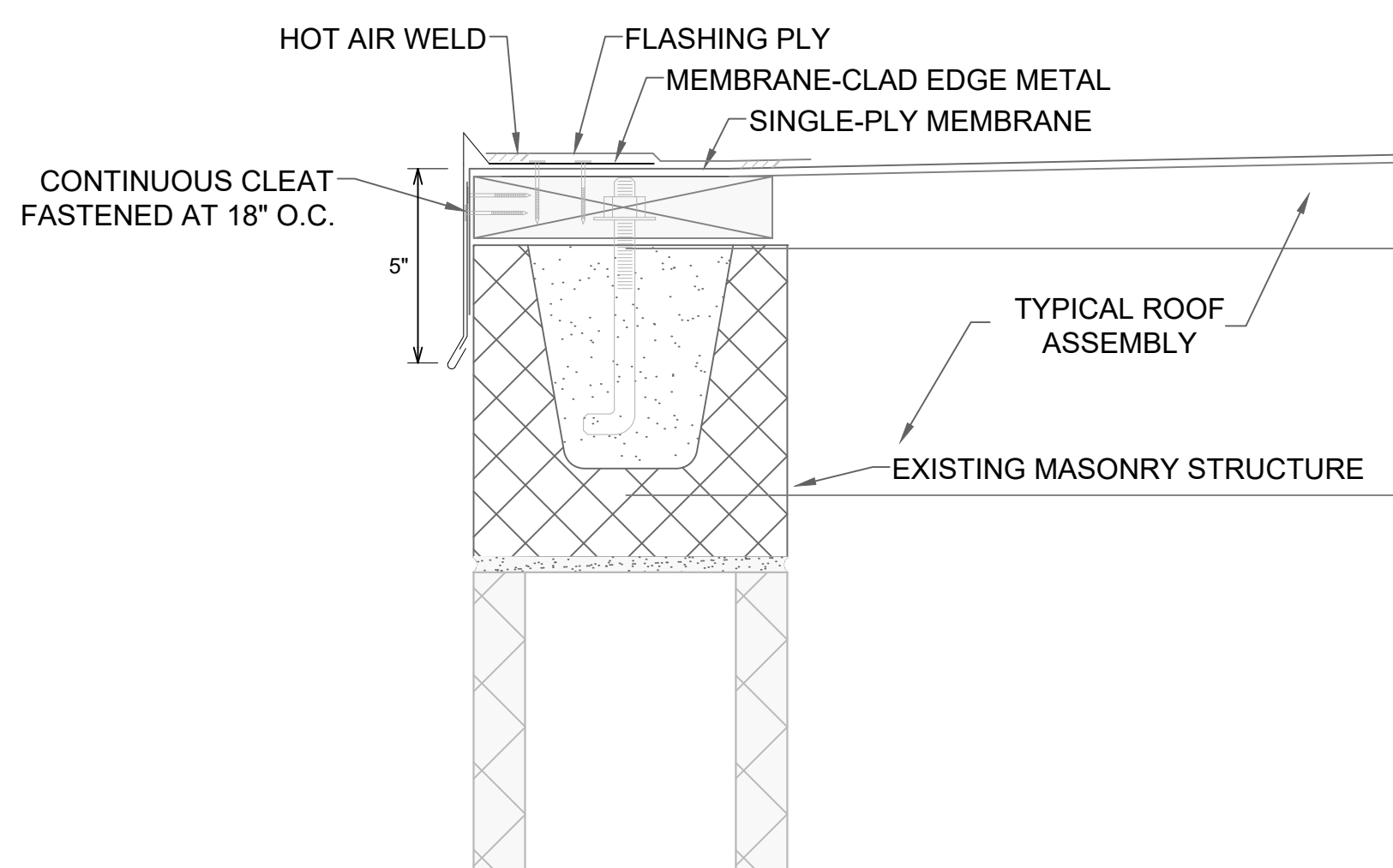




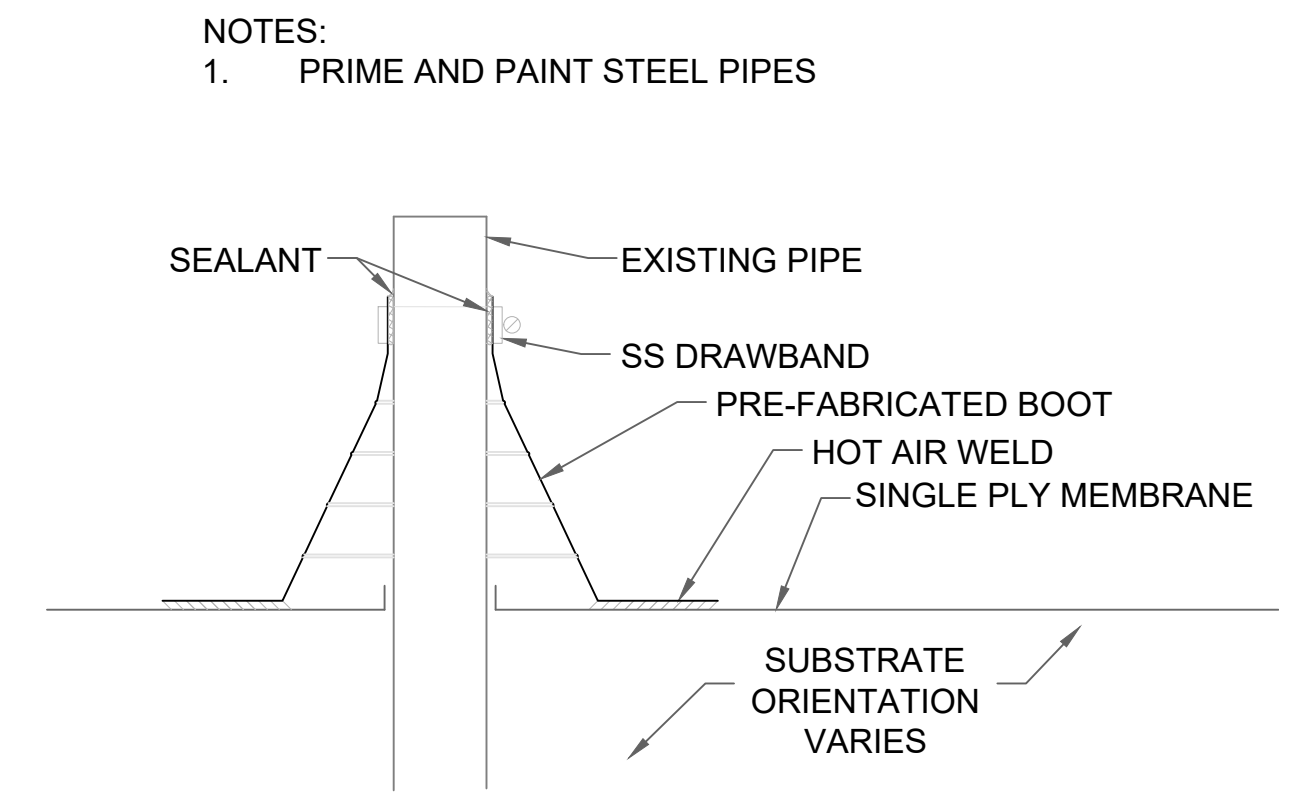
1
D1 GUTTER EDGE
3"=1'-0"



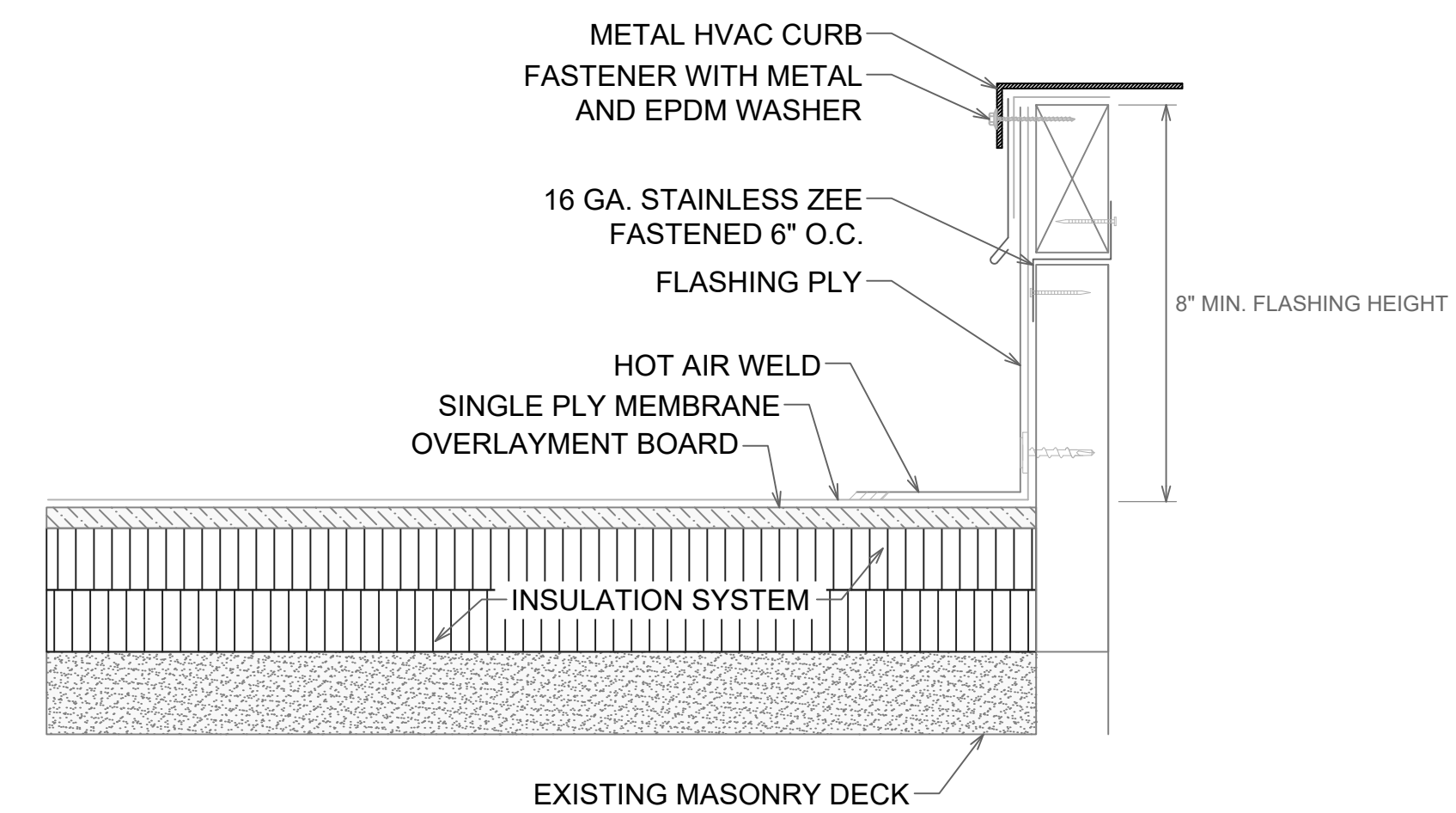
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D1 ROOF EDGE
3"=1'-0"



3
D1 PIPE PENETRATIONS
3"=1'-0"

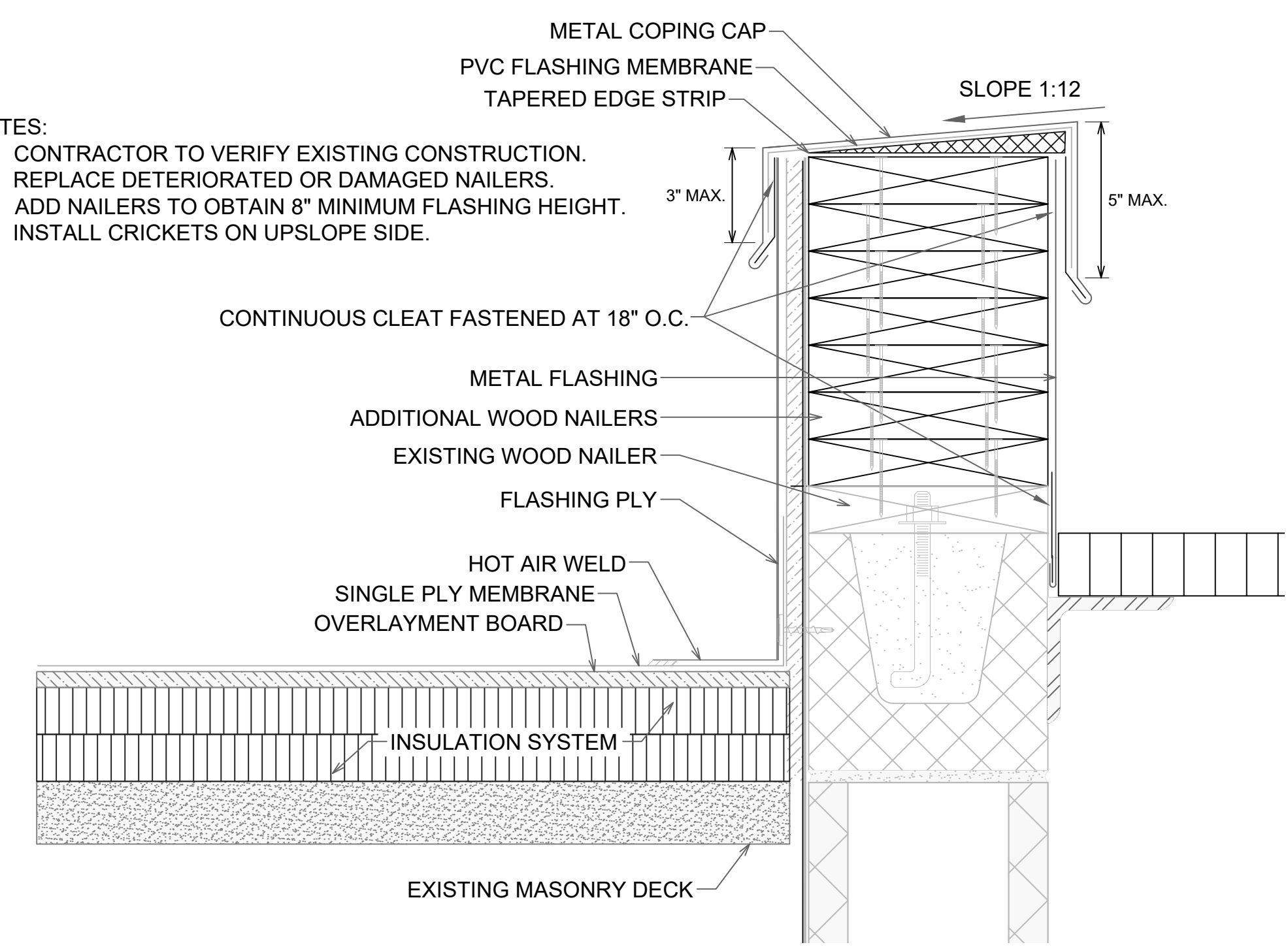


- NOTES:
1. PROVIDE NEW METAL HVAC CURB
 2. CONTRACTOR TO VERIFY EXISTING CONSTRUCTION.
 3. REPLACE DETERIORATED OR DAMAGED NAILERS.
 4. ADD NAILERS TO OBTAIN 8" MINIMUM FLASHING HEIGHT.
 5. INSTALL CRICKETS ON UPSLOPE SIDE OF CURBS.

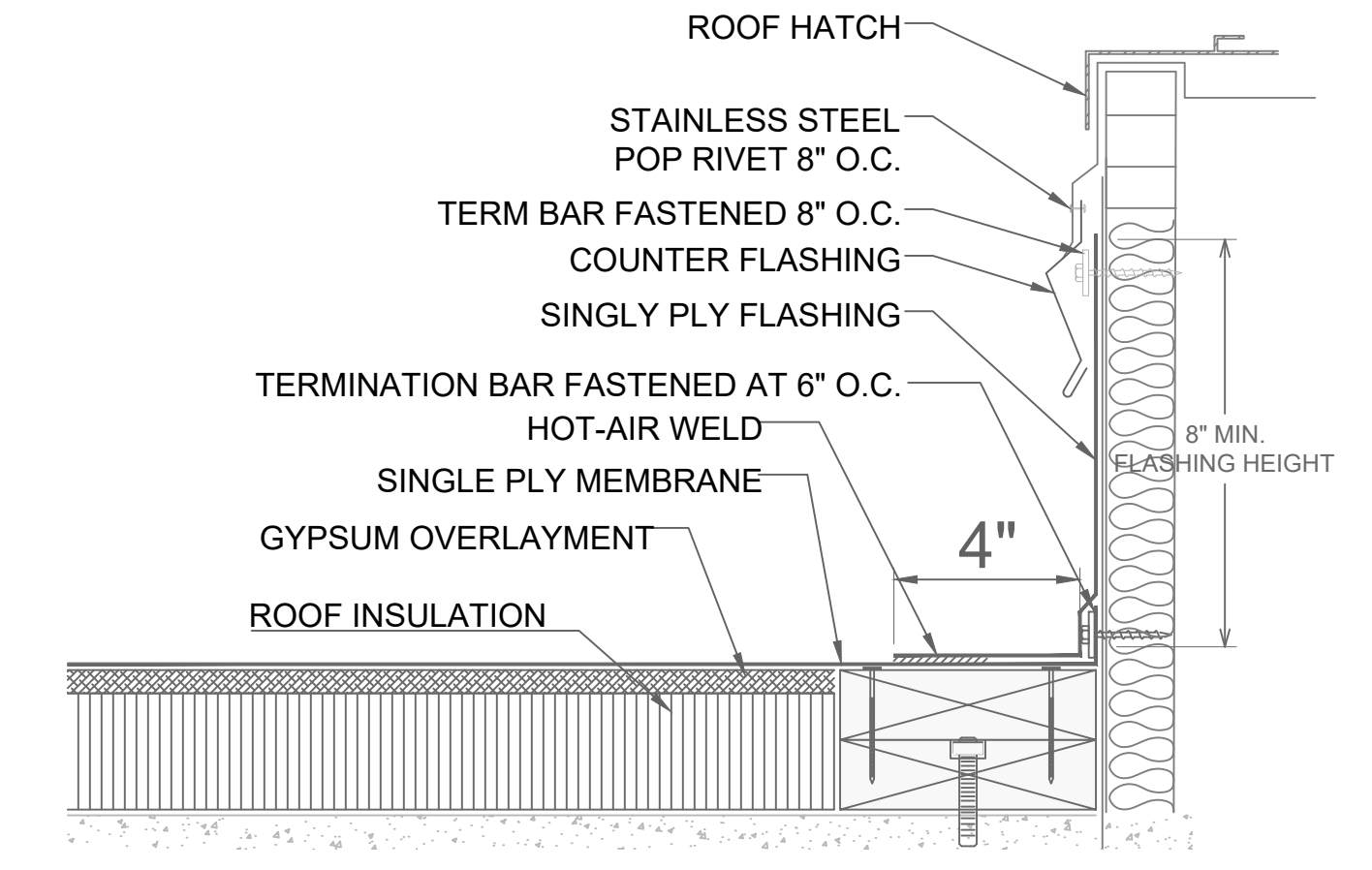


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D1 HVAC CURB
3"=1'-0"

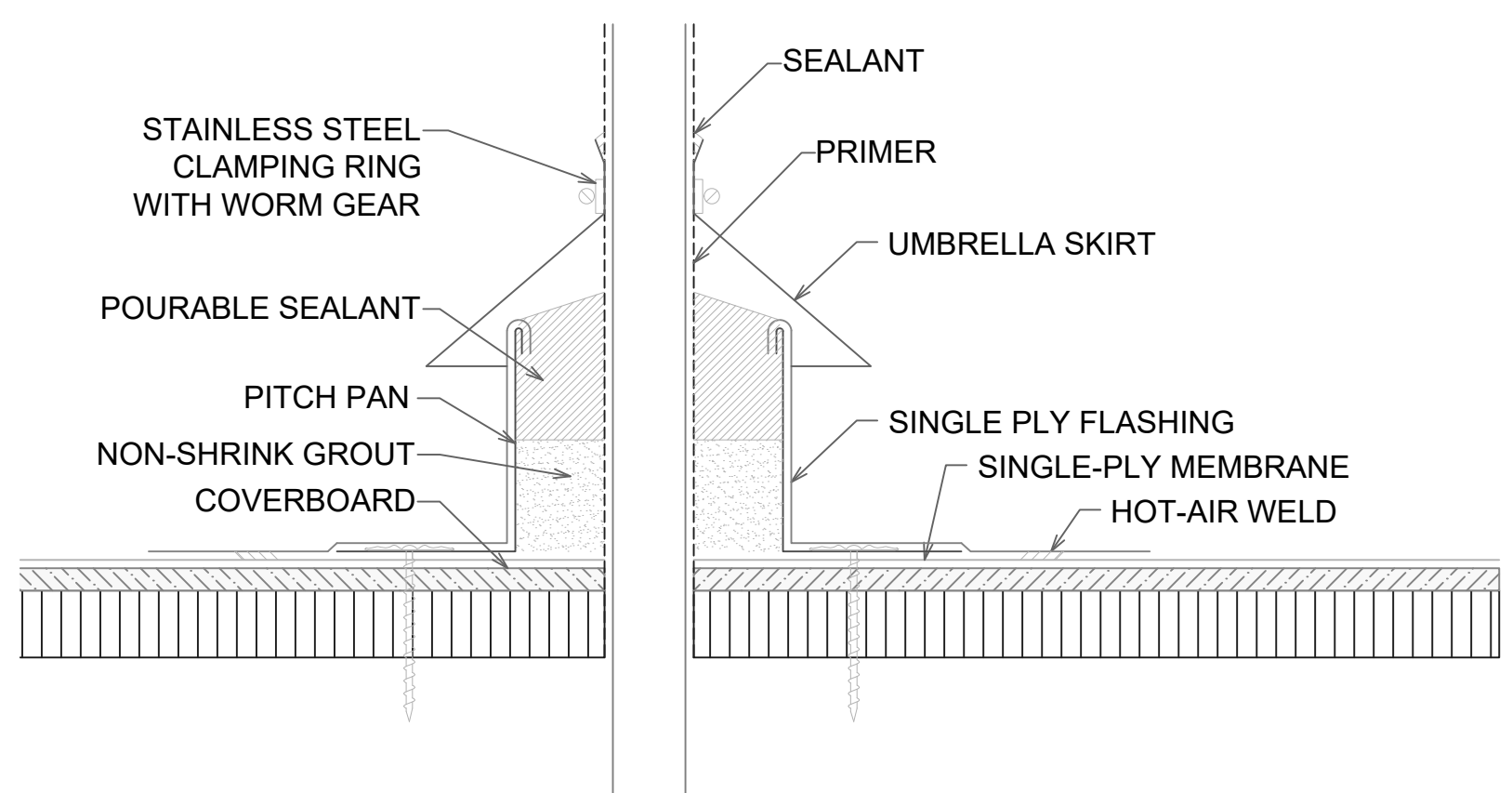
- NOTES:
1. CONTRACTOR TO VERIFY EXISTING CONSTRUCTION.
 2. REPLACE DETERIORATED OR DAMAGED NAILERS.
 3. ADD NAILERS TO OBTAIN 8" MINIMUM FLASHING HEIGHT.
 4. INSTALL CRICKETS ON UPSLOPE SIDE.



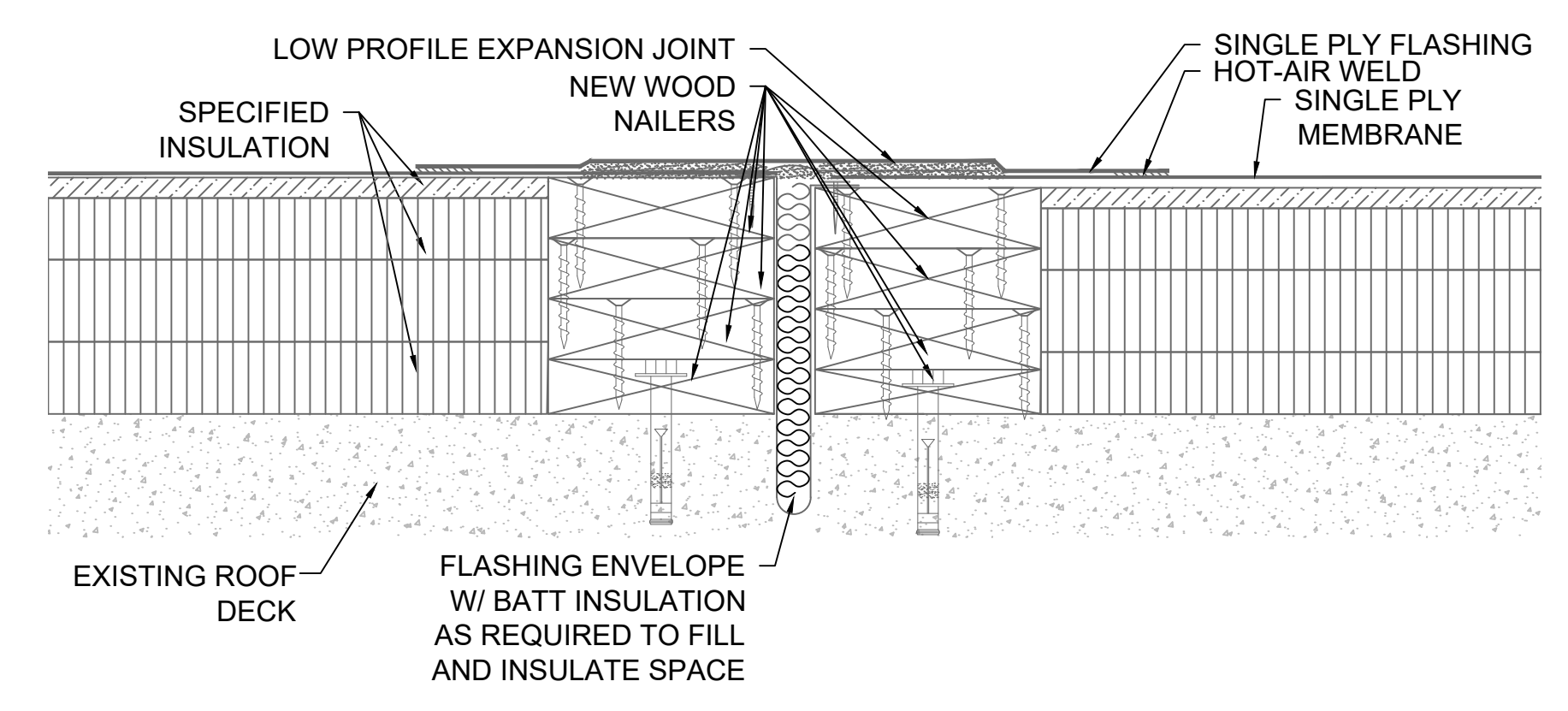
5
D1 PARAPET
3"=1'-0"



6
D1 ROOF HATCH
3"=1'-0"



7
D1 PITCH PAN
3"=1'-0"



8
D1 LOW PROFILE EXPANSION JOINT
3"=1'-0"

REVISION #	REVISION DATE

SCALE: AS NOTED

DATE: 12.18.2018

SHEET DESCRIPTION: ROOF DETAILS

REI PROJECT NO: 018TPA-011

SHEET: D1



10150 HIGHLAND MANOR DR
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ROOFING, WATERPROOFING
AND BUILDING ENVELOPE
ENGINEERS & CONSULTANTS
CERTIFICATE NO. C-1520

INDIAN RIVER COUNTY NORTH RO PLANT ROOF REPLACEMENT
7751 58TH AVE
VERO BEACH, FLORIDA 32967

REVISION # REVISION DATE

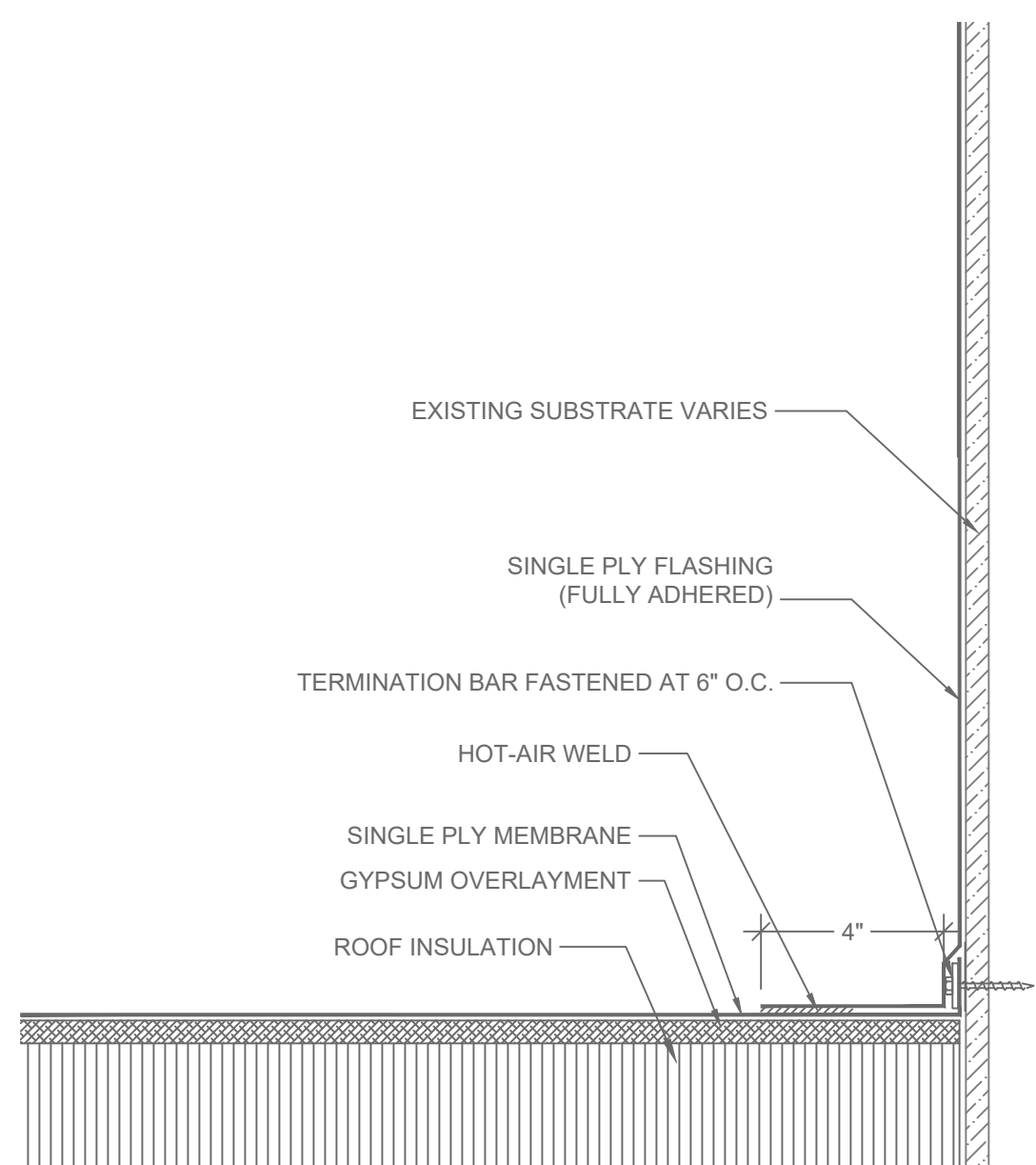
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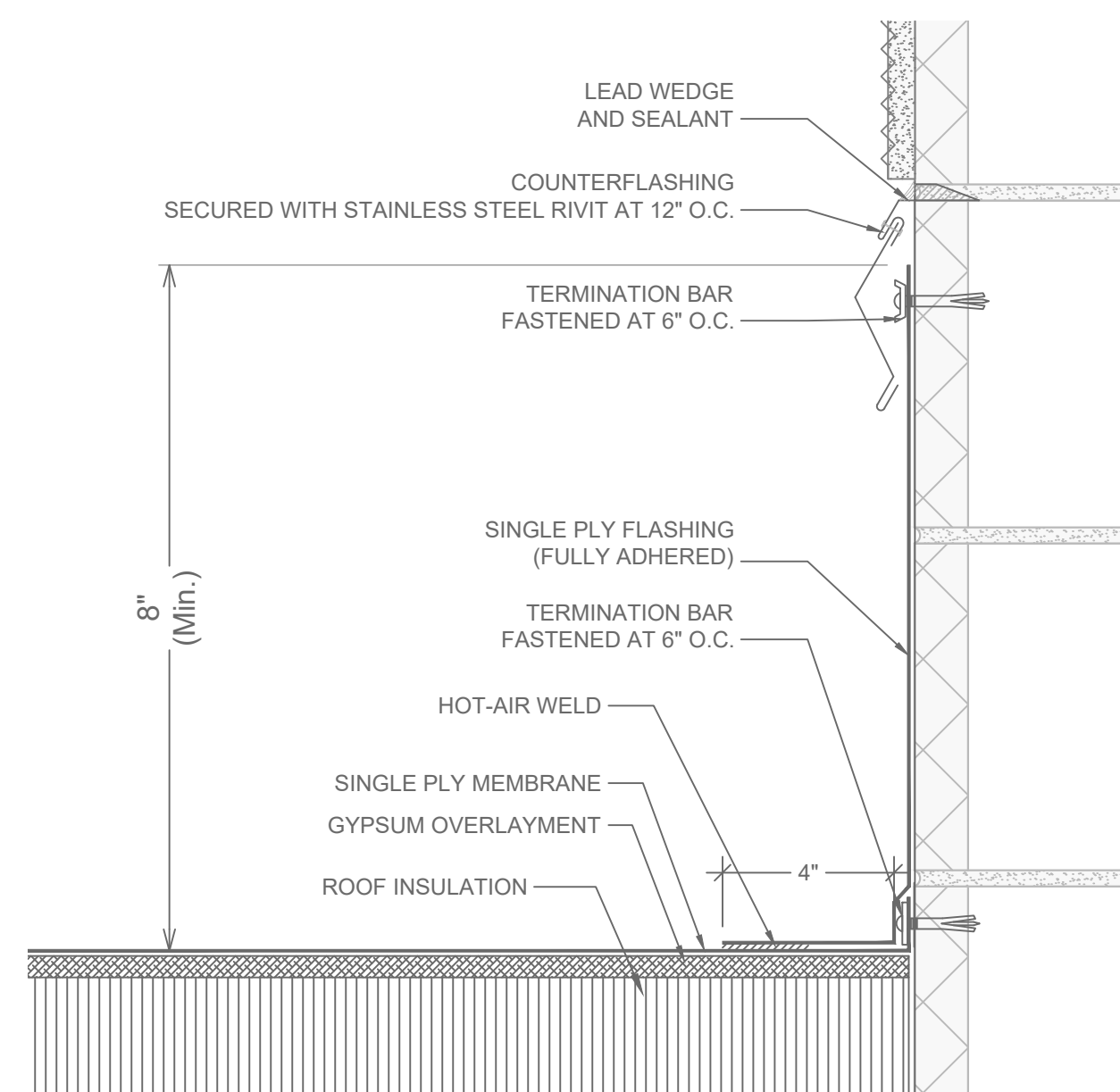
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REI PROJECT NO: 018TPA-011

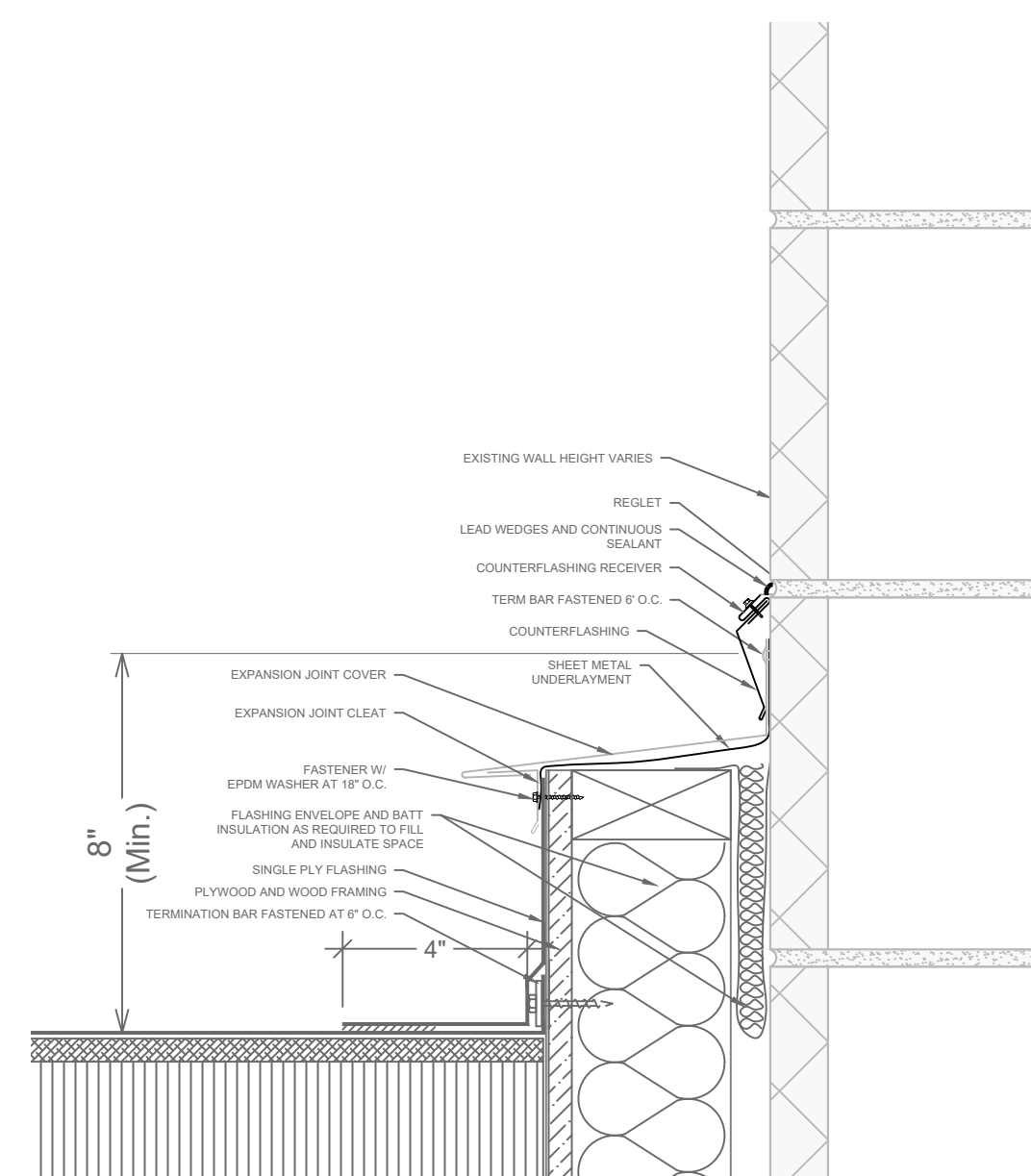
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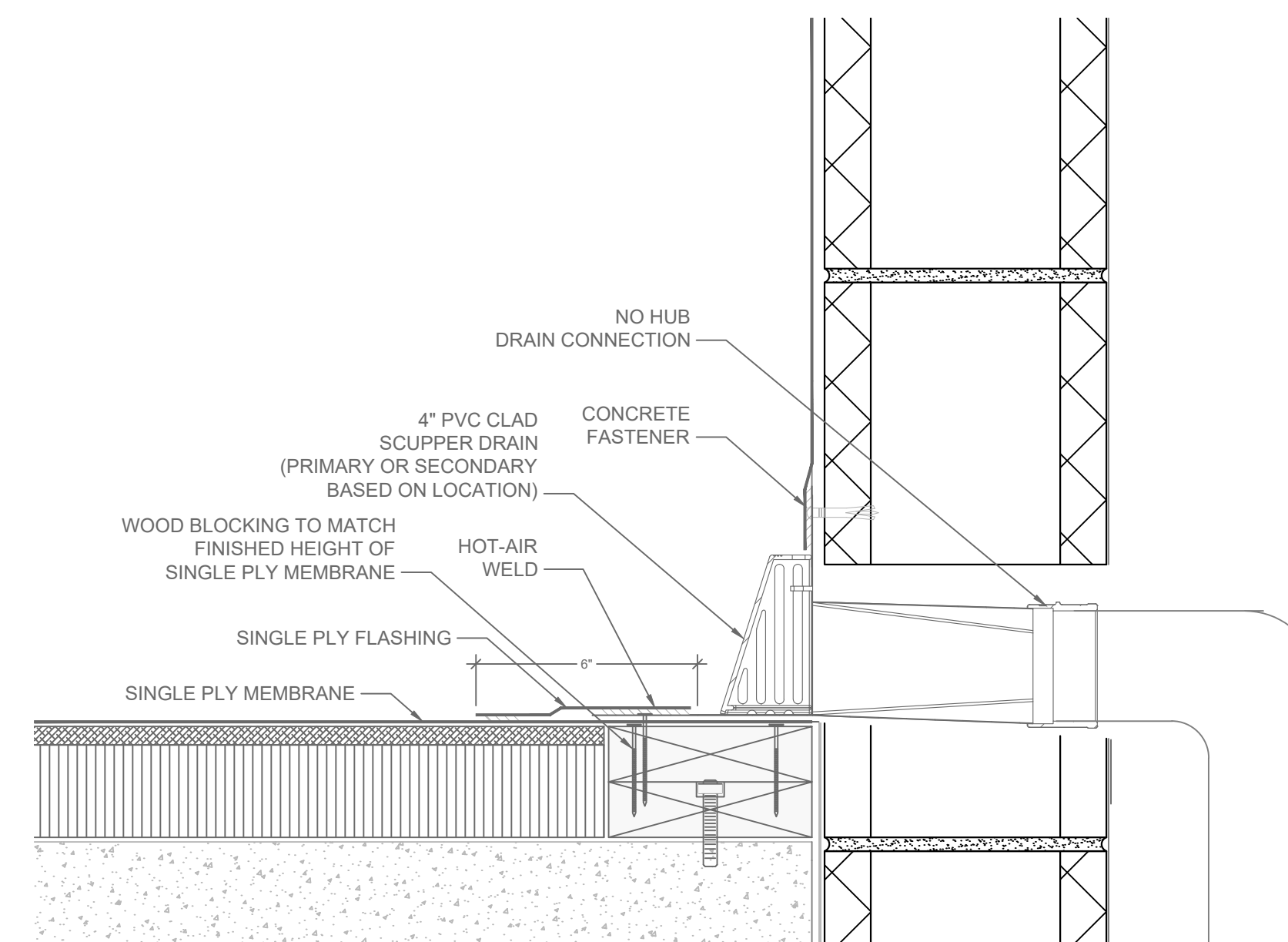
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D2 3\"/>



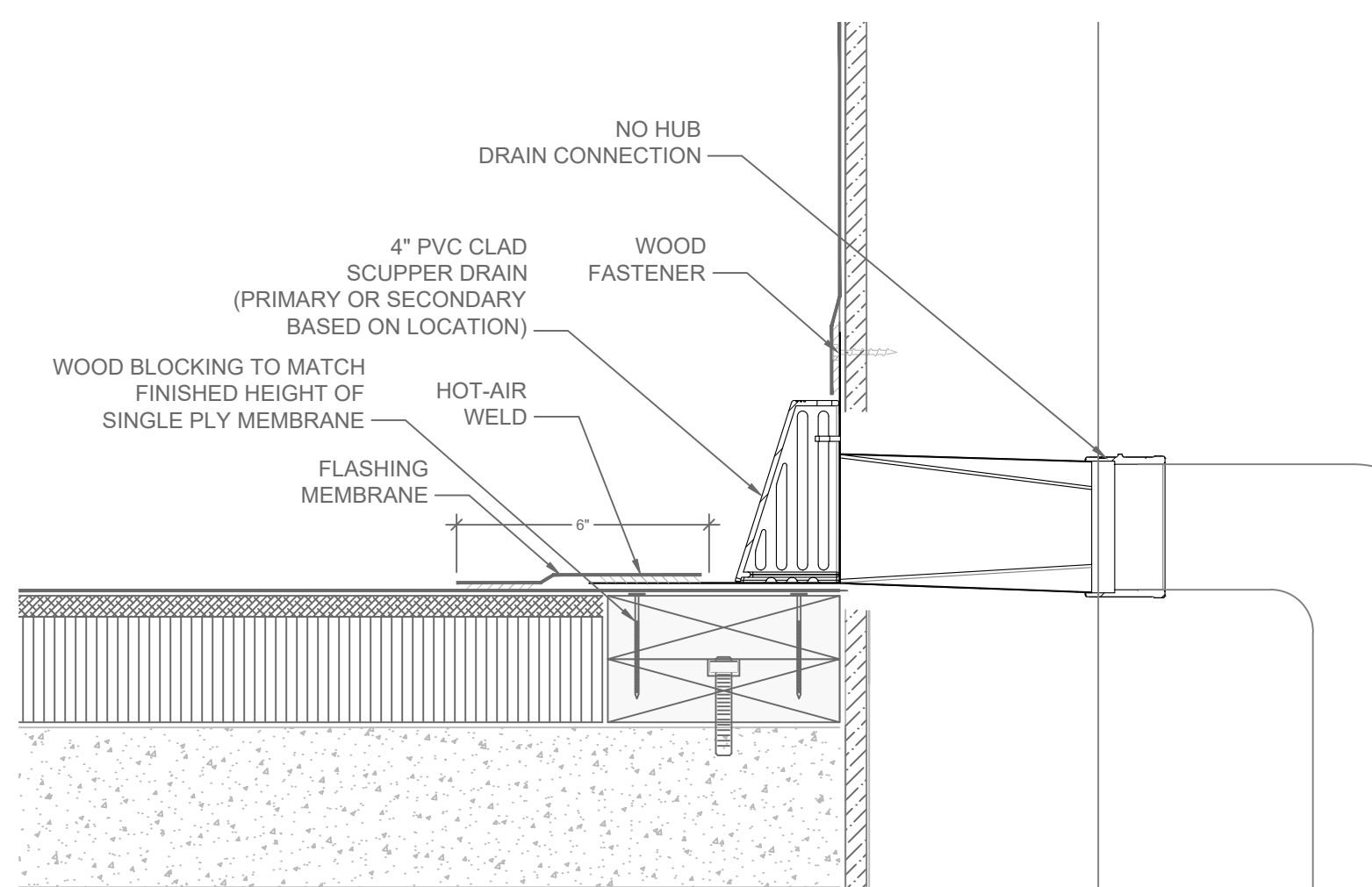
2 WALL FLASHING WITH STUCCO RECEIVER
D2 3\"/>



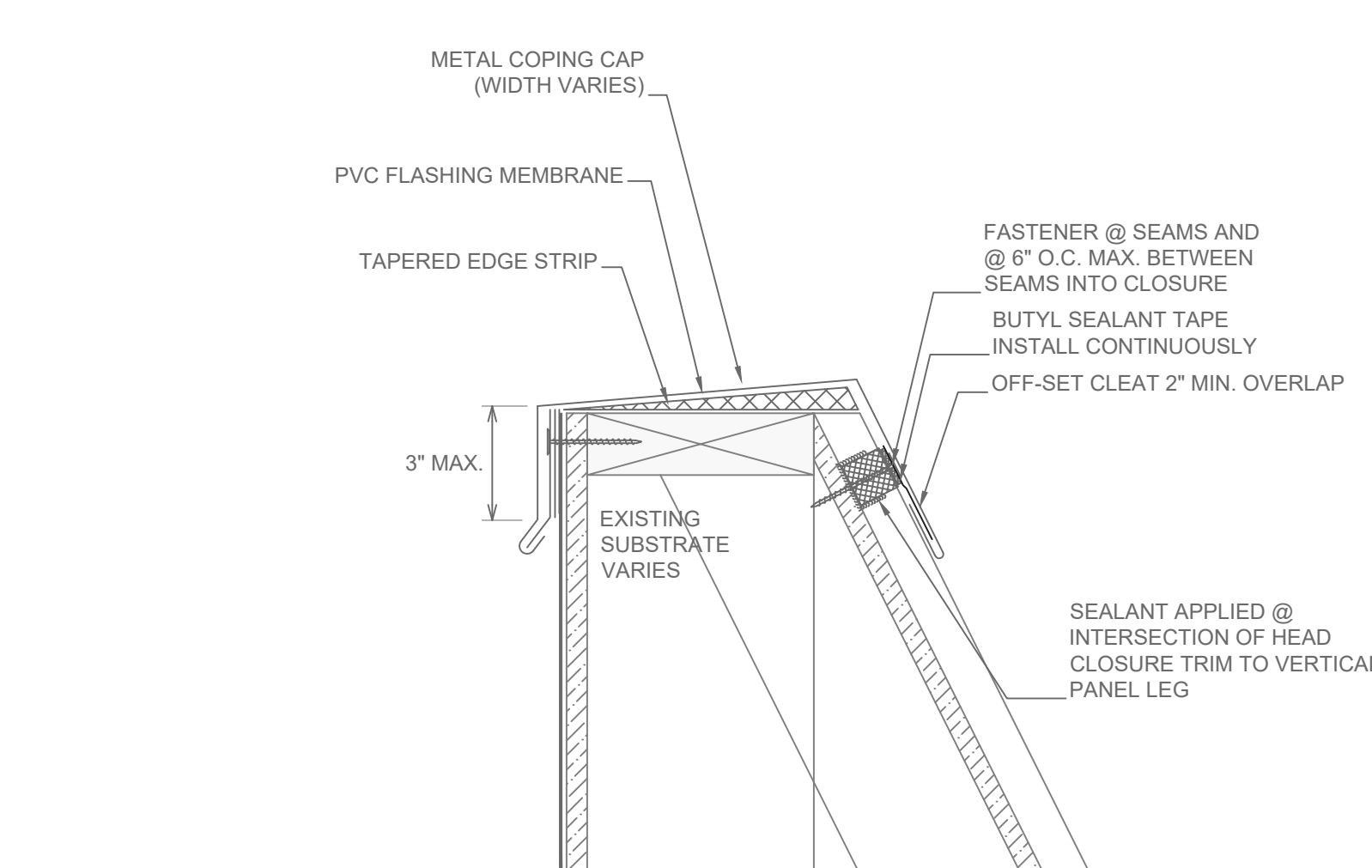
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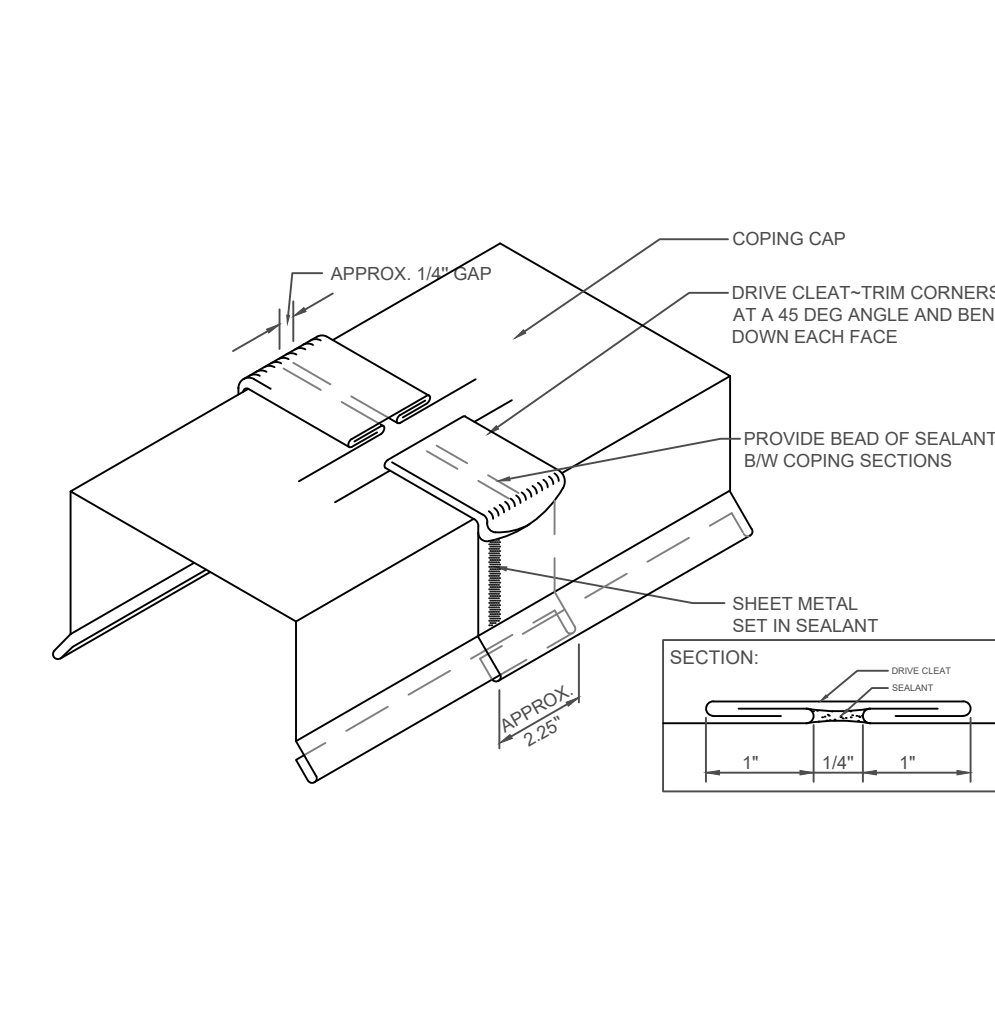
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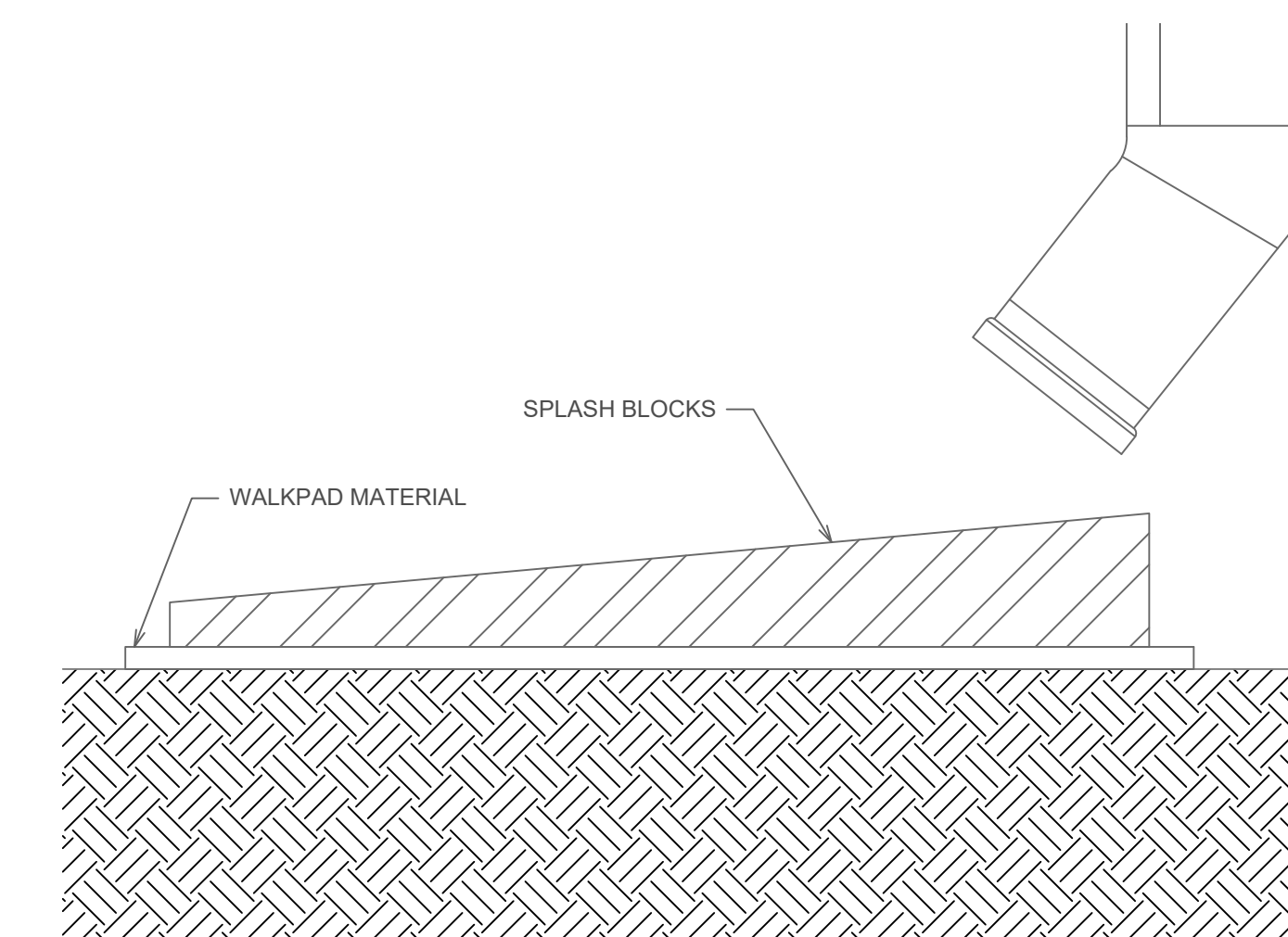
5 SCUPPER DRAIN (WOOD WALL SUBSTRATE)
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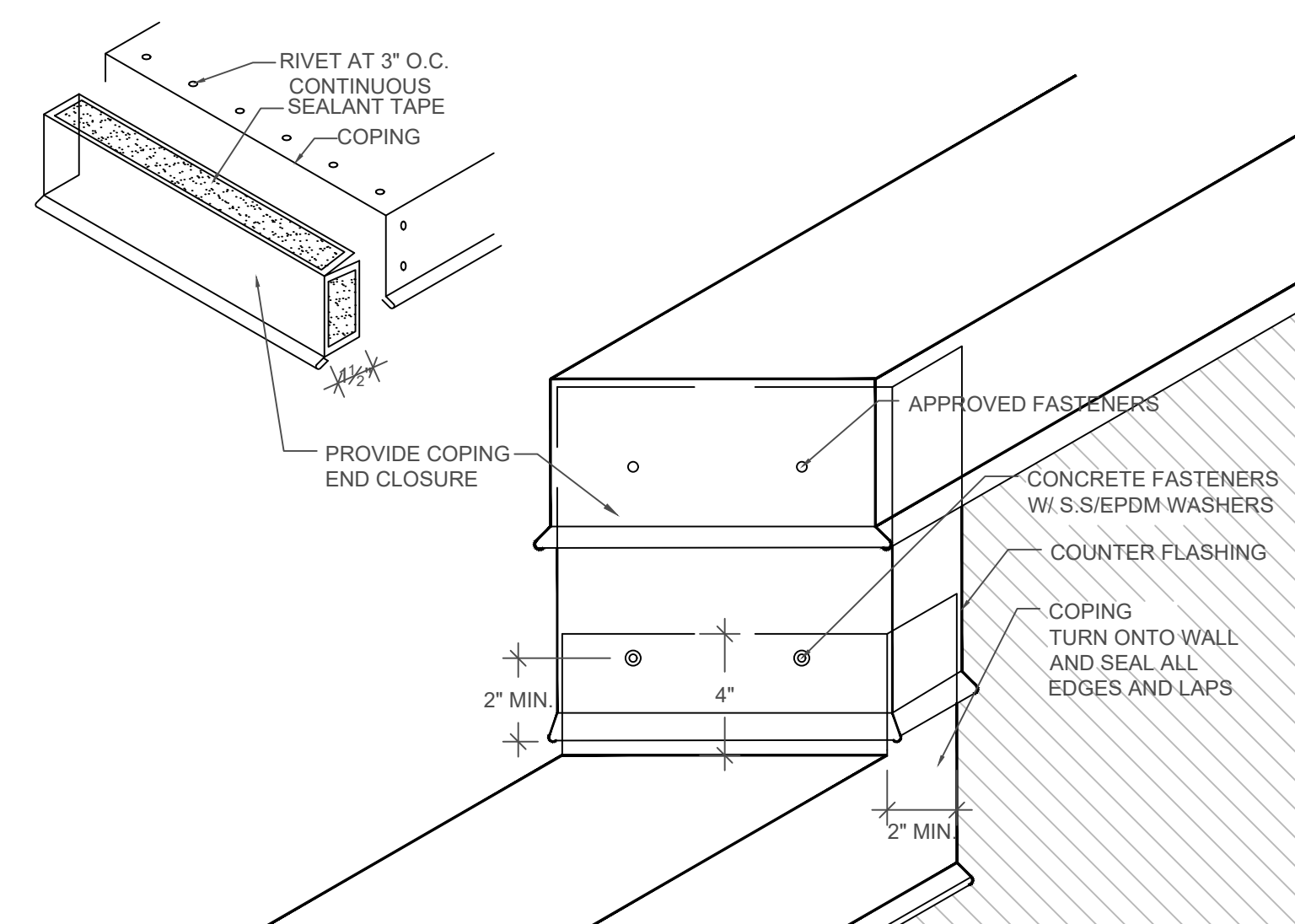
6 COPING CAP
D2 3\"/>



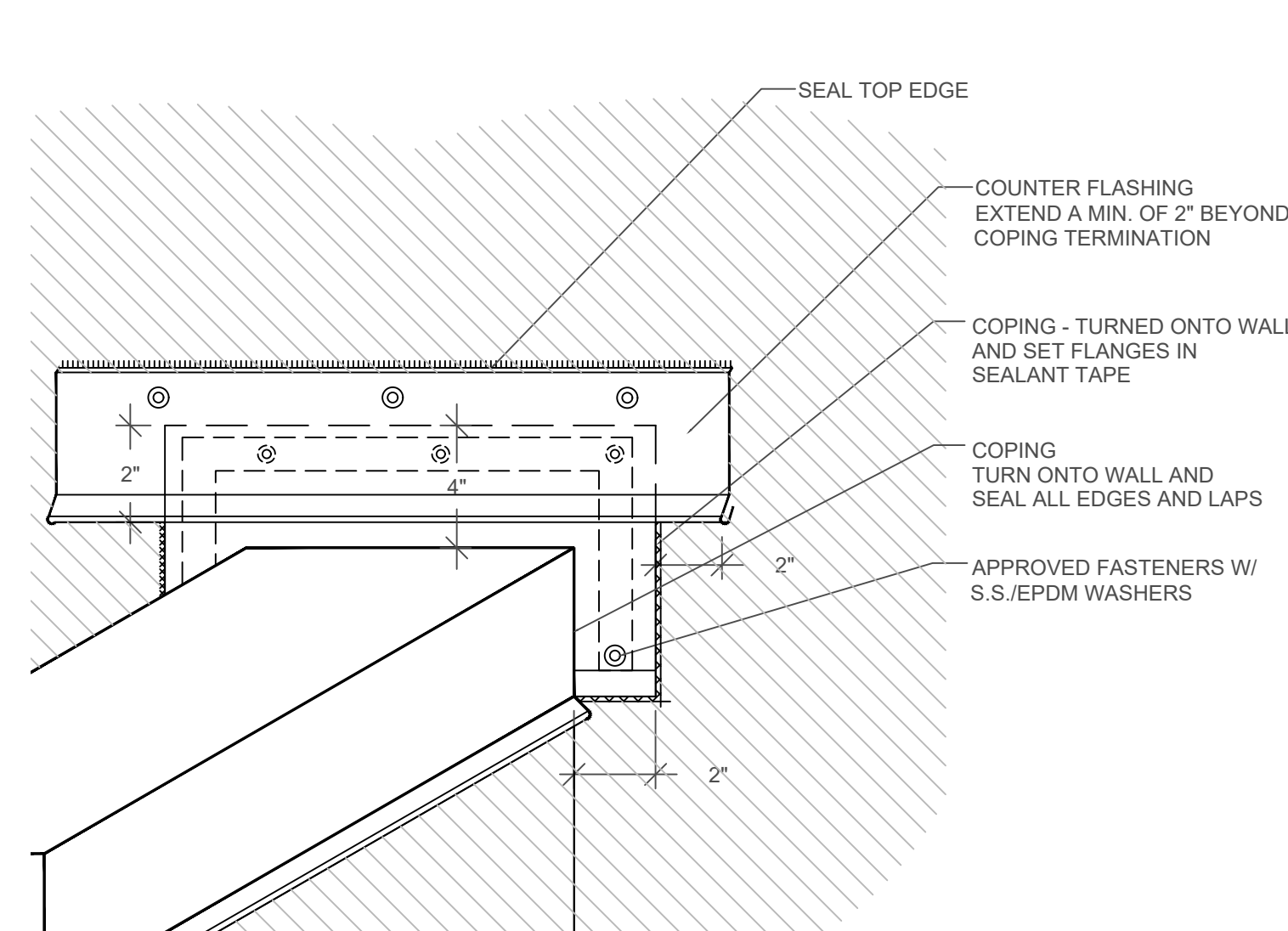
7 COPING JOINT CONFIGURATION
D2 N.T.S.



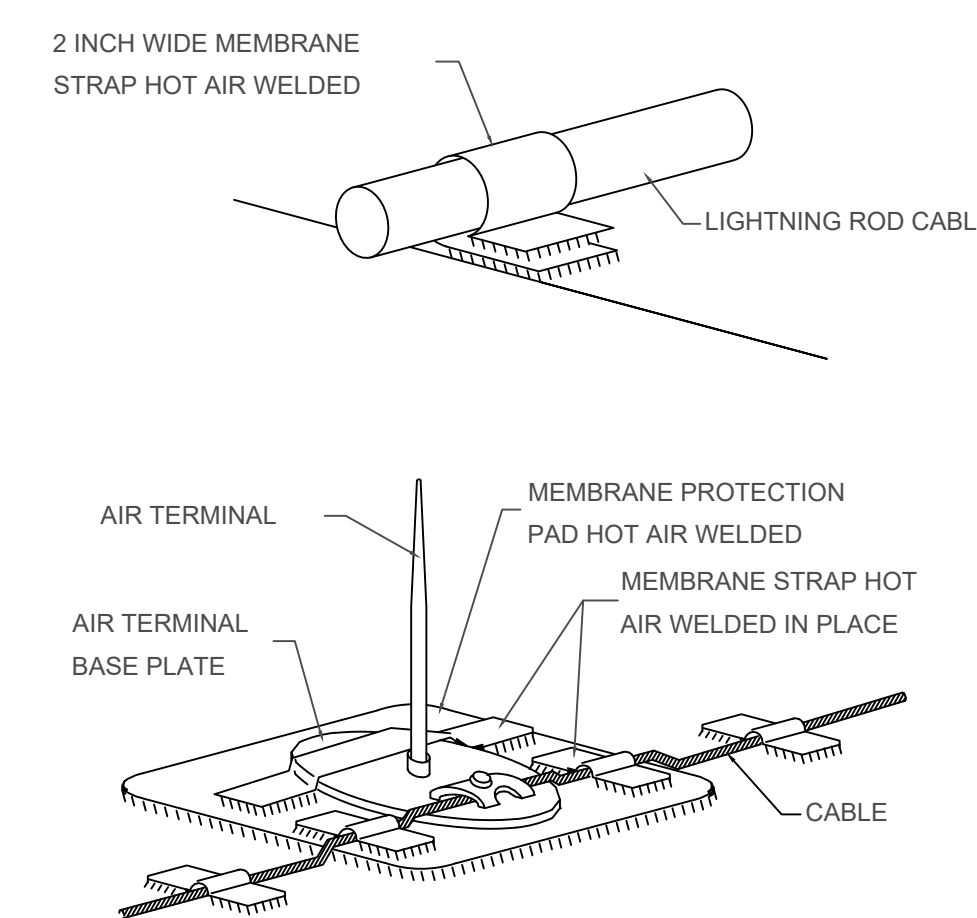
8 SPLASH BLOCKS
D2 N.T.S.



9 COPING STEPPED CONFIGURATION
D2 N.T.S.



10 COPING TERMINATION
D2 N.T.S.



11 LIGHTNING AERIALS
D2 N.T.S.

