

EXHIBIT A

TABLE OF CONTENTS

SPECIFICATION DOCUMENTS

1.01	RELATED DOCUMENTS	4
1.02	SUMMARY OF WORK	4
1.03	QUALITY CONTROL.....	6
1.04	SUBMITTALS	7
1.05	REFERENCES.....	9
1.06	DELIVERY, STORAGE AND HANDLING	10
1.07	SITE CONDITIONS	10
1.08	PAYMENT SECURITY	12
1.09	UNIT PRICES	13
1.10	WARRANTY/MAINTENANCE AGREEMENT	13
2.01	GENERAL.....	14
2.02	ROOF DECKING	14
2.03	CARPENTRY.....	15
2.04	INSULATION	15
2.05	MECHANICAL FASTENERS	15
2.06	ROOFING MATERIALS.....	16
2.07	METAL FLASHINGS.....	17
3.01	EXAMINATION.....	18
3.02	GENERAL WORKMANSHIP	18
3.03	PREPARATION.....	19

3.04	ROOF DECK REPAIRS	20
3.05	THERMAL INSULATION.....	20
3.06	ROOF SYSTEM APPLICATION.....	21
3.07	DAILY WATERSTOP/TIE-INS.....	22
3.08	FLASHINGS	22
3.09	SURFACING TREATMENT ON FLASHINGS.....	25
3.10	WALKWAYS.....	25
3.11	ADJUSTING AND CLEANING	25

TAMKO HERITAGE ARCHITECTURAL COMPOSITION SHINGLE APPLICATION

ROOFTOP PLAN AND DETAILS
ROOFTOP DRAWING

DETAIL DRAWINGS

CONDUIT/PIPE SUPPORT
CURB FOR AIR HANDLING UNIT
DAILY WATERSTOP/TIE IN
METAL CURB
METAL SLEEVE AND STORM COLLAR
METAL WALL FLASHING
PITCH POCKET WITH GROUT
PLUMBING VENT FLASHING
ROOF DRAIN
UNIVERSAL INSULATION FASTENING PATTERN

PART I - GENERAL

1.01 RELATED DOCUMENTS

- A. ~~The attached are components of this section:~~
1. ~~Sample Contract.~~
 2. ~~Supplemental Exhibits.~~

1.02 SUMMARY OF WORK

- A. The work included under these specifications shall consist of furnishing all items, materials, operations, or methods listed, mentioned, indicated, or scheduled in these specifications, including all labor, materials, equipment, insurance, transportation and incidentals necessary and required for project completion.

TOTAL ROOF RENOVATION DESIGNATED ON ATTACHED ROOF DRAWING.

- B. Work includes:
1. The roof manufacturer providing long term warranty shall infra-red existing single ply roofing membrane and designate by marking paint wet and/or deteriorated roof insulation. The roof manufacturer shall provide a detail drawing indicating these wet areas with size of area and dimensions.
 2. The existing single ply membrane is to remain in place and the membrane is cut every 10' to allow for independent movement. All flashings, plumbing projection details etc., are to be removed.
 3. Abolish all non-functioning pitch pans, vent stacks, vertical support pipes, mechanical equipment etc., where designated by marking paint and re-deck where required. Where designated, fabricate and install new metal hoods over the existing curbs.
 4. Localized steel deck repairs, where required. Verify steel deck panels are secured appropriately. **Reference Section 3.04 (A1) of this specification for steel deck attachment.**
 5. Prior to mechanically attaching overlayment gypsum insulation board, inspect the underside of steel decking to ensure enough clearance is provided for the insulation fastener to penetrate decking and not interrupt electric conduct and/or other piping that may have been attached on the underside of the steel decking. Ensure a minimum of 1" penetration clearance into the top flange of the steel decking. The maximum length of the insulation fastener shall be 5". Install the existing single layer Polyisocyanurate insulation system consisting of a base layer of 3" polyisocyanurate insulation and mechanically attached as per specification requirements. Secure overlayment board

consisting of 1/2" Gypsum Fiber roof board and attach in accordance with roof detail drawing. **Reference Section 3.05 of this specification for the execution of the insulation installation.**

6. Install Two (2) ply SBS mineral surfaced modified bitumen roofing system consisting of One (1) ply of Tremco PowerPly Endure 300 smooth modified membrane and One (1) ply of Tremco PowerPly Endure 200 FR modified bitumen membrane set in alternate applications of PowerPly Cold Adhesive. Install roof system in strict accordance with manufacturer's Quality Assurance requirements. **Reference Section 3.06 of this specification for the execution of the roof membrane installation.**
7. Install Two (2) ply flashing system consisting of One (1) ply of Tremco PowerPly Endure 300 smooth modified membrane and One (1) ply of Tremco PowerPly Endure 200 FR set in alternate applications of flashing adhesive to all wall and curb details. Install new cants, metal counterflashing's, bar terminations, and other sheet metal fabrications and sealants as required to provide a watertight system. **Reference Section 3.08 for the execution of the flashing installation.**
8. Fabricate and install pitch pans w/hoods around footings of support piping, conduit etc. Seal according to specifications. Salvage existing parapet coping cover and remove all existing mastics, sealant etc., from existing batten plates. Seal with the specified caulking.
9. Replace all lead jacks and seal according to specifications.
10. Install new roof protection walkway landings along working sides of mechanical equipment and roof access ladders. Roof protection landings shall be 3' x 4' x 3/8" walk treads set in asphalt mastic.
11. Where required, install tapered crickets at all drain locations, high side of curbs, building corners to provide positive drainage. Flash according to specifications. Remove and replace all existing drain screens, ladder clamps, bolts etc., that are found to be deteriorated, broken, or otherwise found missing.
12. Paint all metal flashing surfaces including galvanized metal components, plumbing vents, walk treads, drain screens etc., with aluminum reflective coating.
13. Remove existing composition shingles along the periphery of the building mansard. Replace it with the specified architectural shingle. Remove all existing metal and replace it with pre-finished 24 gage metal.
14. Fabricate and install new pre-finished 24 gage metal R-Panels along the periphery of the interior walls. Provide all metal hat channels, counterflashing and trim
15. Remove existing rectangular satellite dish from the roof and dispose of it appropriately.

This satellite dish is inoperable and will be disconnected by the CNE representative.

1.03 QUALITY CONTROL

- A. Roof Contractor shall:
1. Be experienced in cold process built-up roofing.
 2. Be acceptable to the CNE representative.
 3. Be a Manufacturer Certified/Approved roofing Contractor.
 4. Be registered and endorsed/licensed by the State of Oklahoma.
 5. Utilizing the material manufacturer's local technical inspectors, roof contractors will acquire full-time inspection service days as required by the material manufacturer and/or the CNE representative.
 6. Provide a list of projects available for inspection employing a similar system within a 200-mile radius of the CNE Facility.
 7. Installer must maintain full-time supervisor/foreman on jobsite during times that roofing work is in progress.
 8. Installer shall have in place a formal safety program available for review.
 9. Roof contractor shall provide names of employees with phone numbers available for this project should a problem or leak exist during off-hours, holiday, or weekends.
 10. Roofing contractor shall agree to participate in allowances and adjustments for five (5) years of the warranty period when it is determined by the roof system manufacturer that defects are a result of application and workmanship errors. All defects noted during this time period will be corrected by the roof contractor at their own expense.
- B. Roofing material supplier shall:
1. Be Associate Member in good standing with National Roofing Contractors' Association (NRCA) for at least ten (10) years.
 2. Be nationally recognized in roofing, waterproofing, and moisture survey industry.
 3. Be approved by the CNE representative.
 4. Shall be registered with the State of Oklahoma.
 5. Provide CNE with representative names of at least 3 certified and qualified applicators.
 6. Employ full-time Field Technical Services Representative on a periodic basis for monitoring project work and report to the CNE project representative the progress and quality of workmanship a minimum of two (2) days a week by written field reports. In addition, field representatives shall be available upon the project representative request during roofing activities and weekends.
 7. Employ full-time Field Technical Services Representative available for final roof inspection.
 8. Provide local Field Representative to make periodic site visits, report work quality and job progress.
 9. Provide a list of at least 5 projects available for inspection employing the same roofing system.
 10. The presence and activity of the manufacturer and/or the CNE representative shall in no way relieve the roof contractor of contractual responsibilities or duties.

1.04 SUBMITTALS

- A. Submit prior to the Pre-construction conference:
1. Product compatibility:
 - a. Written verification from roofing material supplier that major roofing components, including (but not limited to) coatings, cold process bitumen, roofing plies, insulation, insulation adhesive, flashing sheeting and mastics; and sealants are all compatible with each other.
 - b. Written verification from primary roofing manufacturer that all major roofing components are manufactured by the primary roofing manufacturer for quality assurance, compatibility, and warranty protection.
 2. Test reports:
 - a. Written verification from roofing material manufacturer that roofing system meets or exceeds regulatory requirements. Provide a copy of approval.
 3. Miscellaneous:
 - a. Documentation that manufacturer has a history of producing/manufacturing roofing systems for at least as long as the manufacturer's longest warranty, and not less than the specified warranty.
 - b. Letter from manufacturer saying that roof contractor has met the required experience for installing the specified cold process built-up roofing system.
- B. Project meetings:
1. Pre-Bid Conference:

A mandatory pre-bid meeting will be scheduled by the CNE representative within the coming weeks. A walkover of the roof will be conducted for those qualified roof contractors for the purpose of reviewing the bidding documents and procedures to receive bidder's questions. Response to questions which are not addressed in these bidding documents or require clarification will be included in an addendum issued to all qualified parties. Roof contractors will assemble near the entrance to the Roland Travel Plaza and be escorted to the roof area.

 - b. Attendance:
 - 1) Roofing material manufacturer.
 - 2) Roof Contractors.
 - 3) The CNE representative.
 - c. Agenda:
 - 1) Distribution of contract documents.
 - 2) Review of specification.
 - 3) Walkover inspection.
 2. Pre-construction conference:
 - a. Will be scheduled by the CNE representative within fifteen (15) days after notice of award.
 - b. Attendance:

- 1) Roofing material manufacturer.
 - 2) Roofing Contractor and project supervisor.
 - 3) CNE representative.
 - c. Agenda:
 - 1) Submittal of insurance certificates.
 - 2) Payment terms.
 - 3) Execution of the CNE-Contractor Agreement.
 - 4) Distribution of contract documents.
 - 5) Designation of responsible personnel.
 - 6) Walkover inspection.
3. Progress meetings:
- a. Will be scheduled by the CNE representative as required.
 - b. Attendance:
 - 1) Roofing material manufacturer/roof contractor.
 - 2) Job superintendent.
 - 3) The CNE representative.
 - c. Minimum agenda:
 - 1) Review of work progress.
 - 2) Field observations, problems, and decisions.
 - 3) Identification of problems which impede planned progress.
 - 4) Maintenance of progress schedule.
 - 5) Corrective measures to regain projected schedules.
 - 6) Planned progress during succeeding work period.
 - 7) Coordination of projected progress.
 - 8) Maintenance of quality and work standards.
 - 9) Effect of proposed changes on progress schedule and coordination.
 - 10) Other business relating to work.
4. Final inspection:
- a. Will be scheduled by roofing material manufacturer upon job completion.
 - b. Attendance:
 - 1) Roofing Contractor.
 - 2) CNE representative.
 3. Roofing Material Manufacturer.
 - c. Minimum agenda:
 - i) waikover inspection.
 - 2) Identification of problems which may impede issuance of warranty.
- C. Random sampling:
1. Roofing material:
 - a. During the course of work, the CNE representative may secure samples according to ASTM D140-88 of materials being used from containers at job site and submit

- them to an independent laboratory for comparison to specified material.
- b. Should test results prove that a material is not functionally equal to specified material:
 - 1) Roof Contractor shall pay for all testing.
 - 2) Roofing installed and found not to comply with the specifications shall be removed and replaced at no change in the contract price.
- D. Regulatory and permit requirements:
- 1. Underwriters Laboratory (U.L)
 - 2. Roof Contractor registration and endorsement with the State of Oklahoma.
- E. Plans and specifications:
- 1. Roof Contractor must notify the CNE representative and specifier of any omissions, contradictions, or conflicts before the bid date. The CNE representative and specifier will provide necessary corrections or additions to plans and specifications by addendum. If the contractor does not notify the CNE representative and specifier of any such condition, it will be assumed that the contractor has included the necessary items in the bid to complete this specification.
 - 2. It is the intent that this be a completed project as far as the contract documents set forth. It is not the intent that different phases of work on this project be delegated to various trades and subcontractors by the contract documents. The Roof Contractor must make their own contracts with various subcontractors, setting forth the work these subcontractors will be held responsible for. Roof Contractor alone will be held responsible by the CNE representative for the completed project.
 - 3. If the contractor feels a conflict exists between what is considered good roofing practice and these specifications the roof contractor shall state in writing all objections prior to submitting their quotations.
 - 4. CNE will be responsible for all electrical and plumbing disconnections on all units and equipment designated to be removed. All large units resting on I beam supports and curbs and are designated to be removed, will be removed, and appropriately disposed of by the roofing contractor. The roofing contractor will also be responsible for removing all curbs and support structures, designated by marking paint. CNE will provide the required information identifying discontinued electrical conduit and power boxes located on the underside of the steel decking. CNE will be responsible for disconnecting the lighting conduit along the interior of the parapet wall. Roof contractors shall take every precaution necessary not to engage electrical conduit/boxes etc., when it is determined that these electrical components are active.
 - 5. It is the contractor's responsibility during the course of the work to bring to the attention of the CNE representative any defective membrane, insulation or deck discovered where not previously identified.

1.05 REFERENCES

- A. ASTM - American Society for Testing and Materials, Philadelphia, PA.

- B. RIC/TIMA Technical Bulletin 281-1 - Roof Insulation Specimen Conditioning Procedure, The Roof Insulation Committee of the Thermal Insulation Manufacturers Association, Mt. Kisco, NY.
- C. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Vienna, VA.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Delivery of materials:
 - 1. Deliver materials to job-site in new, dry, unopened, and well-marked containers showing product and manufacturer's name.
 - 2. Deliver materials in sufficient quantity to allow continuity of work.
 - 3. Coordinate delivery with the CNE representative.
- B. Do not order project materials or start work before receiving written approval from the CNE representative.
- C. Storage of materials:
 - 1. Store roll goods on ends only. Discard rolls which have been flattened, creased, or otherwise damaged. Place materials on pallets. Do not stack pallets.
 - 2. Stack insulation on pallets.
 - 3. Store materials marked "keep from freezing" in areas where temperatures will remain above 5EC (40EF).
 - 4. Store metal roof deck on pallets with one end elevated to provide drainage.
 - 5. Remove plastic packaging shrouds. Cover top and sides of all stored materials with tarpaulin (not polyethylene). Secure tarpaulin.
 - 6. Rooftop storage: Disperse material to avoid concentrated loading.
 - 7. No materials may be stored in open or in contact with ground or roof surface.
 - 8. Should the Roof Contractor be required to quickly cover material temporarily, such as during an unanticipated rain shower, all materials shall be stored on a raised platform covered with secured canvas tarpaulin (not polyethylene), top to bottom.
 - 9. Roof Contractor shall assume full responsibility for the protection and safekeeping of products stored on premises.
- D. Material handling:
 - 1. Handle materials to avoid bending, tearing, or other damage during transportation and installation.
 - 2. Material handling equipment shall be selected and operated so as not to damage existing construction or applied roofing. Do not operate or situate material handling equipment in locations that will hinder smooth flow of vehicular or pedestrian traffic.
 - 3. Cold Process Trilaminate Ply Sheet: Do not remove packaging tubes until roll is ready for use.

1.07 SITE CONDITIONS

- A. Field measurements and material quantities:
 - 1. Applicators shall have SOLE responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect work.

- B. Existing conditions:
 - 1. Building space directly under roof area covered by this specification will be utilized by on-going operations. Do not interrupt the CNE operations unless prior written approval is received from their representative.
 - 2. Access to the roof shall be from the exterior only.
 - 3. Air-conditioning units and other equipment shall be moved as required to install roofing materials completely and in accordance with plans and specifications. When units and equipment are to be moved, they shall be carefully disconnected and removed to a protected area so as not to damage any part or component thereof and shall be reconnected in such a way that they are restored to a prior work operating condition. Appropriate measures shall be taken to prevent dust, vapors, gases, or odors from entering the building during roof removal, replacement, or repair.
 - 4. All disconnections and re-connections shall be performed by a mechanical and/or electrical company licensed to perform such work.

- C. Asbestos:
 - 1. The roof Contractor agrees to exonerate, indemnify, defend, and hold harmless CNE and roofing material manufacturer from and against all claims, demands, lawsuits, damages, expenses, and losses incurred by roof contractor's removal of asbestos-containing materials from the CNE building and work site. Roof contractor must conduct its operations according to applicable requirements including but not limited to those established by:
 - a. Occupation Safety and Health Administration (OSHA).
 - b. Environmental Protection Agency (EPA).
 - c. Department of Transportation (DOT).
 - d. State or Local Air Pollution Control Authorities/Agencies.
 - e. State or Local Solid Waste or Hazardous Waste Authorities/Agencies.
 - f. State or Local Health Department(s).
 - g. State or Local Building Code Authorities.
 - h. Other federal, state, or local agencies or authorities.
 - 2. Roof Contractor shall perform appropriate inspections, surveys, and file timely notifications to proper authorities prior to starting roof renovation or demolition activities. Inspectors, project planners, project managers, contractors and workers involved in the roof project shall have appropriate training, licenses, and registrations. Roof Contractor shall be responsible for determining and implementing regulatory compliance activities, including but not limited to work practices, engineering controls, personal protection, air monitoring, testing, hazard communication, material handling, record retention, and arranging for waste disposal/handling.
 - 3. Roof contractors must file a Uniform Hazardous Waste Manifest from proper landfill

site for each load of asbestos containing material removed. Copies must be sent to the CNE representative and material manufacturer/specifier. Transportation of waste shall be in accordance with applicable Department of Transportation (DOT) requirements.

D. Safety requirements:

1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.
2. Comply with federal, state, local and the CNE fire and safety requirements.
3. Advise the CNE representative whenever work is expected to be hazardous to employees, and/or operators.
4. Maintain a crewman as a floor area guard whenever roof decking is being repaired or replaced.
5. Maintain fire extinguisher within easy access whenever power tools, roofing kettles, and torches are being used.

E. Waste Disposal:

1. Do not re-use, re-cycle or dispose of product containers except in accordance with all applicable regulations. The user of these products is responsible for proper use and disposal of product containers.

F. Environmental requirements:

1. Do not work in rain, snow, or in the presence of water.
2. Do not work in temperatures below 4.44EC (40EF).
3. Do not install materials marked "keep from freezing" when daily temperatures are scheduled to fall below 4.44EC (40EF).
4. Do not perform masonry work below 4.44EC (40EF).
5. Remove any work exposed to freezing.
6. Advise the CNE representative when volatile materials are to be used near air ventilation intakes so that they can be shut down or blocked as required.

G. Security requirements:

1. Comply with the CNE security requirements.
2. Provide the CNE representative with a current list of accredited persons.
3. Check in daily with CNE Security.

H. Temporary sanitary facilities:

1. Furnish, install, and maintain temporary sanitary facilities for employees' use during the project. Remove on project completion. Sanitary facilities will be off limits to the roofing crews.
2. Place portable toilets in conformance with applicable laws, codes, and regulations.

1.08 PAYMENT SECURITY

- A. Progress payments:
1. Roof Contractor shall establish with CNE the procedure for payment and retainages prior to commencement of work on this project.
 2. Partial or progress payments shall not relieve the contractor of performance obligations under this contract, nor shall such payments be viewed as approval or acceptance of work performed.
 3. Final payment shall be withheld until all provisions of the specifications are met.
 4. CNE is a tax-exempt entity and as such, the roof contractor shall work with CNE's Purchasing Department to procure materials.

1.09 UNIT PRICES

- A. Quote unit prices: For work above and beyond the scope of the project, roof contractor shall quote the following unit prices:
1. Steel Deck replacement - \$/sq. ft.
 2. Steel Deck repair (Rust Painting) - \$/sq. ft.
 3. Steel Deck overlayment - \$/sq. ft.
 4. Additional Roof Drains - \$/Drain
Service Connections - \$/per lineal foot.
 5. Damaged insulation 3" Polyisocyanurate Insulation Board - \$/per sq. ft.

1.10 WARRANTY/GUARANTEES

- A. Roof System Warranty:
1. Upon project completion and CNE and roof system manufacturers acceptance, roof manufacturer shall provide a Twenty (20) year Full System Quality Assurance Warranty with a Ten (10) year roof maintenance program covering yearly roof inspections, proactive preventative maintenance, and housekeeping of the roofs as well as a 24 hour a day leak reporting response and tracking service. The specific area covered shall be as follows:
 - a. Inspection includes:
 1. Yearly visual inspection of the roof membrane and roof surface conditions.
 2. Inspection of the flashing systems including, the wall and curb flashings, metal counterflashing's and termination details, soil stacks and vents, and inspections of rooftop projections and equipment including pitch pans, HVAC equipment and access ladders.
 3. Roof manufacturer shall provide reports from these roof inspections. The reports shall become part of the roof database maintained on the roof system. This database shall be updated as a result of each inspection.
 - b. Preventative Maintenance Services shall include:
 1. Tears and splits in flashing membrane will be repaired with the appropriate repair mastics and membranes. Unsecured rooftop equipment will be secured. Exposed fasteners will be sealed. Termination bars and metal counterflashing's will be sealed.

2. Roof membrane repairs shall consist of tears, breaks, and splits in the field of roof membrane. All splits and blisters which threaten the roof integrity of the roof membrane will be cleaned, primed, and repaired with the appropriate repair materials. Metal projections (hood and clamps) will be sealed.
 - c. Housekeeping shall include:
 1. Removal of incidental debris (i.e., leaves, branches, paper, and similar items).
 2. Removal of debris from roof drains and scuppers.
 - d. Leak response service shall include:
 1. 24 hour a day toll free leak response phone number.
 2. List of local and qualified roof contractors who will respond to leaks within the established timelines.
 3. Manufacturer shall provide quarterly leak reports of leak activity in calendar quarters where leaks have occurred.
 - e. Web-based Information Management System:
 1. To manage roofing assets, the roof system manufacturer shall provide to CNE an interactive web-based computerized data management program to assist in monitoring all yearly roof inspections, completed Maintenance, leak reports, review specifications, drawings, and photographs. Data will always be available in a secure, password protected environment.
- B. Warranty Architectural Composition Shingles:
1. Fifteen (15) Year Tamko Class 4 Heritage IR Architectural Asphalt Shingles with a 110 mph wind classification and UL C790 Class A Fire rating or approved equal.

PART II - PRODUCTS

2.01 GENERAL

- A. Comply with quality control, references, specifications, and manufacturer's data. Products containing asbestos are prohibited on this project. Use only asbestos-free products.
- B. Use products with personal protection. Users must read container labels and material safety data sheets prior to use.

2.02 ROOF DECKING

- A. Metal roof deck:
 1. To match existing steel deck configuration.
- B. Rust inhibitive paint:
 1. Alkyd based paint with primer by Anchor or approved equal.

- C. Steel Deck Overlayment:
 - 1. 22 ga. Flat galvanized steel.

2.03 CARPENTRY

- A. Wood Blocking:
 - Southern Pine; No. 2 grade; free from warping and visible decay; pressure treated with alkaline copper quaternary (ACQ) to meet AWPB, LP, 0.40 retention marked.
- B. Cant Strips:
 - 1. Fibered cant.

2.04 INSULATION

- A. Bottom Layer Replacement: Class 1, Polyisocyanurate.
 - 1. Asphalt impregnated with organic/fiberglass facer.
 - 2. Manufactured by Johns Manville or approved equal.
 - 3. Thickness: 4' X 4' X 3".
- B. Top Layer: Gypsum-Fiber Roof Board
 - 1. High performance, gypsum fiber-reinforced and water resistant overlayment board.
 - 2. Thickness: 1/2".
 - 3. Securock or approved equal.

2.05 MECHANICAL FASTENERS

- A. Wood to wood:
 - 1. Galvanized, common, annular ring nail.
 - 2. Length: Sufficient to penetrate underlay blocking 32 mm (1-1/4 inches).
- B. Galvanized sheet steel to wood blocking:
 - 1. Type II, Style 20, roofing nails; galvanized steel wire, flat head, diamond point, round, barbed shank.
 - 2. Length: Sufficient to penetrate wood blocking 32 mm (1-1/4 inches) minimum.
- C. Drawband:
 - 1. Gold Seal stainless steel worm gear clamp by Murray Corporation, Cockeysville, MD.
 - 2. Power-Seal stainless steel worm drive clamps by Breeze Clamp Company, Saltsburg, PA.
- D. Insulation to Steel Decking:
 - 1. JM UltraFast #12 with UltraFast square metal plate or approved equal.
 - 2. Length: 4" Sufficient to provide a minimum of 1" embedment minimum into the steel decking top flange.

- E. Termination Bar to wood/metal:
 - 1. UltraFast #12 fastener.
 - 2. Length: Sufficient to provide a minimum of 1-1/2" embedment minimum.

2.06 ROOFING MATERIALS

- A. Adhesives:
 - 1. Interply and surfacing adhesive:
 - a. Power Ply Cold Adhesive by Tremco or approved equal.

- B. Base Ply sheet:
 - 1. SBS Urethane modified asphalt coated composite polyester and fiberglass reinforced high tensile strength, smooth surfaced Power Ply Endure 300 smooth.

Thickness	100mils		
Tensile Strength	450 lbf/in. MD	375 lbf/in. XD	
Tear Strength	715 lbf MD	630 lbf/.	XD

- C. Top Cap Sheet Membrane:
 - 1. SBS Urethane modified asphalt coated polyester reinforced sheet with white granular surfaced, fire resistant Power Ply Endure 200 FR.

Thickness	150 mils		
Tensile Strength	165 lbf/in. MD	140 lbf/in. XD	
Tear Strength	160 lbf/in. MD	140 lbf/in. XD	

- D. Related materials:
 - 1. Asphalt mastic:
 - a. ASTM D 4586-86 fibrated asphalt mastic.
 - 2. Water based asphalt primer.
 - a. ASTM D 41-85.
 - 3. Flashing adhesive:
 - a. Asphalt mastic.
 - 4. Flashing surfacing:
 - a. Ready-mixed aluminum coating.
 - 5. Flashing Membrane:
 - a. Composite Ply HT/PP Endure 200 FR.
 - 6. Pitch pan mastic:
 - a. ASTM D 4586-86 fibrated asphalt mastic.
 - 7. Sealants:
 - a. Draw band sealant:
 - 1) Single component, acrylic sealant.
 - b. T-bar sealant:
 - 1) Single component, acrylic sealant.
 - 8. Stripping adhesive for metal flanges:
 - a. asphalt adhesive.
 - 9. Stripping ply:

- a. PP Composite Ply HT/Endure 200 FR.
- 10. Walkway panels:
 - a. 3 ft. x 4 ft., granule surfaced, fiberglass reinforced protection landings.

2.07 METAL FLASHINGS

- A. Termination bar:
 - 1. Aluminum steel bar:
 - a. 1/8" x 1".
- B. Termination bar sealant:
 - 1. Metal primer: Primer No. 6 by Tremco.
 - 2. Single component, polyurethane sealant.
- C. Counterflashing at HVAC Units:
 - 1. Galvanized Steel: ASTM A 526-85, sheet steel with 1.25 oz./sq. galvanized coating with caulking receiver.
 - a. Gage: Twenty-four (24).
- D. Pitch pans with hood:
 - 1. Galvanized Steel: ASTM A 526-85, sheet steel with 1.25 oz./sq. galvanized coating.
 - a. Gage: Twenty-four (24).
- E. Piping through roof box:
 - 1. Galvanized Steel: ASTM A 526-85, sheet steel with 1.25 oz./sq. galvanized coating.
 - a. Gage: Twenty-four (24).
 - b. Solder: ASTM B32-89, alloy grade 50A. Neutralize flux after soldering.
- F. Drains:
 - 1. Roof drains shall be sized and discharged in accordance with local building and plumbing codes.
 - 2. All drain components shall be cast iron. Including drain body, clamping ring, and strainer. 4" minimum diameter.
 - 3. Acceptable manufacturers:
 - a. Donovan Manufacturing Co., North Reading, MA.
 - b. Josam Manufacturing Co., Michigan City, IN.
 - c. Smith Manufacturing Co., Inc., Montgomery, AL.
 - d. Tyler Pipe, Tyler, TX.
 - e. Zurn Industries, Inc., Erie, PA.
- G. Lead Flashings:
 - a. ASTM B 29-79(1984), 1.82 kg (4 lb.) sheet lead.
- H. Metal Wall Panels and Counterflashing along interior Parapet:
 - a. 24 ga. pre-painted galvanized steel: ASTM 526, sheet steel with 1.25 oz./sq., galvanized

coating. Roof contractor shall provide color chart displaying metal color options. See attached detail roof drawing for installation.

- b. Paint finish at exposed sides: Factory baked-on two (2) coat system comprised of One (1) coat of full 70% resin fluorocarbon (polyvinylidene fluoride PV2) by Kynar 500 or Approved equal.
- I. Architectural Composition Shingles:
 - a. Class 4 impact rated composition shingle with a 110-mph high wind warranty protection rating manufactured by Tamko or approved equal.
- J. Work shall be in accordance with Architectural Sheet Metal Manual, as issued by Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA).

PART III - EXECUTION

3.01 EXAMINATION

- A. Verify conditions as satisfactory to receive work.
- B. Do not begin roofing until all unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions.
- C. Verify that work of other trades penetrating roof deck or requiring men and equipment to traverse roof deck has been approved by CNE, manufacturer, and roofing contractor.
- D. Check projections, curbs, and deck for inadequate anchorage, foreign material, moisture, or unevenness that would prevent quality and execution of new roofing system.

3.02 GENERAL WORKMANSHIP

- A. Substrate: Free of foreign particles prior to laying roof membrane.
- B. **PHASED APPLICATION:** Not permitted. All plies shall be completed each day.
- C. Traffic and equipment: Kept off completed plies until adhesive has set.
- D. Wrapper and packaging materials: Not to be included in roofing system.
- E. Fit plies into roof drain rims; install lead flashing and finishing plies; secure clamping collars; install domes.
- F. Cut and remove single ply flashing and cant at deck transition. New Flashing shall extend a

minimum of 12" from top of cant. Extend new roofing membrane to top edge of cant at wall and projection bases.

G. Cut out fish mouths/side laps which are not completely sealed, patch. Replace all sheets which are not fully and continuously bonded.

H. Insulation:

1. Remove all wet and damaged insulation boards designated by infrared scan. Install new insulation board to match existing thickness.
 - a. Firmly butt each insulation board to surrounding boards. Do not jam or deform boards.
 - b. Eliminate open joints and uneven surfaces.
2. Maximum insulation gap: 1/4 inch.
3. Fill insulation board joint gaps larger than 1/4 inch with roof insulation.
4. Maximum elevation variation between boards at joints: 1/8 inch.
5. Cut and fit insulation boards where roof deck intersects vertical surfaces. Cut the board 1/4 inch from vertical surface.
6. Stagger joints at least 6 inches.
7. Filler size: 18 inches in length or width, minimum.

I. Insulation: Form continuous insulation joints over deck flange. Do not cantilever insulation edges over deck ribs. Minimum bearing surface: 1-1/2 inches.

3.03 PREPARATION

A. Protection:

1. The contractor shall be responsible for the protection of property during the course of work. Lawns, shrubbery, paved areas, building walls shall be protected from damage. Repair damage at no extra cost to CNE.
2. Provide at site prior to commencing removal of debris, a dumpster or dump truck to be located adjacent to building where directed by the CNE representative.
3. Roofing, flashings, membrane repairs, and insulation shall be installed and sealed in a watertight manner on same day of installation or before arrival of inclement weather.
4. At the start of each workday drains within the daily work area shall be plugged. Plugs are to be removed at the end of each workday or before the arrival of inclement weather.
5. Preparation work shall be limited to those areas that can be covered with installed roofing material on the same day and before the arrival of inclement weather.
6. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surface, and equipment movement. Move equipment and ground storage areas as work progresses.
7. Construct an enclosed chute from the roof for removal of debris from roof area. Protect building surfaces at chute/set-up areas with tarpaulin. Secure tarpaulin. Remove dumpster from premises when full and empty at approved dumping or

refuse area. Deliver empty dumpster to site for further use. Upon job completion, dumpster/chute shall be removed from premises. Spilled or scattered debris shall be cleaned-up immediately. Removed material to be disposed from roof as it accumulates.

8. At end of each working day, removal areas shall be sealed with water stops along edges to prevent water entry.
9. **Provide clean plywood/foam walkways and take other precautions required to prevent tracking or damaging existing roof areas when crossing over to dispose of roofing debris. Plywood/foam walkways shall be relocated during each day and phase of demolition process. Roof membrane shall be thoroughly inspected for damage on a daily basis and repaired appropriately to ensure roof areas remain watertight throughout roofing process.**
10. Roof Contractor shall instruct and police workmen to ensure that aggregate/debris is not tracked into new work areas on workmen's shoes or equipment wheels. Discovery of entrapped aggregate/debris within new membrane is sufficient cause for its rejection.

B. Surface preparation:

1. Sweep existing single ply membrane of all dirt and sediment and dispose of debris appropriately.
2. Cut single ply membrane in 10' sections to allow membrane to relax. Remove existing cant and 12" of single ply flashing membrane to provide and expose existing substrate for new flashing assembly.

3.04 ROOF DECK REPAIRS

A. Metal roof deck repairs:

1. Deck reattachment:
 - a. Mechanically reattach loose sections of deck to steel support members 12 o.c., within the field of the roof and no more than 6 inches o.c., within the roof perimeter and corner zones.
 - b. Side laps: Mechanically fasten 18 inches o.c.
2. Deck replacement:
 - a. Remove defective metal decking. Examine supports. If unsound, contact the CNE representative immediately for future action.
 - b. Install new metal decking in accordance with SDI, Design Manual for Roof Decks.
3. Deck protection:
 - a. Remove rust scales and apply rust inhibitive paint at the rate of 150 sq. ft. per gallon.

3.05 THERMAL INSULATION

- A. Salvage existing insulation and ensure insulation is suitable to be reused. Overlay existing single ply membrane with a ½" gypsum board and mechanically attach as defined as Zone 1 (Field) One (1) fastener every Two (2) sq. ft., (16 fasteners per 4' X 8') Zone 2 (Perimeter) and Zone 3 (Corners). Zone 2 width should be increased to a minimum of 18 feet wide in the field and Zone 3 should have L-shaped areas with legs that are each 18 feet and 6 feet wide. Ensure any whole or partial component width that falls within the calculated zone dimension has the increased fastener. Zone 2 at 1 fastener every 4 sq. ft., (8 additional fasteners per 4' X 8') and. Zone 3 should remain at 1 fastener every 1 sq. ft., (32 total fasteners).
- B. Install additional fasteners to ensure insulation is firm under foot.
- C. Filler insulation requires two (2) fasteners per piece.
- D. Install top layer of Gypsum-Fiber Roof Board over insulation base layer ensuring joints are staggered a minimum of six (6) inches. Set insulation in the specified urethane insulation adhesive spaced at no more than 12" o.c., within the field of the roof, no more than 6" o.c., within the roof perimeter zone, and no more than 4" o.c., within all roof corner zones.

3.06 ROOF SYSTEM APPLICATION

- A. Install One (1) Ply of PP Endure 300 smooth and One (1) PP Endure 200 FR modified bitumen membrane in alternate applications of PowerPly cold process adhesive. Place ply sheets to ensure water will flow over or parallel to; but, never against exposed edges.
- B. All end laps and selvage edges of both base and top membrane are to be heat welded. Follow manufacturers strict heat welding requirements.**
 Application Rates: Base Ply: PP Endure 300: 2.5 gallons per 100 sq. ft.
 Top Ply: PP Endure 200 FR Modified Membrane: 2.5 gallons per 100 sq. ft.
- C. Immediately after installation, broom and/or roll ply sheet. Ensure complete and continuous seal and contact between adhesive and felts, including ends, edges and laps without wrinkles, fish mouths, or blisters. Apply uniform and continuous pressure to exposed edge and end laps to ensure complete adhesion when heat welding.
- D. Avoid walking on plies until adhesive has set.
- E. Overlap previous day's work 24 inches. Provide headers where new roof membrane terminates to the previous day's work.
- F. Lap ply membrane ends 4 inches. Stagger end laps 3 feet minimum.
- G. Embed each ply in a uniform and continuous application of interply mastic.
- H. Broom in roofing felt to ensure contact with adhesive. Use 70lb. roller to immediately.

embed modified membrane into adhesive.

3.07 DAILY WATERSTOP/TIE-INS

- A. Remove embedded dirt /debris from top ply of felt along termination.
- B. Width: 18 inches.
- C. Adhere 12- and 18-inch-wide ply sheets from exposed deck to existing roofing with a continuous 1/16-inch-thick application of tie-off mastic. Glaze cut-off with surfacing mastic. Extend 18 inch wide felt 3 inches either side 12 inch felt.
- D. Install "deadman" insulation filler at insulation staggers.
- E. Extend roofing system at least 12 inches onto prepared area of adjacent roofing. Seal edge with 6-inch-wide reinforcing membrane embedded between alternate courses of tie-off mastic.
- F. At the beginning of the next day's work remove temporary connection by cutting felts evenly along edge of existing roof system. Remove "deadman" insulation fillers.
- G. Roof contractor is to ensure all tie-ins including wall and curb flashings, projection details, expansion joints etc., are completely sealed prior to leaving project at day's end. Flashings are to be sealed with one (1) ply of reinforcing membrane set between alternate applications of the specified mastic. Tie-ins are to remain in-place until the appropriate detail is completed.

3.08 FLASHINGS

- A. General flashing requirements:
 - 1. Wall and Curb Flashings:
 - a. Adhere both PP Endure 300 smooth and PP Endure 200 FR flashing membrane completely by **heat welding**. All bleed out shall have loose granules embedded. to flashing surface, cant, and roofing.
 - b. Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 4 inches.
 - c. Seal vertical edge of flashing membrane by heat welding.
 - e. Secure flashing membrane with 1-bar secured at 8" o.c., with the appropriate fastener. Fabricate and install metal R-Panels along the interior periphery of the parapet wall with metal counterflashing. Secure metal channels to the existing wall substrate. Install as per manufacturers instructions.
- B. At plumbing vents:
 - 1. Wedge plumbing vent tight against deck.

2. Fabricate and install plumbing vent flashing from lead. Flange: 4 inches wide minimum; extend completely around periphery of vent flashing. Set flange into mastic. Neatly dress flange with wood block.
 3. Prime metal flange with asphalt primer.
 - a. Pipe outside diameter greater than 2 inches: Bend lead inside pipe 1 inch minimum with pliers or rubber/plastic mallet; replace cracked lead.
 - b. Pipe outside diameter 2 inches or less: Cut lead at vent top; fabricate and install integral lead cap.
 4. Install two (2) ply stripping described in the general flashing requirements and heat weld both membranes to roofing.
- C. At pitch pockets:
1. Fabricate pitch pans. Sides: 4 inches high, hemmed to outside at top edge. Flange: 4 inches wide, completely around periphery. Clearance between projection and pitch pan: 2 inches. Set flange in mastic.
 2. Pack gap between roof-penetrating element and deck with compressible insulation. Seal with reinforcing membrane embedded between alternate courses of asphalt mastic.
 3. Nail flange to wood blocking 3 inches o.c., staggered.
 4. Prime metal flange, projection, and pitch pan interior with asphalt primer.
 5. Install two ply stripping described in general flashing requirements section.
 6. Fill the pitch pan with asphalt mastic. Double fill if necessary.
 7. Fabricate and install umbrella with draw band over pitch pan. Tighten draw band.
 8. Wipe clean top of umbrella and projection with metal cleaner. Prime surface with metal primer.
 9. Caulk stack/sheet metal interface. Provide watershed. Tool neatly.
- D. At equipment stands (pipe):
1. Apply 1/16 inch uniformly thick layer of asphalt mastic to surface receiving metal flange.
 2. Fabricate and install sleeve flashing. Height: 8 inches. Flange width: 4 inches. Flange to extend completely around flashing periphery. Solder all joints. Double solder vertical joints.
 3. Nail flange to wood blocking 3 inches o.c., staggered.
 4. Prime flange with asphalt primer.
 5. Install two (2) ply stripping described in the general flashing requirements section.
 6. Fabricate umbrella and install draw band; cover sleeve flashing 3 inches minimum. Install immediately above sleeve flashing. Tighten draw band.
 7. Wipe clean top of umbrella and projection with metal cleaner. Prime surface with metal primer.
 8. Caulk projection/sheet metal interface. Provide watershed. Tool neatly.
- E. At metal sleeve and storm collar(s):
1. Apply 1/16 inch uniformly thick layer of asphalt mastic to surface receiving metal flange.

2. Fabricate and install sleeve flashing. Height: 8 inches. Flange width: 4 inches. Flange to extend completely around flashing periphery. Solder all joints. Double solder vertical joints.
 3. Nail flange to wood blocking 3 inches o.c., staggered.
 4. Prime flange with asphalt primer.
 5. Install two (2) ply stripping described in the general flashing requirements section.
 6. Fabricate storm collar with bolted connection. Cover sleeve flashing 3 inches minimum. Tighten bolts.
 7. Wipe clean top of storm collar and projection with metal cleaner. Prime surface with metal primer. Caulk projection/sheet metal interface. Provide watershed. Tool neatly.
- F. At piping through roof deck:
1. Fabricate and install a two-piece pipe box. Bottom portion fabricated with 4-inch flange. Top section notched to fit over piping.
 2. Set flange in mastic, nail flange to wood blocking 3 inches o.c. Prime flange.
 3. Fill box interior with batt insulation.
 4. Fasten top and closure detail to bottom.
 5. Wipe clean metal surfaces of box and piping with metal cleaner. Prime metal with metal primer. A caulk joint between box and piping. tool neatly.
 6. Install two (2) ply stripping described in the general flashing requirements section.
- G. At roof drains:
1. Install tapered edge strip around drain to create approximate (24 x 24 inch) sump. Miter corners. Seal toe of tapered edge to drain rim with reinforcing membrane embedded between alternate courses of asphalt mastic.
 2. Install roofing system into sump and onto drain rim.
 3. Plug drain to prevent debris entry into drainage lines until completed.
 4. Apply 1/16 inch uniformly thick layer of asphalt mastic to surface receiving lead flashing.
 5. Set single piece lead flashing in mastic centered over drain; extend lead 150 mm (6 inches) beyond drain rim. Neatly dress lead with wood block.
 6. Clamp flashing collar to drain in bed of mastic.
 7. Neatly cut lead/felts within drain at rim. extend it to 25 mm (1 inch) into bowl.
 8. Prime lead with asphalt primer.
 9. Install two-ply stripping described in general flashing requirements section. Stripping shall not extend under clamping ring.
- H. At gas lines and equipment runners:
1. All gas lines greater than 3" shall be resting on wood blocking and resting on 1/4" steel plate and protection pad consisting of polyester/walktred set in the specified adhesive. Spacing shall be 4' o.c. Remaining piping smaller than 3" shall be resting on new 4 X 4 redwood runners and installed over polyester/walktred set in the specified adhesive. Rest piping on new block runner and attach galvanized pre-formed strap and secure to blocking with the appropriate fastener.

3.09 SURFACING TREATMENT ON FLASHINGS

- A. Coat lead, drains screens, galvanized metal, walk treads etc., with one (1) coat of aluminum 301 reflective coating applied at an approximate rate of 130 sq. ft. per gallon. Coat neatly.

3.10 WALKWAYS

- A. Install walkway panels along the working sides of mechanical equipment, roof access ladders. Install 3' x 4' x 3/8" walk treads in spot applications of asphalt mastic.

3.11 ADJUSTING AND CLEANING

- A. Repair of deficiencies:
 - 1. Installations of details noted as deficient during Final inspection must be repaired and corrected by applicator, and made ready for re-inspection, within five (5) working days.
- B. Clean-up:
 - 1. Immediately upon job completion, roof membrane, flashing surfaces and drains shall be cleaned of debris.
 - 2. Remove all loose trash and debris from staging area and correct all damage to building and grounds that may have occurred during roofing process.
 - 3. Clean gutters/downspouts, drains etc., of all debris and ensure they are freeflowing.

HERITAGE® ARCHITECTURAL ASPHALT SHINGLES

DALLAS, TX • FREDERICK, MD • JOPLIN, MO • PHILLIPSBURG, KS



SHINGLES BEGIN TO AGE AS SOON AS THEY ARE EXPOSED TO NATURE. BUILDINGS EXPERIENCE AGING FACTORS DIFFERENTLY, SO IT IS DIFFICULT TO PREDICT HOW LONG SHINGLES WILL LAST. TAMKO PROVIDES A LIMITED WARRANTY FOR MANY PRODUCTS, THAT INCLUDES A BINDING ARBITRATION CLAUSE AND OTHER TERMS AND CONDITIONS WHICH ARE INCORPORATED HEREIN BY REFERENCE. YOU MAY OBTAIN A COPY OF THE LIMITED WARRANTY AT TAMKO.COM OR BY CALLING 1-800-641-4691.

WARNING: Use of this product in an assembly that includes polyurethane foam insulation (including without limitation an application directly to the underside of a roof deck or within a wall assembly) may cause premature degradation or failure of this product. We continue to evaluate compatibility of polyurethane foams with our asphalt building products. Chemical incompatibility, off-gassing after application and excess heat during and after application of polyurethane foams may affect the performance of asphalt and modified asphalt building products and metal fasteners used with those products.



IMPORTANT SAFETY INFORMATION: Do not install until all appropriate safety precautions have been read and understood. The TAMKO Safety Data Sheet (SDS) is available at tamko.com/sds. Always use appropriate fall protection equipment and wear appropriate personal protective equipment (PPE) when working with this product. Moisture, frost, debris or other material will decrease the traction and can cause slippery conditions when walking on the product. **Applicator safety is of utmost importance.**

THESE ARE THE MANUFACTURER'S APPLICATION INSTRUCTIONS FOR ROOFING CONDITIONS DESCRIBED. TAMKO BUILDING PRODUCTS LLC ASSUMES NO RESPONSIBILITY FOR LEAKS OR OTHER DEFECTS RESULTING FROM FAILURE TO FOLLOW THE MANUFACTURER'S INSTRUCTIONS. FAILURE TO FOLLOW THESE INSTRUCTIONS WILL ADVERSELY AFFECT COVERAGE UNDER THE LIMITED WARRANTY AND ARBITRATION AGREEMENT. SEE THE LIMITED WARRANTY FOR DETAILS.

CHECK LOCAL BUILDING CODES TO DETERMINE SUITABILITY OF THIS PRODUCT FOR YOUR INTENDED USE.

INFORMATION INCLUDED IN THESE APPLICATION INSTRUCTIONS WAS CURRENT AT THE TIME OF PRINTING. TO OBTAIN A COPY OF THE MOST CURRENT VERSION OF THESE APPLICATION INSTRUCTIONS,

US AT 1-800-641-4691.

THIS TAMKO® PRODUCT IS COVERED BY A LIMITED WARRANTY AND ARBITRATION AGREEMENT, THE TERMS OF WHICH ARE PRINTED ON THE WRAPPER.

IN COLD WEATHER (BELOW 40°F), CARE MUST BE TAKEN TO AVOID DAMAGE TO THE EDGES AND CORNERS OF THE SHINGLES.

IT IS NOT NECESSARY TO REMOVE THE PLASTIC STRIP FROM THE SHINGLES.

HERITAGE® ARCHITECTURAL ASPHALT SHINGLES

DALLAS, TX • FREDERICK, MD • JOPLIN, MO • PHILLIPSBURG, KS



1. ROOF DECK

These shingles are for application to roof decks consisting of plywood, oriented strand board (OSB) or sheathing boards capable of receiving and retaining fasteners, and to inclines of not less than 2" per foot.

Shingles must be applied in strict accordance with the application instructions. TAMKO assumes no responsibility for leaks or defects resulting from improper application, or failure to properly prepare the surface to be roofed over.

STANDARD ROOF: For roofs having pitches equal to or greater than 4" per foot and up to but less than 21" per foot (4:12 and up to but less than 21:12).

LOW-SLOPE: For roofs having pitches 2" per foot up to but less than 4" per foot (2:12 up to but less than 4:12), refer to special instructions titled "Low Slope Application."

MANSARD ROOF OR STEEP SLOPE: For roofs having pitches equal to or greater than 21" per foot, refer to special instructions titled "Mansard Roof or Steep Slope Roof."

NEW ROOF DECK CONSTRUCTION: Roof deck must be smooth, dry and free from warped surfaces. It is recommended that metal drip edges be installed at eaves and rakes.

PLYWOOD: All plywood shall be exterior grade as defined by APA - The Engineered Wood Association. Plywood shall be a minimum of 3/8" thickness and applied in accordance with the recommendations of APA - The Engineered Wood Association.

ORIENTED STRAND BOARD: Oriented strand board shall be exterior grade as defined by APA - The Engineered Wood Association, minimum 7/16" thickness, APA-rated in accordance with Voluntary Standard PS 2 and applied in accordance with the recommendations of APA - The Engineered Wood Association.

SHEATHING BOARDS: Boards shall be well-seasoned tongue-and-groove boards and not over 6" nominal width. Boards shall be a 1" nominal minimum thickness. Boards shall be properly spaced and nailed.

2. VENTILATION

Inadequate ventilation of attic spaces can cause accumulation of moisture in winter months and a build-up of heat in the summer. These conditions can lead to:

1. Vapor condensation.
2. Buckling of shingles due to deck movement.
3. Rotting of wood components.
4. Premature failure of roof.

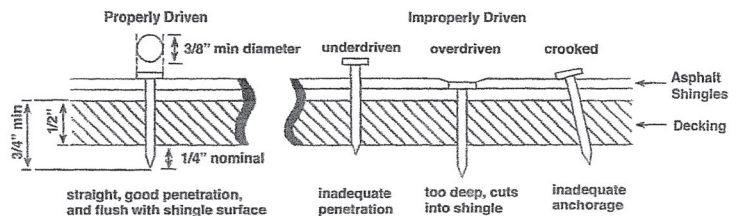
To ensure adequate ventilation and circulation of air, the ventilation system must include inlets and outlets. This may be accomplished with a combination of ridge and soffit vents or by using gable end vents. FHA minimum property standards require one square foot of net free ventilation area to each 150 square feet of space to be vented.

This may be reduced to one square foot of ventilation area per 300 square feet if at least 40% and not more than 50% of venting is provided not more than 3 feet below the ridge and if a Class I or II vapor barrier is installed on the warm-in-winter side of the ceiling in climate zones 6, 7, and 8 as recommended by the 2018 International Residential Code. For more information consult your design professional. If the ventilation openings are screened, the total area should be doubled.

IT IS PARTICULARLY IMPORTANT TO PROVIDE ADEQUATE VENTILATION.

3. FASTENERS

NAILS: TAMKO requires the use of nails as the method of application. Standard type roofing nails should be used. Nail shanks should be made of minimum 12 gauge wire, and a minimum head diameter of 3/8". Nails should be long enough to penetrate 3/4" into the roof deck. Where the deck is less than 3/4" thick, the nails should be long enough to penetrate completely through decking and extend at least 1/8" through the roof deck. Drive nail head flush with the shingle surface.



WIND CAUTION: Extreme wind velocities can damage these shingles after application when proper sealing of the shingles does not occur. This can especially be a problem if the shingles are applied in cooler months or in areas on the roof that do not receive direct sunlight. These conditions may impede the sealing of the adhesive strips on the shingles. The inability to seal down may be compounded by prolonged cold weather conditions and/or blowing dust. In these situations, hand sealing of the shingles is required. To ensure quicker sealing, apply 4 quarter-sized dabs of any adhesive meeting ASTM D4586, Type I, on the back of the shingle 1" and 13" in from each side and 1" up from the bottom of the shingle. Press shingle firmly into the adhesive. For maximum wind resistance along rakes, install any TAMKO starter shingle including sealant or cement shingles to the underlayment and seal with a thin uniform layer of any adhesive meeting ASTM D4586, Type I. Caution: Apply ONLY a thin uniform layer of adhesive less than 1/8" thick. Excessive amounts can cause blistering of the shingles and may soften the asphalt in certain underlayments resulting in the asphalt flowing, dripping and staining. Shingles must also be fastened according to the fastening instructions described below.

3. FASTENERS (continued)

Correct placement of the fasteners is critical to the performance of the shingle. **If the fasteners are not placed as shown in the diagram as described below, this will result in the termination of TAMKO's liabilities under the Limited Warranty and Arbitration Agreement.** TAMKO will not be responsible for damage to shingles caused by winds in excess of the applicable MPH as stated in the Limited Warranty and Arbitration Agreement. See Limited Warranty and Arbitration Agreement on the wrapper or tamko.com for details.

FASTENING PATTERNS:

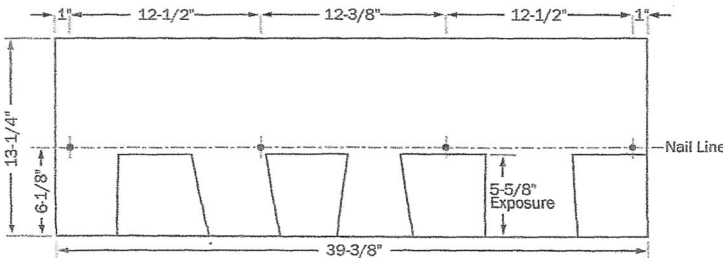
FASTENERS MUST BE PLACED 6-1/8" FROM THE BOTTOM EDGE OF THE SHINGLE, PENETRATING THROUGH THE COMMON BOND, AND LOCATED HORIZONTALLY AS FOLLOWS:

1) STANDARD FASTENING PATTERN:

For use on decks with slopes 2" per foot up to but less than 21" per foot.

One fastener 1" from each end and one fastener 13-1/2" from each end for a total of 4 fasteners per shingle. (See Standard Fastening Pattern illustrated below.)

STANDARD FASTENING PATTERN



2) MANSARD ROOF OR STEEP SLOPE FASTENING PATTERN:

For use on decks with slopes equal to or greater than 21" per foot.

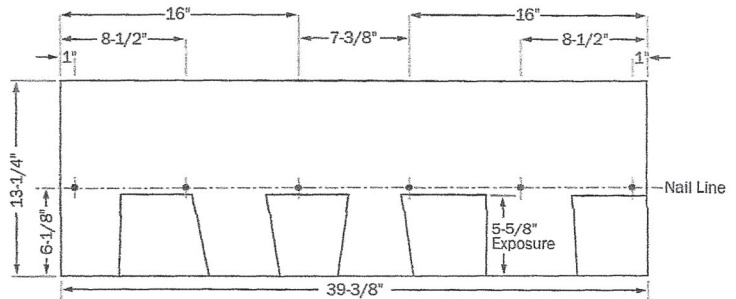
One fastener 1" from each end, one fastener 8-1/2" from each end and one fastener 16" from each end for a total of 6 fasteners per shingle. (See High Wind Warranty, Mansard Roof or Steep Slope Fastening Pattern illustrated below.)

3) HIGH WIND WARRANTY FASTENING PATTERN:

One fastener 1" from each end, one fastener 8-1/2" from each end and one fastener 16" from each end for a total of 6 fasteners per shingle. (See High Wind Warranty, Mansard Roof or Steep Slope Fastening Pattern illustrated below.)

CAUTION: ALL FASTENERS FOR MANSARD AND HIGH WIND APPLICATIONS MUST BE DRIVEN INTO THE COMMON BOND AS SHOWN IN THE HIGH WIND WARRANTY, MANSARD ROOF OR STEEP SLOPE FASTENING PATTERN DIAGRAM BELOW.

HIGH WIND WARRANTY, MANSARD ROOF OR STEEP SLOPE FASTENING PATTERN



4) ADDITIONAL REQUIREMENTS FOR HIGH WIND WARRANTY:

TAMKO also requires the use of TAMKO® starter shingles including sealant strip at eaves and rakes. Alternatively, along rakes, cement shingles to the underlayment and each other in a 4" width of any adhesive meeting ASTM

1/8" thick. Excessive amounts can cause blistering of the shingles and may soften the asphalt in certain underlayments resulting in the asphalt flowing, dripping and staining.

High Wind Application is offered on new construction or complete tear-off applications only. It is not offered for re-cover applications. If High Wind Application requirements are not followed, the High Wind Application Warranty MPH, as stated on Table I in the Limited Warranty and Arbitration Agreement, reverts to the Standard Application Wind Warranty MPH limit. (See High Wind Warranty, Mansard Roof or Steep Slope Fastening Pattern illustrated above.)

"High Wind Application" means application of shingles in strict accordance with the High Wind Warranty Fastening Pattern application instructions stated previously. See local building codes for additional nailing requirements.

HERITAGE® ARCHITECTURAL ASPHALT SHINGLES

DALLAS, TX • FREDERICK, MD • JOPLIN, MO • PHILLIPSBURG, KS



4. UNDERLAYMENT

UNDERLAYMENT: An underlayment must be applied over the entire deck before the installation of TAMKO® shingles. Failure to add underlayment can cause premature failure of the shingles, which is not covered by TAMKO's Limited Warranty and Arbitration Agreement.

Products which are acceptable for use as underlayment are:

Asphalt Saturated Felt Underlayments

- Any TAMKO® non-perforated asphalt saturated organic felt
- A non-perforated asphalt saturated organic felt which meets ASTM D226 or ASTM D4869

Specialty Underlayments

- Synthetic Guard™ Plus Underlayment or Synthetic Guard™ Underlayment
- A polymeric underlayment designed for use with asphalt shingles which meets ASTM D8257
- TAMKO® Moisture Guard® Ice & Rain Underlayment, TW Underlayment or TW Metal and Tile Underlayment (additional ventilation may be required—contact TAMKO's Technical Services Department for more information)
- A self-adhesive underlayment designed for use with asphalt shingles which meets ASTM D1970

For Asphalt Saturated Felt Underlayments

Apply the felt when the deck is dry. On roof decks with slopes 4" per foot and greater apply the felt parallel to the eaves lapping each course of the felt over the lower course at least 2". Where ends join, lap the felt 4". If left exposed, the felt may be adversely affected by moisture and weathering. Laying of the felt and the shingle application must be done together.

For All Other Specialty Underlayments

On roof decks with slopes 4" per foot and greater, apply the underlayment parallel to the eaves in accordance with underlayment application written instructions. The underlayment should not be left exposed for a longer period of time than is specified in the underlayment application written instructions. The final roof covering must be installed before the structure is

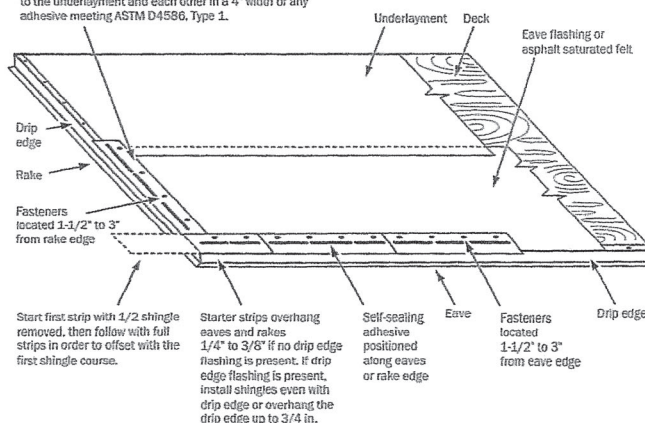
high wind, hail, ice storms, etc.

In areas where ice builds up along the eaves or a back-up of water from frozen or clogged gutters is a potential problem, TAMKO® Moisture Guard®, TW Metal and Tile Underlayment or TW Underlayment (or any specialty eaves flashing product) may be applied to eaves, rakes, ridges, valleys, around chimneys, skylights or dormers to help prevent water damage. Contact TAMKO's Technical Services Department for more information.

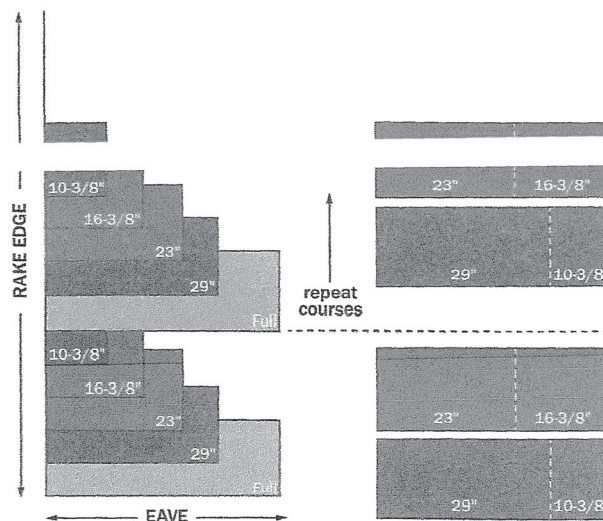
5. APPLICATION INSTRUCTIONS

STARTER COURSE: A starter course may consist of TAMKO® Shingle Starter, TAMKO® 10-inch Starter, TAMKO® Perforated Starter, or self-sealing 3-tab shingles. If self-sealing 3-tab shingles are used, remove the exposed tab portion and install with the factory applied adhesive adjacent to the eaves. Attach the starter course with approved fasteners along a line parallel to and 1-1/2" to 3" above the eaves edge. The starter course should overhang the eave edge 1/4" to 3/4" and the rake edge 3/8" to 3/4" if drip edge flashing is not used along the eaves or rakes. If drip edge flashing is present, install shingles even with the drip edge or overhang the starter course over the drip edge up to 3/4". Minimizing overhang at eaves and rakes is recommended to improve wind resistance of the installed system.

For maximum wind resistance along rakes, install any TAMKO starter shingle including sealant or cement shingles to the underlayment and each other in a 4" width of any adhesive meeting ASTM D4586, Type 1.



2 CUTS, 5 COURSES, NO-WASTE SHINGLE APPLICATION: Start the first course with a full-size shingle placed directly over the starter course. Cut 10-3/8" from a full shingle to form a shingle 29" long. Use this to start the second course (see diagram below). Cut a 23" long shingle to start the third course. Use the remaining 16-3/8" piece of shingle to start the fourth course and use the remaining 10-3/8" piece to begin the fifth course. Continue up the rake in as many rows as necessary using the same formula as outlined below.



HERITAGE® ARCHITECTURAL ASPHALT SHINGLES

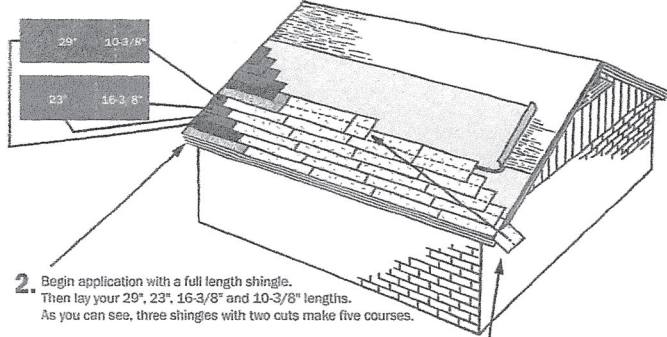
DALLAS, TX • FREDERICK, MD • JOPLIN, MO • PHILLIPSBURG, KS



5. APPLICATION INSTRUCTIONS (continued)

The butt of the shingle should be aligned with the top edge of the sawtooth of the underlying shingle for a 5-5/8" exposure. When you make your final cut at the roof's edge, flip any pieces that are 8" or longer back onto the roof. These pieces can be worked in anywhere without creating zippers or color variations.

1. Cut your first course shingle to make 29" and a 10-3/8" length.
Cut a second shingle to make a 23" and a 16-3/8" length.



2. Begin application with a full length shingle.
Then lay your 29", 23", 16-3/8" and 10-3/8" lengths.
As you can see, three shingles with two cuts make five courses.
3. Continue working your way across the roof. When you make your final cut at the roof's edge, flip any pieces that are 8" or longer back onto the roof. These pieces can be worked in anywhere without creating zippers or color variations.

NOTE: do not align joints of shingle courses when working in cut pieces. Joints should be no closer than 4" from one another.

6. LOW SLOPE APPLICATION

On pitches 2" per foot up to but less than 4" per foot (2:12 up to but less than 4:12) cover the deck with two layers of underlayment. Begin by applying the underlayment in a 1/2-sheet width plus 1/2 width of the side lap (i.e. for 36" wide asphalt saturated felt with a 2" side lap, the width would be 19") along the eaves. Place a full sheet width over the starter piece, completely overlapping it. All succeeding courses will be positioned to overlap the preceding course by 1/2-width sheet plus 1/2 width of the side lap. If winter temperatures average 25 °F or less, thoroughly cement the laps of the entire underlayment to each other with any adhesive meeting ASTM D4586 Type I from eaves and rakes to a point of at least 24" inside the interior wall line of the building. As an alternative, one layer of TAMKO® Moisture

underlayment may be used in lieu of the double coverage underlayment.

7. MANSARD ROOF OR STEEP SLOPE ROOF

If the slope is equal to or exceeds 21" per foot (60°), each shingle must be sealed with any adhesive meeting ASTM D4586 Type I immediately upon installation. Quarter-sized dabs of cement must be applied to shingles. Use 6 fasteners per shingle — see Section 3 for the Mansard Roof or Steep Slope Fastening Pattern.

8. RE-COVERING

High Wind Warranty is offered on new construction or complete tear-off applications only. It is not offered for re-cover applications.

Before re-covering a roof be certain to inspect the roof decks. All decking shall meet the requirements listed in Section 1.

It is not recommended to install laminated asphalt shingles directly over existing laminated shingles due to the unevenness of the existing multi-layered shingles. The performance of the sealant feature may be compromised, preventing the shingles from sealing properly. It is acceptable to install laminated shingles over existing three-tab strip shingles which are flat and essentially intact. Nail down or remove curled or broken shingles from the existing roof. Replace all missing shingles with new ones to provide a smooth base. Shingles that are buckled usually indicate warped decking or protruding nails. Hammer down all protruding nails or remove them and refasten in a new location. Remove all drip edge metal and replace with new.

If re-covering over an existing roof where new flashing is required to protect against ice dams (freeze/thaw cycle of water and/or the backup of water in frozen or clogged gutters), remove the old roofing to a point at least 24" beyond the interior wall line and apply TAMKO® Moisture Guard®, TW Metal and Tile Underlayment, or TW Underlayment. For more information contact TAMKO's Technical Services Department at 800-641-4691.

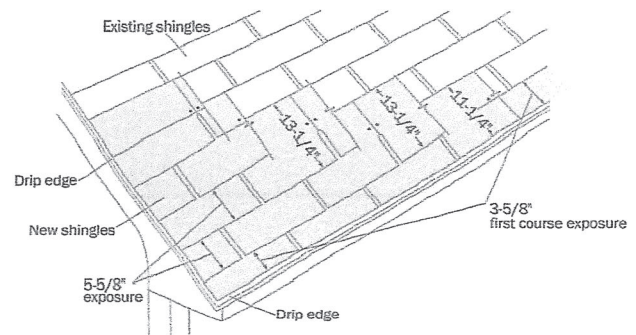
Measurements will vary when nesting over an existing 5" exposure shingled roof: Call TAMKO's Technical Services for further information.

The nesting procedure described below is the preferred method for re-covering over existing metric size shingles with a 5-5/8" exposure. See description below:

Starter Course: Remove the tabs and an additional portion from the head of a full-size shingle so that its height is equal to the exposure of the existing shingles. Position the resulting strip over the existing roof edge (with the factory-applied adhesive strip along the eaves). Cut approximately 6" from the rake end and apply the remaining portion at the eaves. Continue the starter strip by applying full length shingle strips cut to height as above, evenly along the existing roof at the eaves. The existing roof should overhang the eaves far enough to carry water off into the gutter. If this is not the case, cut and apply the starter strip so that it will provide sufficient overhang for proper drainage.

First Course: Remove an amount from the butt edge of a full-size shingle so that the remaining portion of the shingle fits between the butts of the existing third course. This course must also be applied evenly along the eaves edge of the new starter strip.

Second and Succeeding Courses: Remove 10-3/8" from the rake end of the first shingle in the second course, and continue with full width shingles for the remainder of the course, placing the top edge of each new shingle against the butt edge of the old shingle in the course above. This method should create an exposure of 5-5/8" after the first course. When beginning the succeeding courses



9. VALLEY APPLICATION

Center a minimum 36" wide sheet of TAMKO® Moisture Guard®, TW Metal and Tile Underlayment, any self-adhesive underlayment designed for use with asphalt shingles which meets ASTM D1970, or a minimum 50 lb. roll roofing in the valley. Nail the underlayment only where necessary to hold it in place and then only nail the outside edges. Install shingle underlayment and extend over valley flashing by 6".

IMPORTANT: PRIOR TO INSTALLATION, WARM SHINGLES TO PREVENT DAMAGE WHICH CAN OCCUR WHILE BENDING SHINGLES TO FORM VALLEY.

- The first course and only the first course of shingles from the intersecting roof surface should be woven with the first course of shingles on the starting roof.
- Apply the first course of shingles along the eaves on one of the intersecting roof planes and across the valley.

Note: For proper flow of water over the trimmed shingle, always start applying the shingles on the roof plane that has the lower slope or less height.

- Extend the end shingle at least 12" onto the adjoining roof. Apply succeeding courses in the same manner, extending them across the valley and onto the adjoining roof.
- Press the shingles tightly into the valley.
- Use normal shingle fastening methods.

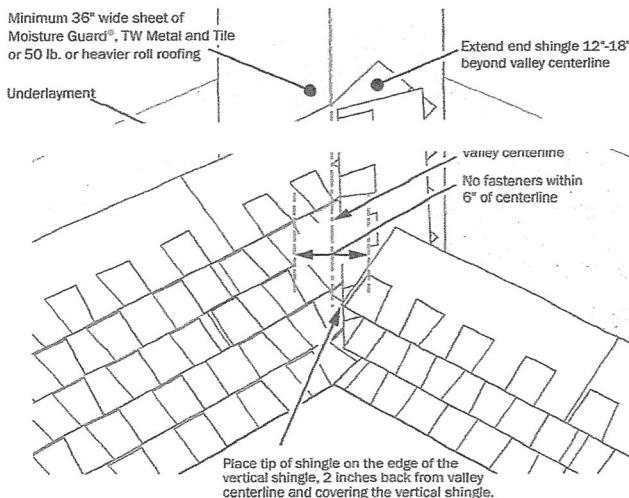
Note: No fastener should be within 6" of the valley centerline, and two fasteners should be placed at the end of each shingle crossing the valley.

- To the adjoining roof plane, apply one row of shingles vertically facing the valley and 2" back from the valley centerline.

Note: For a neater installation, snap a chalkline over the shingles for guidance.

- To complete the valley, apply shingles on the adjoining roof plane by positioning the tip of the first shingle of each row at the 2" point from the centerline where the edge of the vertical shingle has been applied, covering the vertical shingle.

For alternate valley application methods, please contact TAMKO's Technical Services Department at 800-641-4691.



10. HIP AND RIDGE FASTENING DETAIL

TAMKO recommends the use of TAMKO® Hip and Ridge shingle products. Where matching colors are available, it is acceptable to use TAMKO® Elite Glass-Seal® shingles cut down to 12" pieces.

IMPORTANT: PRIOR TO INSTALLATION, CARE NEEDS TO BE TAKEN TO PREVENT DAMAGE WHICH CAN OCCUR WHILE BENDING SHINGLES IN COLD WEATHER.

Apply shingles up to a hip or ridge from both sides of the roof before finishing the intersection. To facilitate finishing, adjust the last few courses so that the ridge capping will adequately cover the top courses of shingles equally on both sides of the ridge.

To apply the capping, bend each shingle along the centerline so that it will extend an equal distance on each side of the hip or ridge. Chalk lines may assist in proper alignment. In cold weather, warm the shingle until it is pliable before bending.

Apply the shingles with a 5-1/8" exposure, beginning at the bottom of the hip or from the end of the ridge opposite the direction of the prevailing winds. See Figure 1. Secure each shingle as illustrated in Figure 2 with one fastener on each side, 5-5/8" back from the exposed end and 1" up the from the edge. DO NOT NAIL BELOW THIS LINE 1" UP FROM THE EDGE. The length of the fastener should be long enough to penetrate through the roofing material and 3/4" into the wood decking or completely through the decking.

In high wind areas, it may be advisable, at the discretion of the roofing contractor, to use a spot of sealant to minimize blow off problems.

Alternatively, a 2-layer application of TAMKO® hip and ridge shingles with dimension 12-1/4" x 12" may be applied to all Heritage® roofs to enhance the overall appearance. When the second layer is applied, offset this layer by 1/4" to create a "shadow" effect. See Figure 3.

For a high profile appearance, TAMKO recommends Heritage® Designer Ridge. The application instructions are available at tamko.com or by calling TAMKO's Technical Services Department at 800-641-4691.

Figure 1

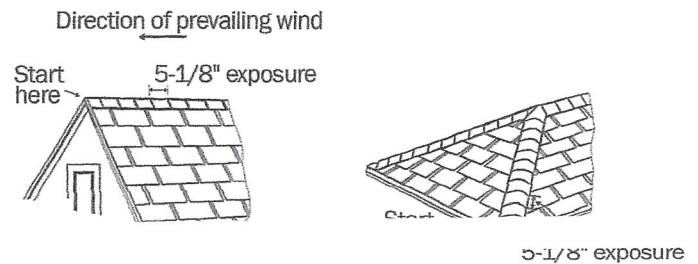


Figure 2

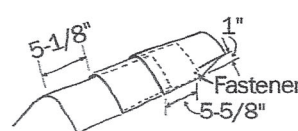
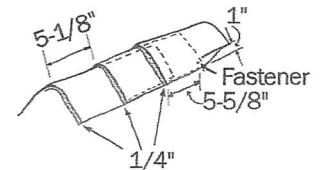
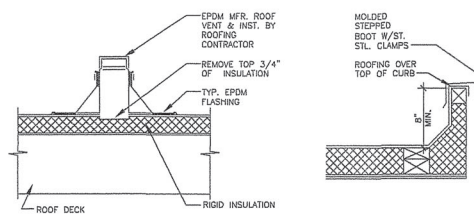
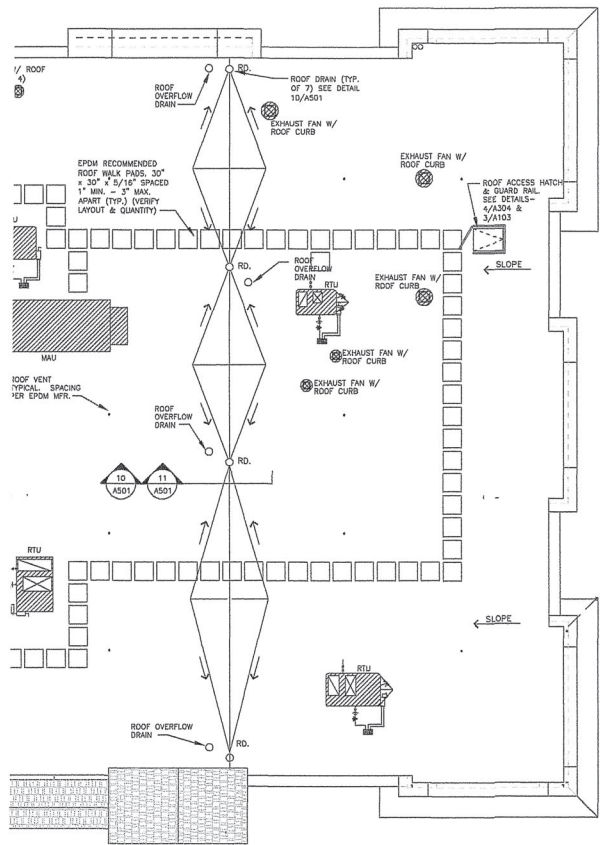
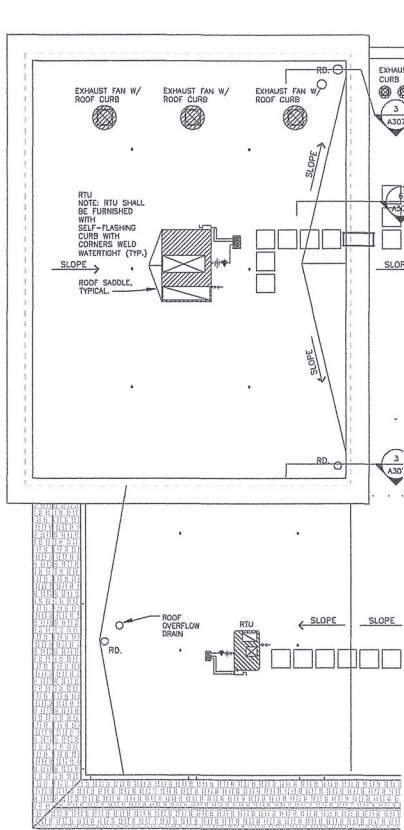
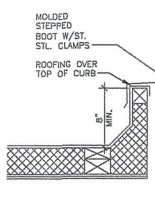


Figure 3

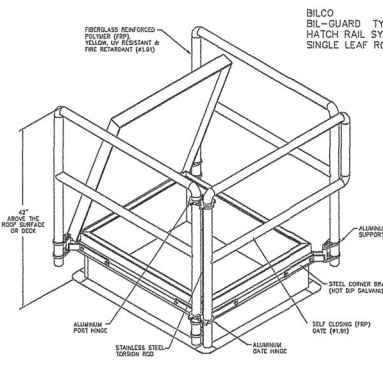




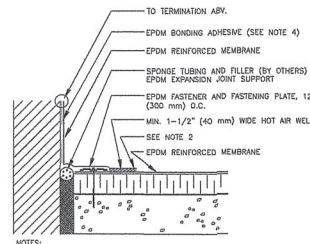
1 ROOF VENT



2 PIPE



3 HATCH GUARD RAIL



- NOTES:
1. POSITION FASTENING PLATES 1/2" (13 mm) MINIMUM TO 1" (25 mm) MAXIMUM FROM EDGE OF DECK FLANGE.
 2. APPROXIMATELY 1/8" (3 mm) DIAMETER BEAD OF EDGE SEALANT IS REQUIRED ON CUT EDGES OF EPDM REINFORCED MEMBRANE.
 3. REFER TO EPDM MEMBRANE FASTENER CRITERIA FOR PROPER FASTENERS AND PLATES.
 4. EPDM BONDING ADHESIVE IS REQUIRED REGARDLESS OF TERMINATION HEIGHT.

4 EXPANSION JOINT AT WALL

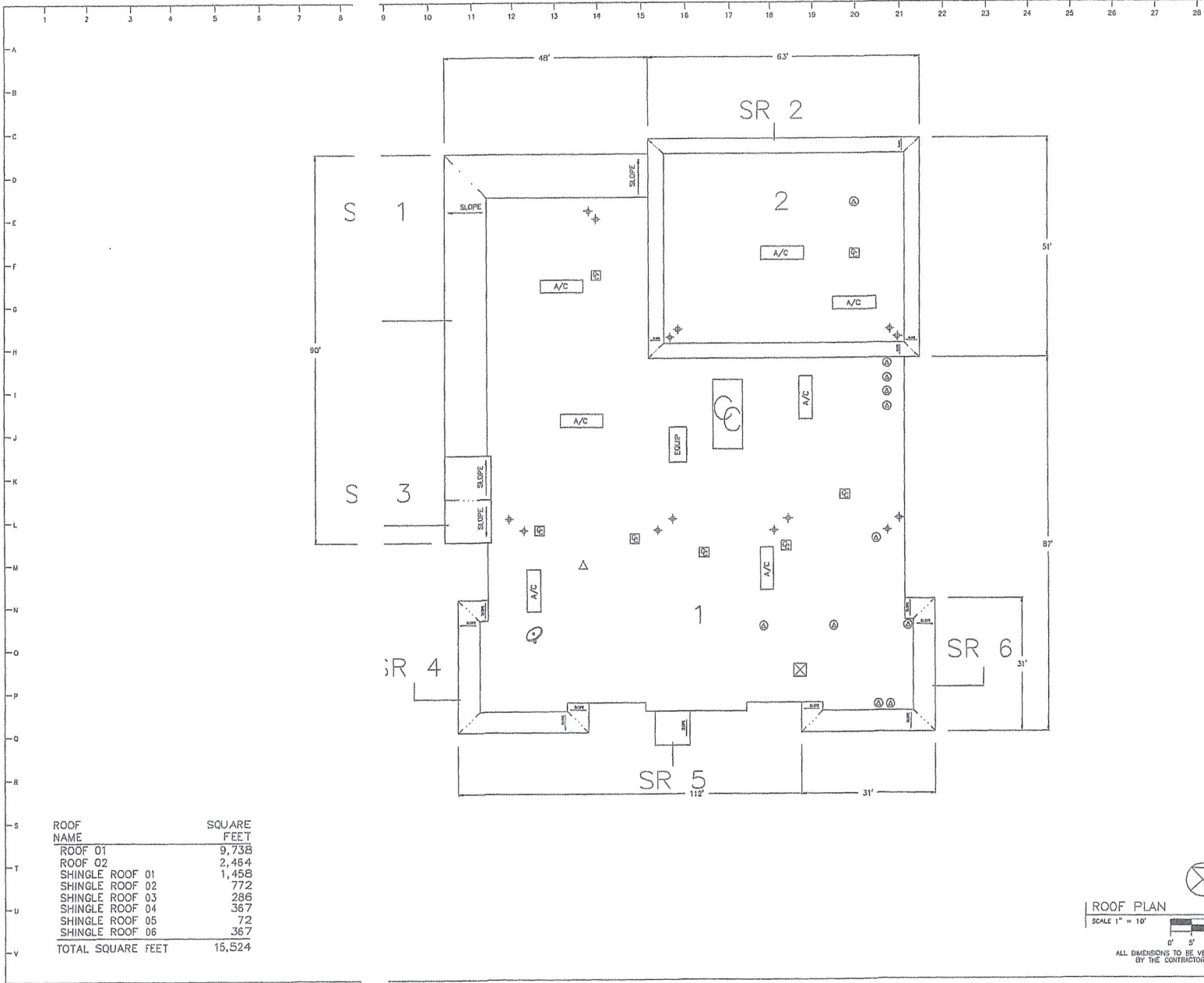


ROOF PLAN

EPDM ROOF SYSTEM:

- ALL AREAS TO HAVE TO BE 1/4"/12" PITCHED ROOFS
- FULLY ADHERED SHEET EPDM 60 MIL NON-REINFORCED MEMBRANE (SINGLE PLY). REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND DETAILS FOR SPECIFIC ROOF SYSTEM INSTALLATION. CONTRACTOR TO PROVIDE COMPLETE ROOFING PACKAGE PER MANUFACTURER'S RECOMMENDATIONS.
- MANUFACTURED TO COMPLY W/ CLASS A FIRE CLASSIFICATION
- ROOFING CONTRACTOR SHALL PROVIDE MFR'S 15-YEAR WARRANTY CERTIFICATE FOR INSTALLATION & MATERIAL.
- COORDINATE WITH MECHANICAL CONTRACTOR FOR LICATION OF ALL ROOF PENETRATIONS AND OPENINGS AND INSTALL FLASHING FOR ALL ROOF TOP EQUIPMENT CURBS.
- REFER TO DETAILS ON SHEET A501.

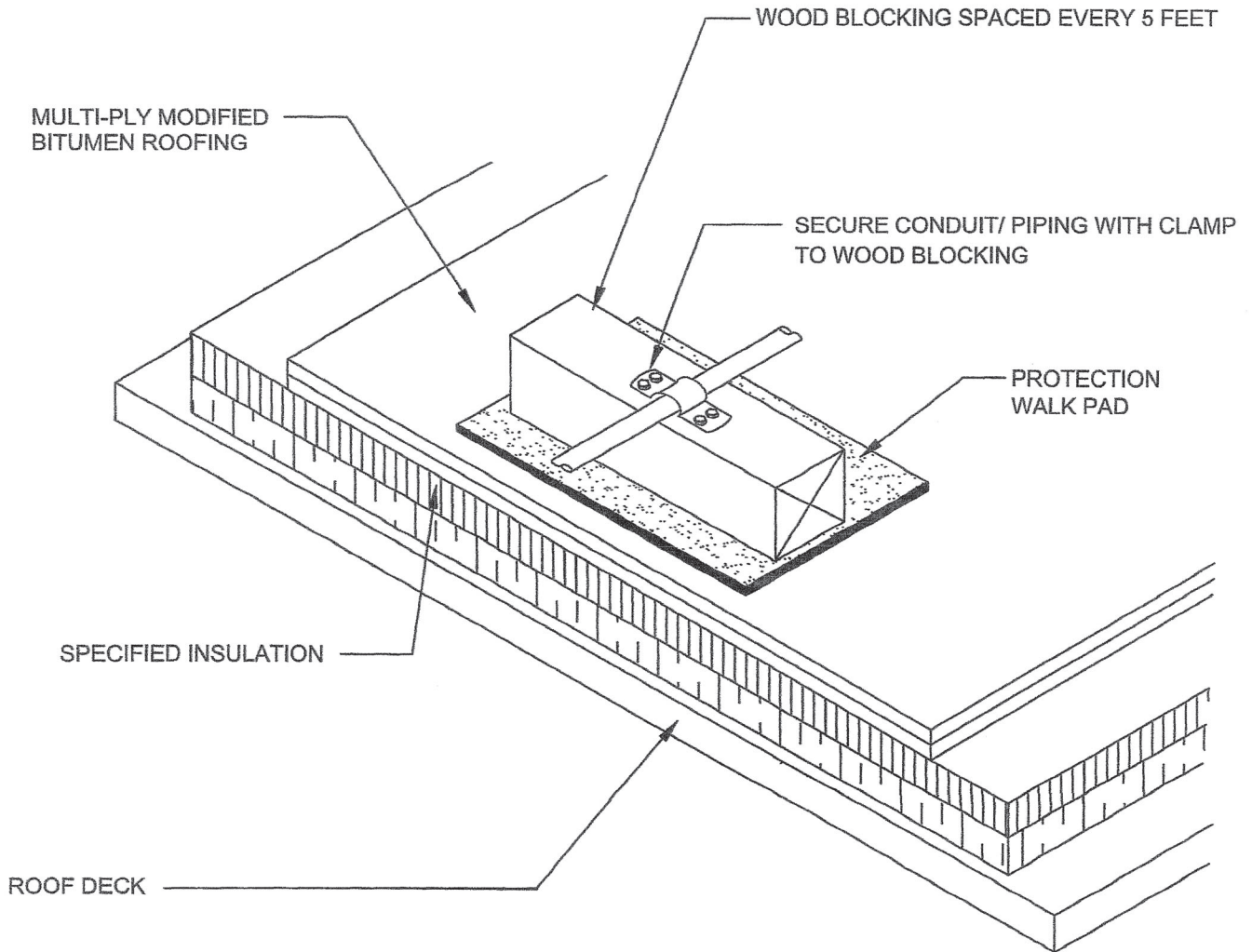




ROOF NAME	SQUARE FEET
ROOF 01	9,738
ROOF 02	2,464
SHINGLE ROOF 01	1,458
SHINGLE ROOF 02	772
SHINGLE ROOF 03	286
SHINGLE ROOF 04	367
SHINGLE ROOF 05	72
SHINGLE ROOF 06	367
TOTAL SQUARE FEET	16,524

ROOF PLAN
 SCALE 1" = 10'

0 5 10'
 ALL DIMENSIONS TO BE VERIFIED BY THE CONTRACTOR



SHEET TITLE:

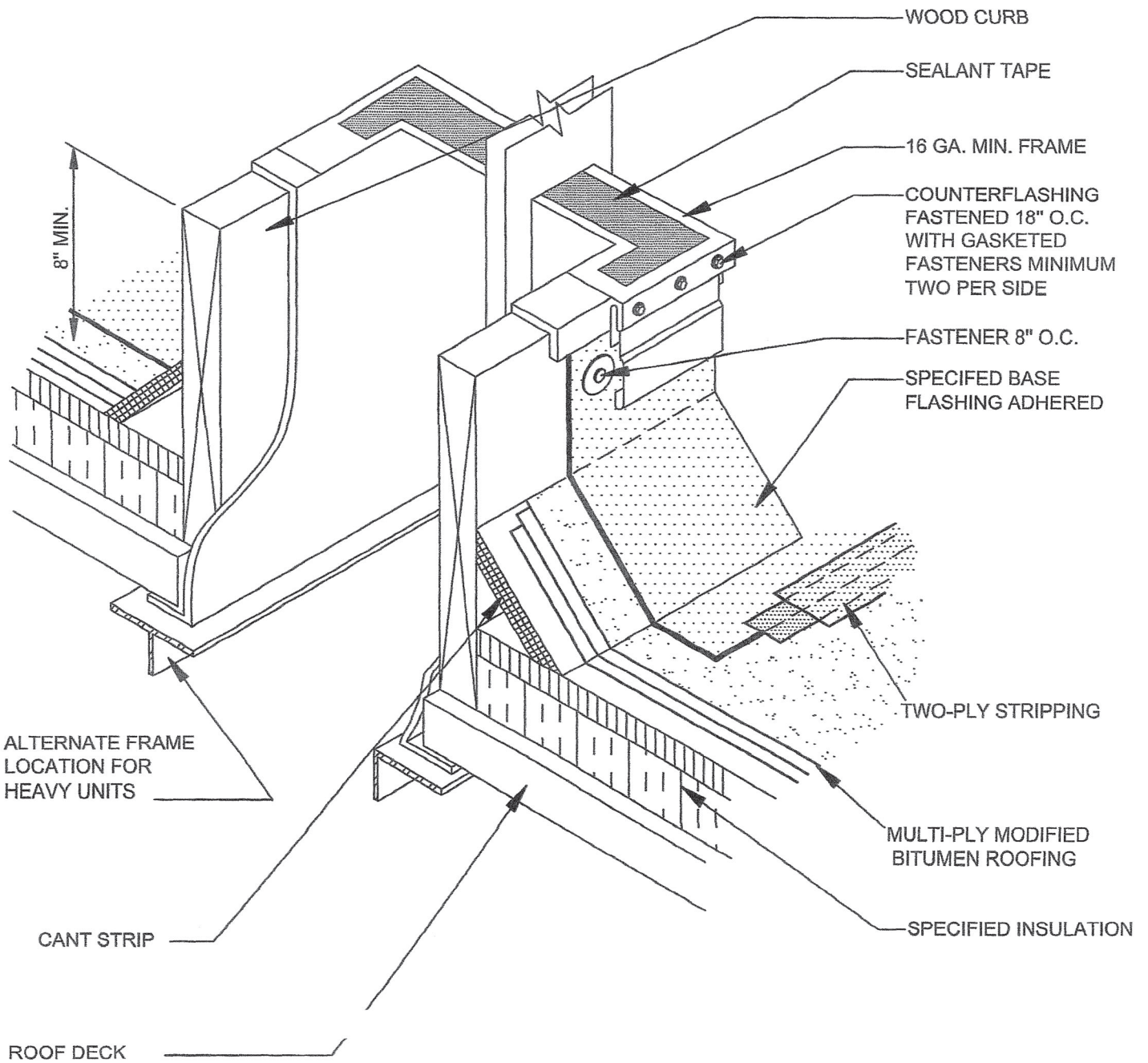
CONDUIT / PIPE SUPPORT

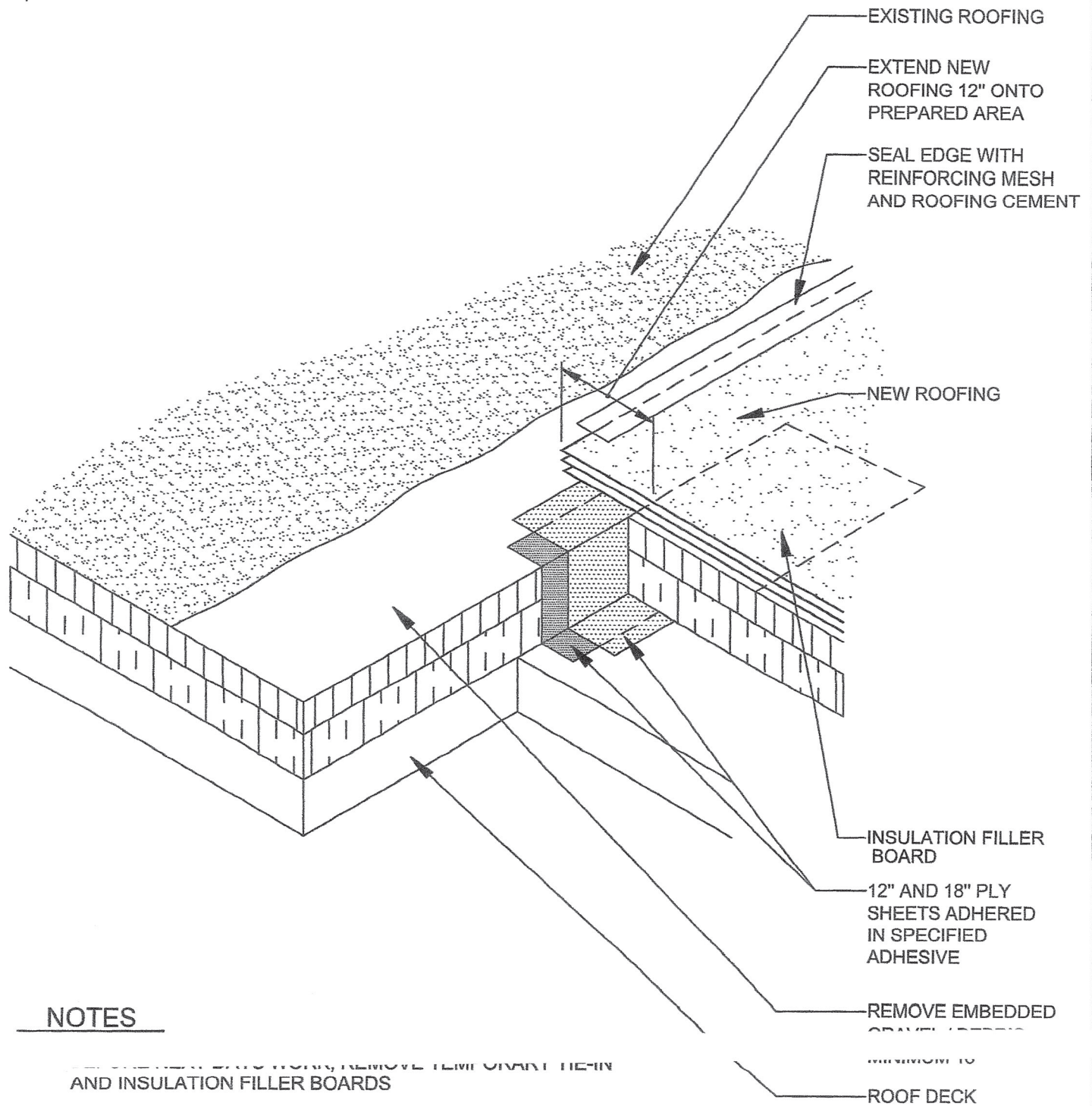
SCALE:

NTS

DRAWING No.:

DWG NO. 31





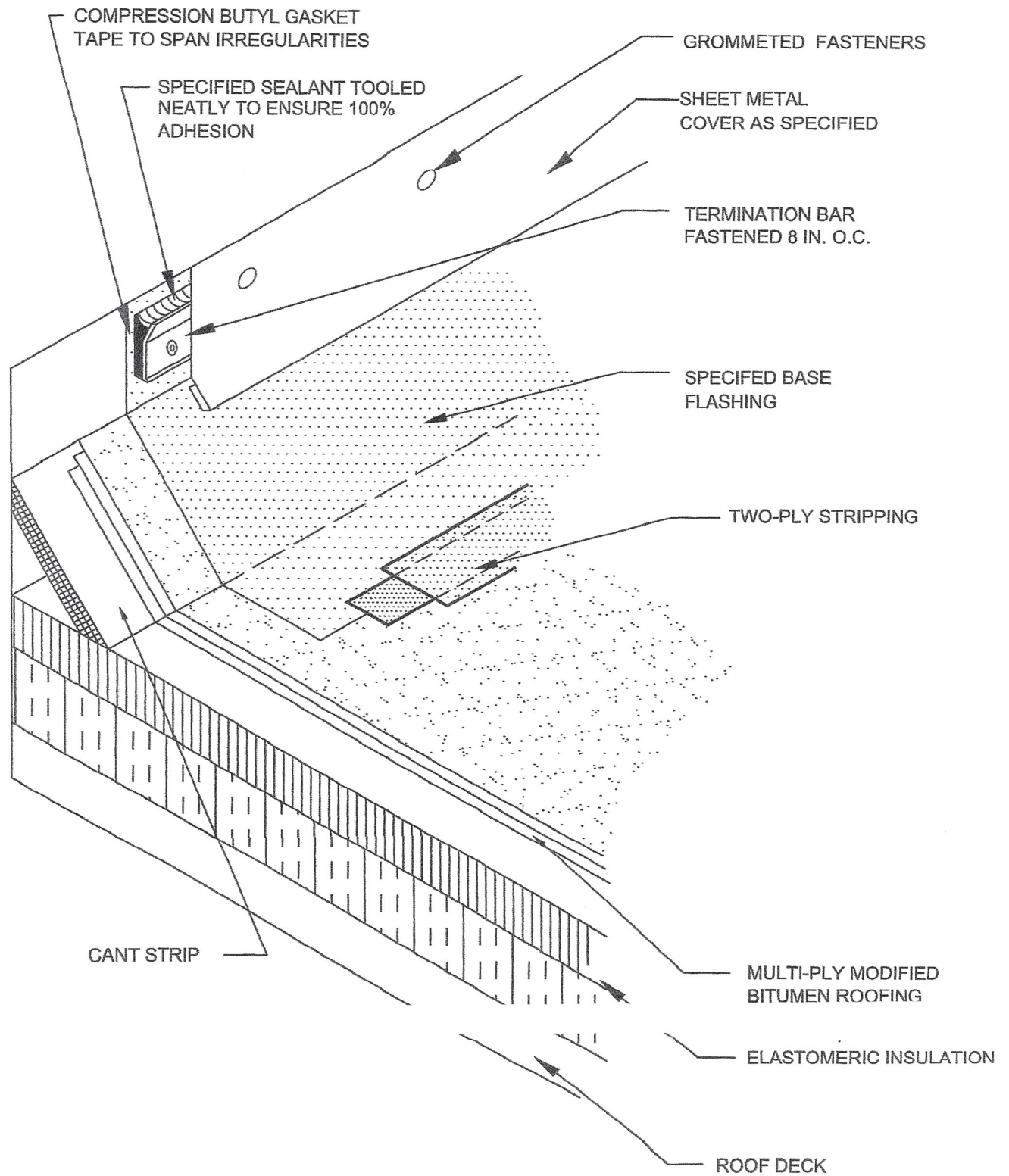
NOTES

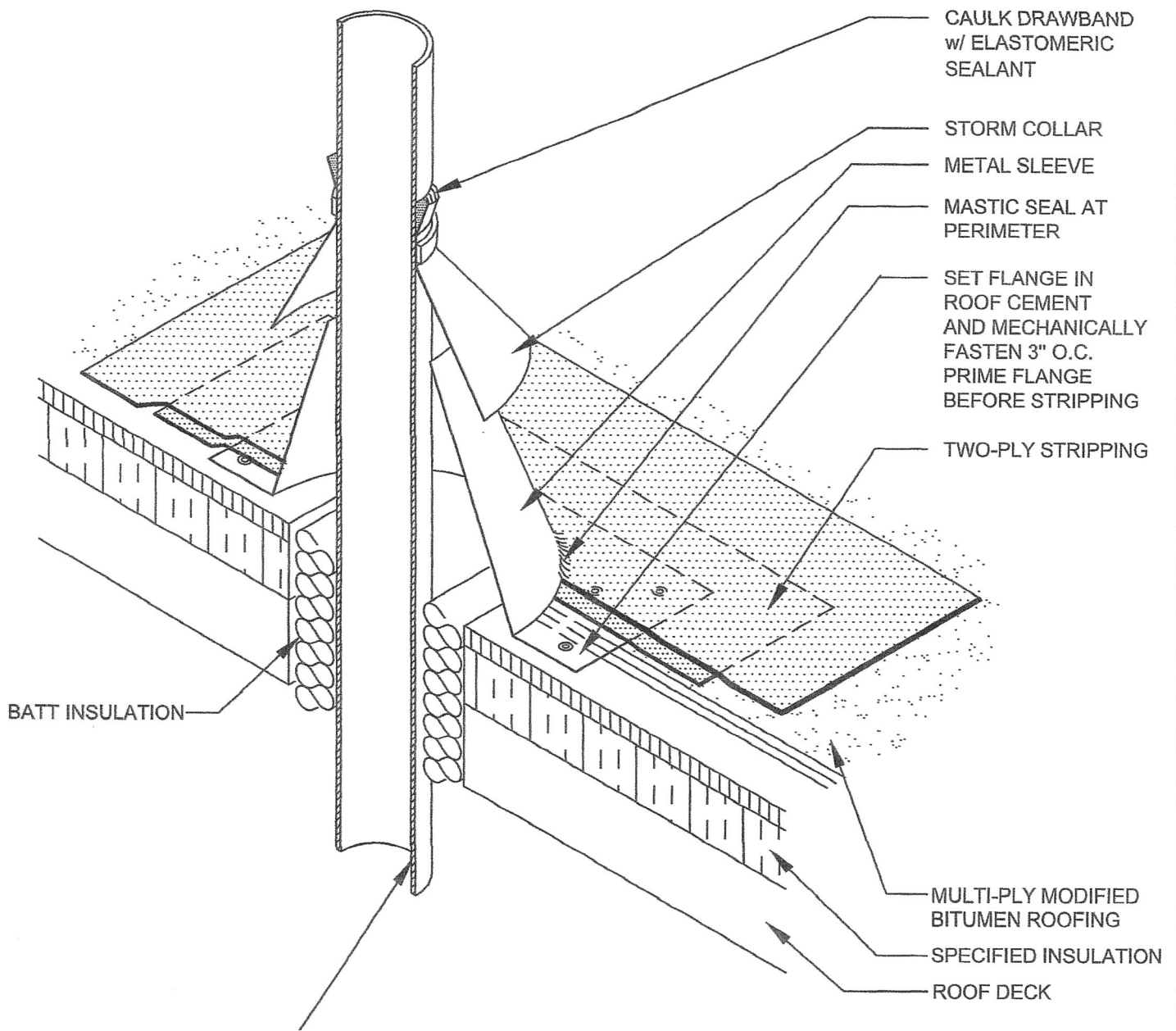
REMOVE EMBEDDED GRAVEL, REMOVE TEMPORARY TIE-IN AND INSULATION FILLER BOARDS



SHEET TITLE:
DAILY WATERSTOP / TIE IN

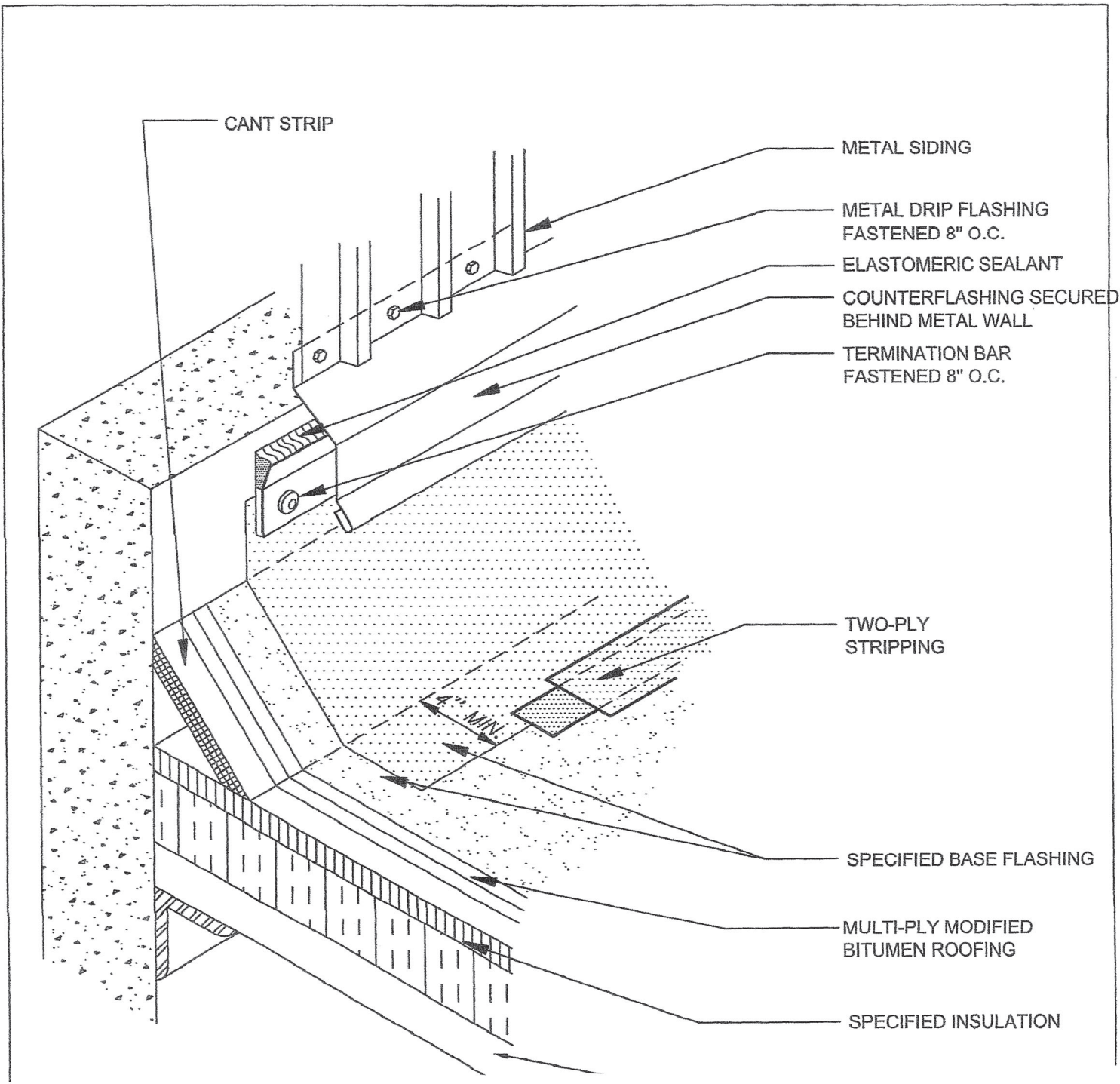
SCALE:
NTS
DRAWING No.:
DWG NO. 07





SHEET TITLE:
**METAL SLEEVE AND
 STORM COLLAR**

SCALE:
 NTS
 DRAWING No.:
DWG NO. 16



CANT STRIP

METAL SIDING

METAL DRIP FLASHING
FASTENED 8" O.C.

ELASTOMERIC SEALANT

COUNTERFLASHING SECURED
BEHIND METAL WALL

TERMINATION BAR
FASTENED 8" O.C.

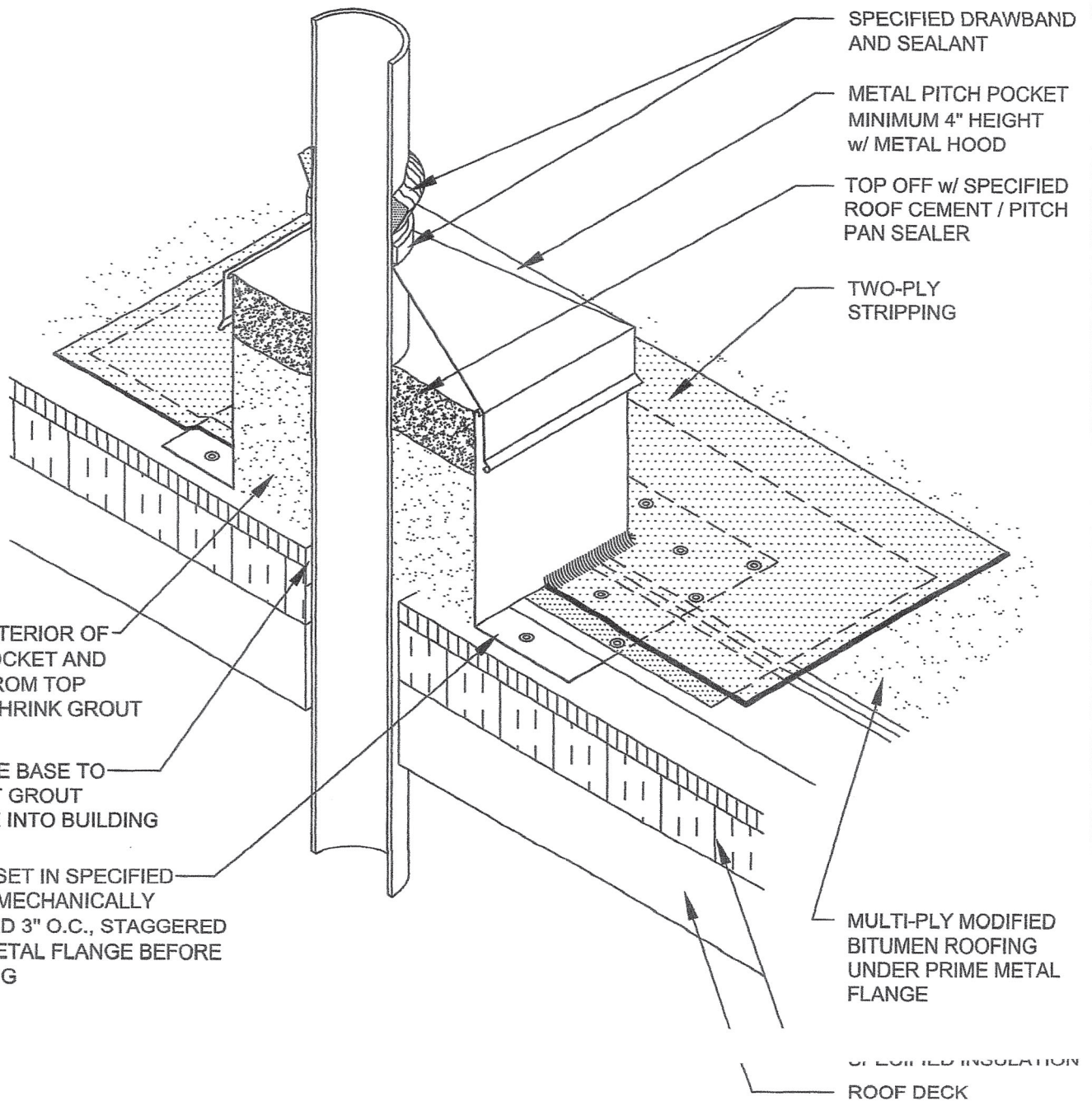
TWO-PLY
STRIPPING

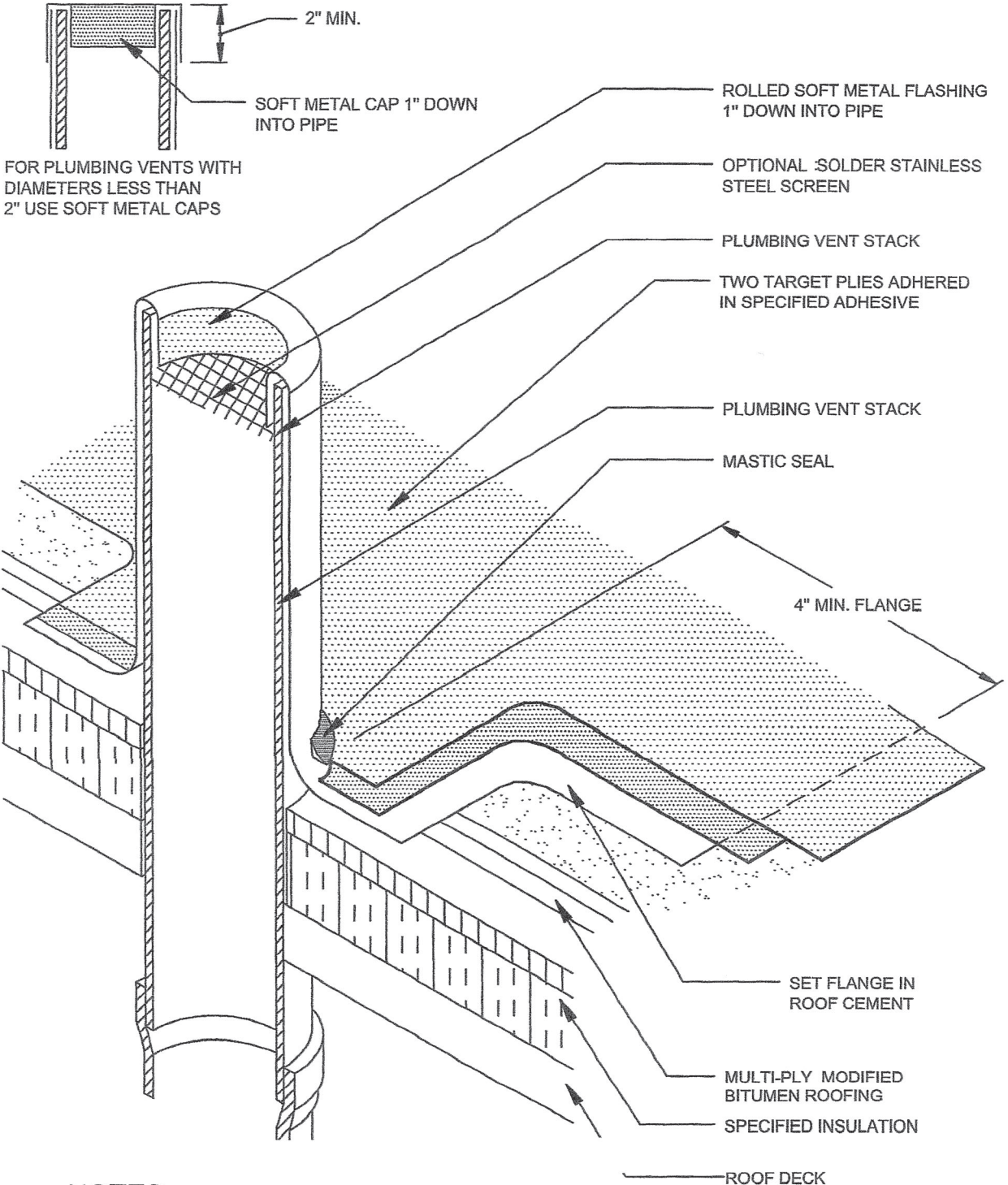
SPECIFIED BASE FLASHING

MULTI-PLY MODIFIED
BITUMEN ROOFING

SPECIFIED INSULATION

4" MIN.





NOTES

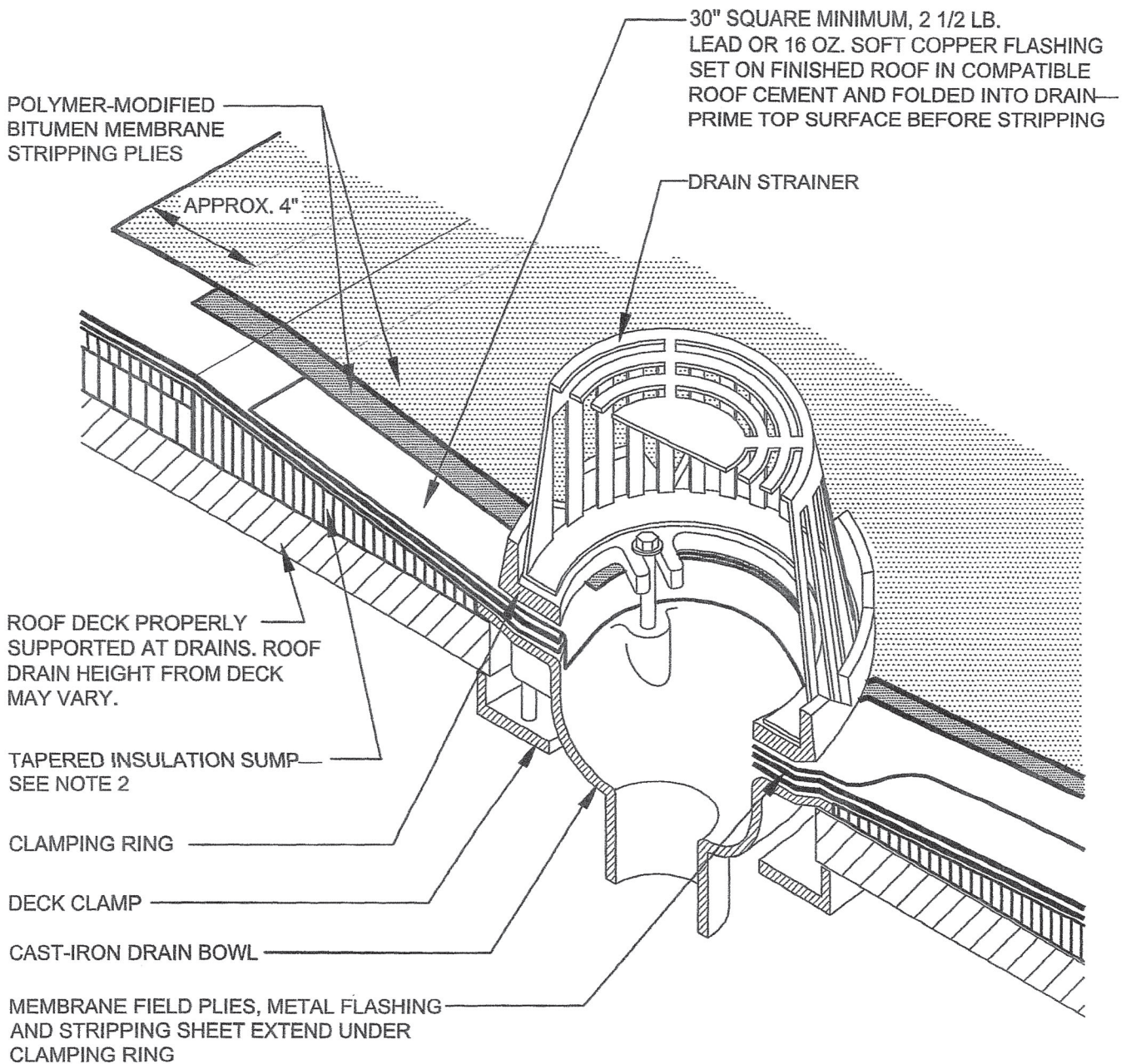
SOFT METAL FLASHINGS

1. SHEET LEAD MINIMUM 4 LB. (20kg/m) PER SQ.FT.
2. SHEET COPPER MINIMUM 16 OZ. IF COPPER FLASHING IS INSTALLED OVER AN IRON OR STEEL PIPE, WRAP AN ASPHALT COATED ROOFING FELT TO PREVENT DIRECT CONTACT BETWEEN TWO DISSIMILAR METALS.



SHEET TITLE:
PLUMBING VENT FLASHING

SCALE:
 NTS
 DRAWING No.:
DWG NO. 18



NOTES:

1. THIS DETAIL IS APPLICABLE FOR HOT-, COLD- OR TORCH-APPLIED FLASHING SYSTEMS.
2. THE USE OF A METAL DECK SUMP PAN IS NOT RECOMMENDED. HOWEVER, DRAIN RECEIVER/BEARING PLATES ARE APPLICABLE WITH SOME PROJECTS.
3. THE DESIGNER SHOULD CONSIDER INSULATING THE DRAIN COMPONENTS BELOW THE DECK TO PREVENT POTENTIAL CONDENSATION.
4. MEMBRANE SEAMS SHOULD NOT INTERSECT DRAIN CLAMPING RING.
5. FOR ROOF SYSTEMS WITH FACTORY-APPLIED GRANULE SURFACING, PROPERLY PREPARE CAP SHEET TO RECEIVE FLASHING.



SHEET TITLE:

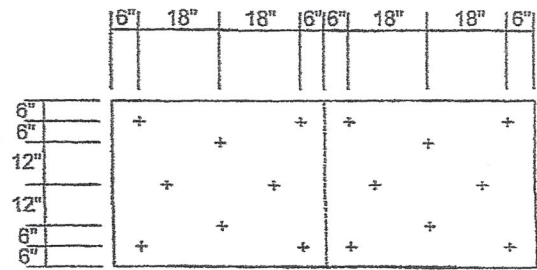
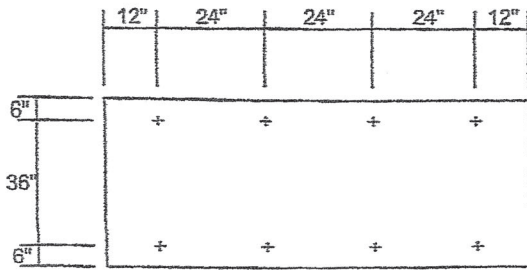
ROOF DRAIN ALT

SCALE:

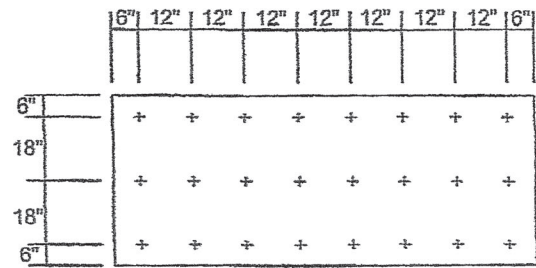
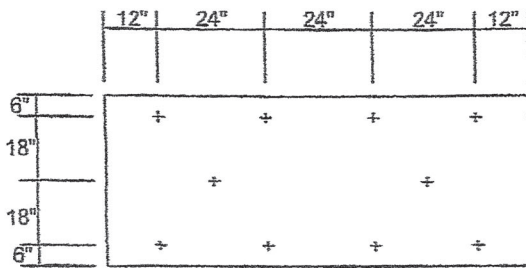
NTS

DRAWING No.:

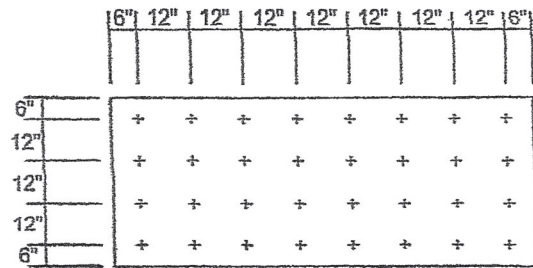
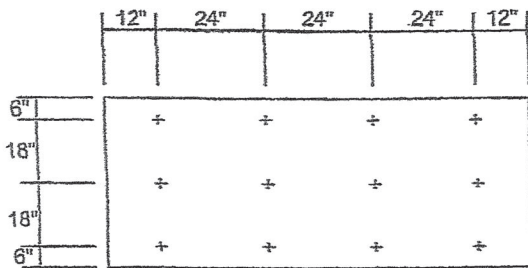
DWG NO. 13.A



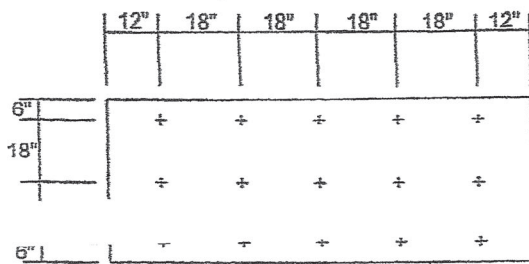
Z1



Z2



Z3



UNIVERSAL INSULATION FASTENING PATTERNS

SHEET TITLE:
UNIVERSAL INSULATION
FASTENING PATTERN

SCALE:
NTS
DRAWING No.:
DWG NO. 50