

2012 NC ENERGY CODE

CHAPTER 5:
TABLE 502.1
ZONE 4 REQUIRES R-30 MINIMUM CONTINUOUS INSULATION ABOVE ROOF DECK

EXISTING ROOF CONSTRUCTION:
BUILT-UP ROOF MEMBRANE (2) LAYERS 5/8" FIBERGLASS INSULATION, VAPOR BARRIER,
3/8" GYPSUM AND 2" CEMENTITIOUS WOOD FIBER DECK WITH STRUCTURAL SLOPE
EXISTING INSULATION TO BE REMOVED AND REPLACED WITH:
5.5" POLYISOCYANURATE INSULATION (in a minimum of 2 layers)
= R-31.9

2012 NC ENERGY CONSERVATION CODE
1014.2 REQS IN PART:
"ADDITIONS, ALTERATIONS, RENOVATIONS OR REPAIRS PORTION THEREOF SHALL CONFORM TO THE
PROVISIONS OF THIS CODE AS THEY RELATE TO NEW CONSTRUCTION WITHOUT REQUIRING THE UNALTERED
PORTION(S) OF THE EXISTING BUILDING OR BUILDING SYSTEM TO CONFORM WITH THIS CODE. (EMPHASIS ADDED)"

NCDO ENGINEERING, UPDATE NEWSLETTER DATED MAY 30, 2012 PROVIDES REEROOFING SCENARIOS AS
EXAMPLES OF THE SECTION NOTED ABOVE:

"SCENARIO 3: REMOVE EXISTING ROOF MEMBRANE AND ROOF INSULATION, INSTALL NEW ROOF MEMBRANE AND
NEW ROOF INSULATION.
SOLUTION 3: NEW INSULATION MUST MEET CURRENT CODE REQUIREMENTS. HANDSHIPS WILL HAVE TO BE
ADDRESSED ON A CASE BY CASE BASIS. THE REQUIREMENT FOR ADDING NEW INSULATION IS NOT INTENDED TO
ALSO CAUSE EXTENSIVE STRUCTURAL REPAIR, I.E. HAVING TO RAISE WINDOWS IN AN ADJOINING WALL OR
REQUIRING EXTENSIVE REPAIR OF THROUGH WALL FLASHING DRAINAGE SYSTEMS."

INSULATION TYPE	R-value per inch of thickness
(PER DOE INSULATION FACT SHEET)	
FIBER GLASS BLANKET OR BATT	2.9 to 3.8 (avg. 3.2)
HIGH PERFORMANCE FIBER GLASS BLANKET OR BATT	3.7 to 4.3 (avg. 3.8)
LOOSE FILL FIBER GLASS	2.3 to 2.7 (avg. 2.5)
LOOSE FILL ROCK WOOL	2.7 to 3.0 (avg. 2.8)
LOOSE FILL CELLULOSE	2.4 to 3.7 (avg. 3.5)
PERLITE OR VERMICULITE	3.4 to 3.7 (avg. 3.7)
EXPANDED POLYSTYRENE BOARD	3.6 to 4 (avg. 3.8)
EXTRUDED POLYSTYRENE BOARD	4.5 to 5 (avg. 4.8)
POLYISOCYANURATE BOARD, UNFACED	5.6 to 6.3 (avg. 5.8)
POLYISOCYANURATE BOARD, FACED	7 (avg. 5.8)
SPRAY POLYURETHANE FOAM	5.6 to 6.3 (avg. 5.9)

INSULATION TYPE	R-value per inch of thickness
(NON-DOE SOURCE)	
TECTUM	2.0 (avg. 1.82)
CELLULAR LIGHTWEIGHT CONCRETE	1.0 to 2.22
VERMICULITE LIGHTWEIGHT CONCRETE	.9 to 1.49
CONCRETE	.3

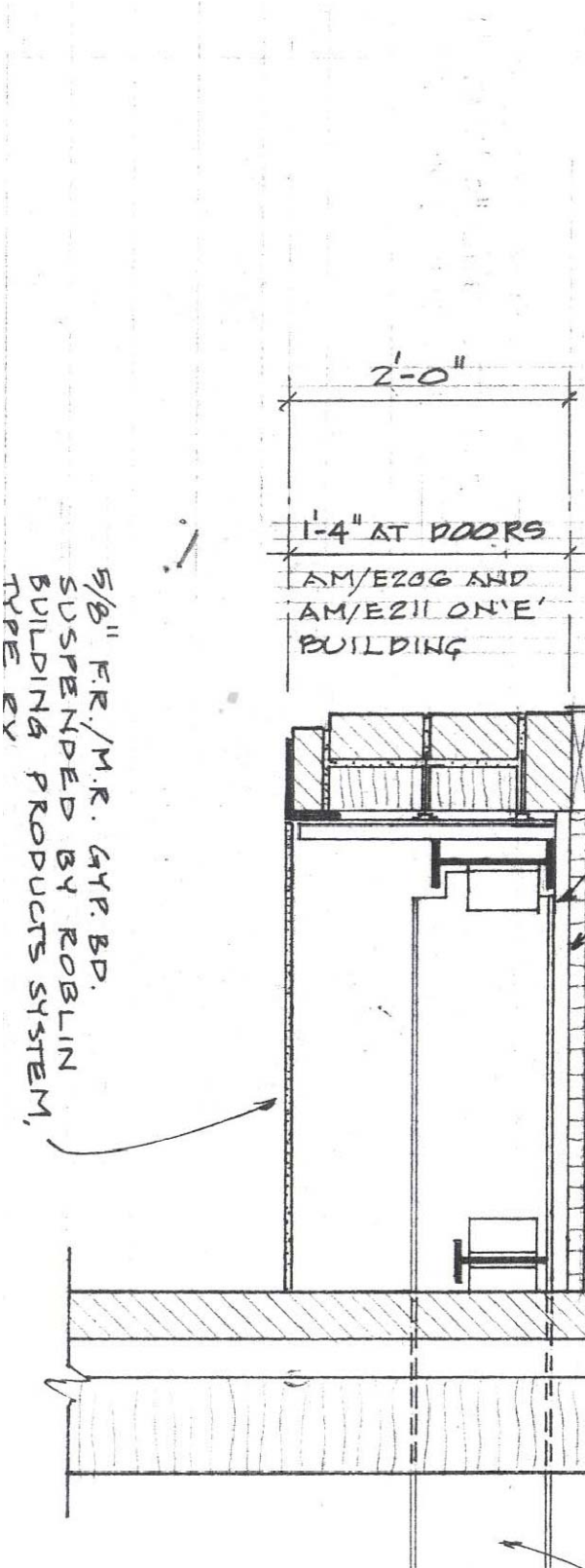
LIMITS OF
WORK

COORDINATE ROOF ACCESS LAY DOWN
AREA WITH OWNER. PROVIDE CHAIN LINK
FENCE ENCLOSURE

MAIN
ENTRANCE

SCOPE OF WORK AT CANOPIES:
1) PROVIDE .080 TPO ADHERED MEMBRANE AND METAL EDGE RECOVERY ROOF
OVER EXISTING BUILT UP ROOF. PROVIDE 1/2" HIGH DENSITY POLYISO COVER
BOARD MECHANICALLY FASTENED TO METAL DECK.
2) POLYISO CRICKETS TO SLOPE TO DRAIN.
3) CANOPIES TO BE INCLUDED IN FULL SYSTEM WARRANTY.

SEE CANT DET-SHT 29
B.U. ROOF - SEE SPECS
1 1/2" x 18" TAPERED INSUL.
1 5/8" FIBERGLASS INSUL.
METAL DECK.
NAILER & GRAVEL STOP
DET. SHOWN TO DET. A/T/B



2 EXISTING CANOPY ROOF SECTION
NOT TO SCALE

ENKA HIGH SCHOOL

RE-ROOFING BUILDING CTE WING & CANOPIES
475 ENKA LAKE ROAD
CANDLER, NC 28715

PROJECT DESCRIPTION:

BASE BID WORK INVOLVES DEMOLITION OF THE EXISTING BUILT UP ROOF TO CEMENTITIOUS WOOD FIBER AND METAL
DECKS & INSTALLATION OF NEW INSULATION, LIMITED TAPERED INSULATION, COVER BOARD AND FULLY ADHERED .080 TPO
MEMBRANE ROOF SYSTEM.

A NEW ANSIPRI METAL EDGE PRE-MANUFACTURED IN A UL CLASSIFIED, MAMMADE COMPLIANT CERTIFIED FACILITY IS
REQUIRED IN THE RE-ROOF AREAS AND SHALL BE COVERED BY THE ROOF SYSTEM MANUFACTURER'S FULL SYSTEM
WARRANTY. NEW WOOD WALKERS & METAL EXPANSION JOINT COVERS ARE REQUIRED. NEW CURBS AND WALKWAYS SHALL
BE PROVIDED IN THIS CONTRACT.

CONTRACTOR TO COORDINATE WITH SCHOOL ADMINISTRATORS / STUDENT CLASS SCHEDULES FOR ANY SERVICE
INTERRUPTIONS.

CONTRACTOR IS RESPONSIBLE FOR ALL PERMIT COSTS AND INSPECTIONS.

CONTRACTOR IS TO PROTECT AND CLEAN BUILDING INTERIOR AS REQUIRED FOR STUDENTS TO ATTEND SCHOOL.
REGULARLY, CONTRACTOR IS RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES THAT MAY OCCUR DURING THE
RE-ROOFING PROJECT.

DESIGN AND TECHNICAL CONTACT:

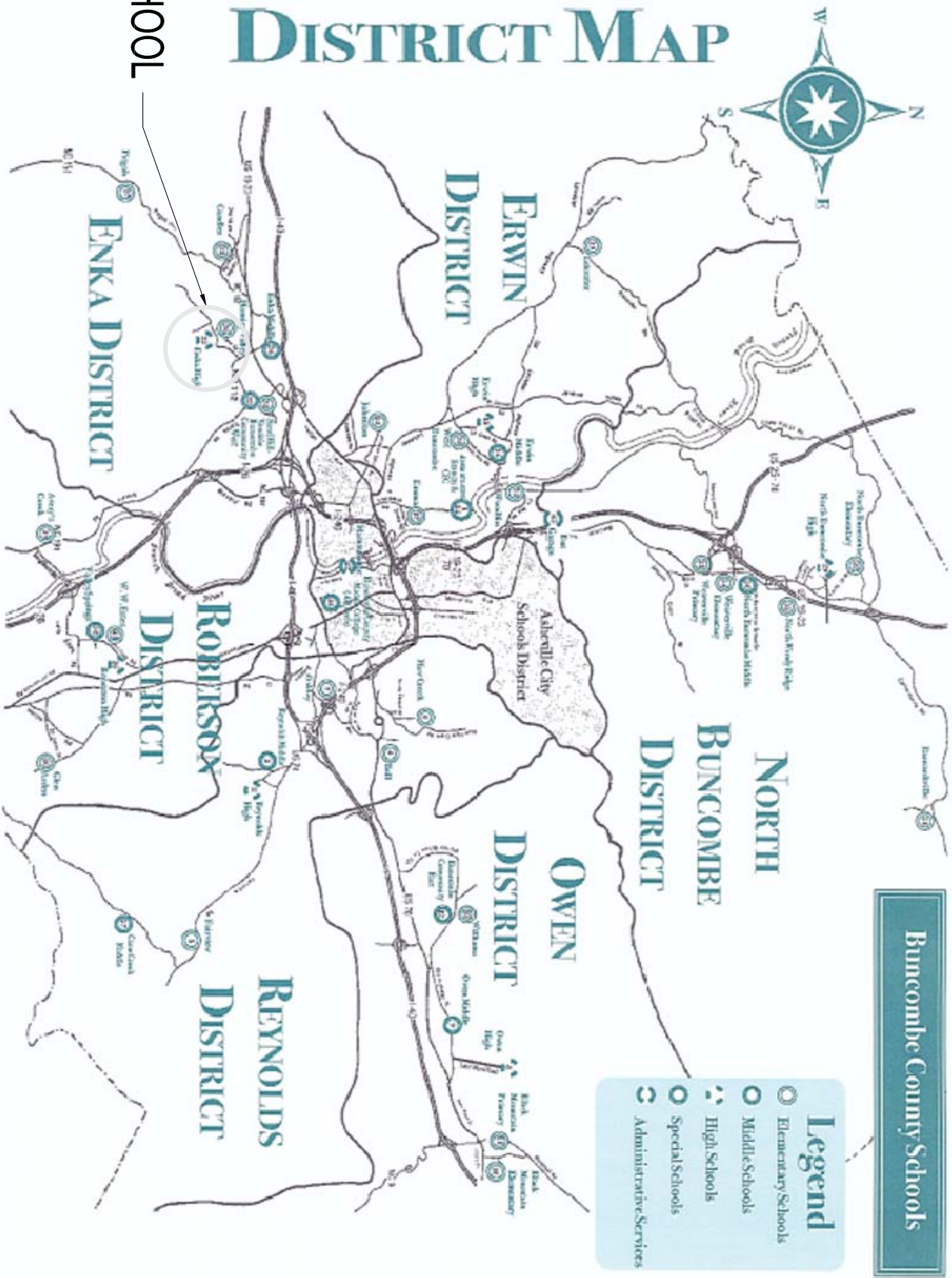
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PHONE: 828-255-5916
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BIDDING & ADMINISTRATIVE CONTACT:

RON VENTURELLA
PURCHASING OFFICER
PHONE: 828-255-5891
FAX: 828-251-1730

SHEET SCHEDULE:

COVER COVER, ENERGY CODE & VICINITY PLAN
A104.1 ROOF PLAN AND EXISTING DETAILS
A501.1 DETAILS

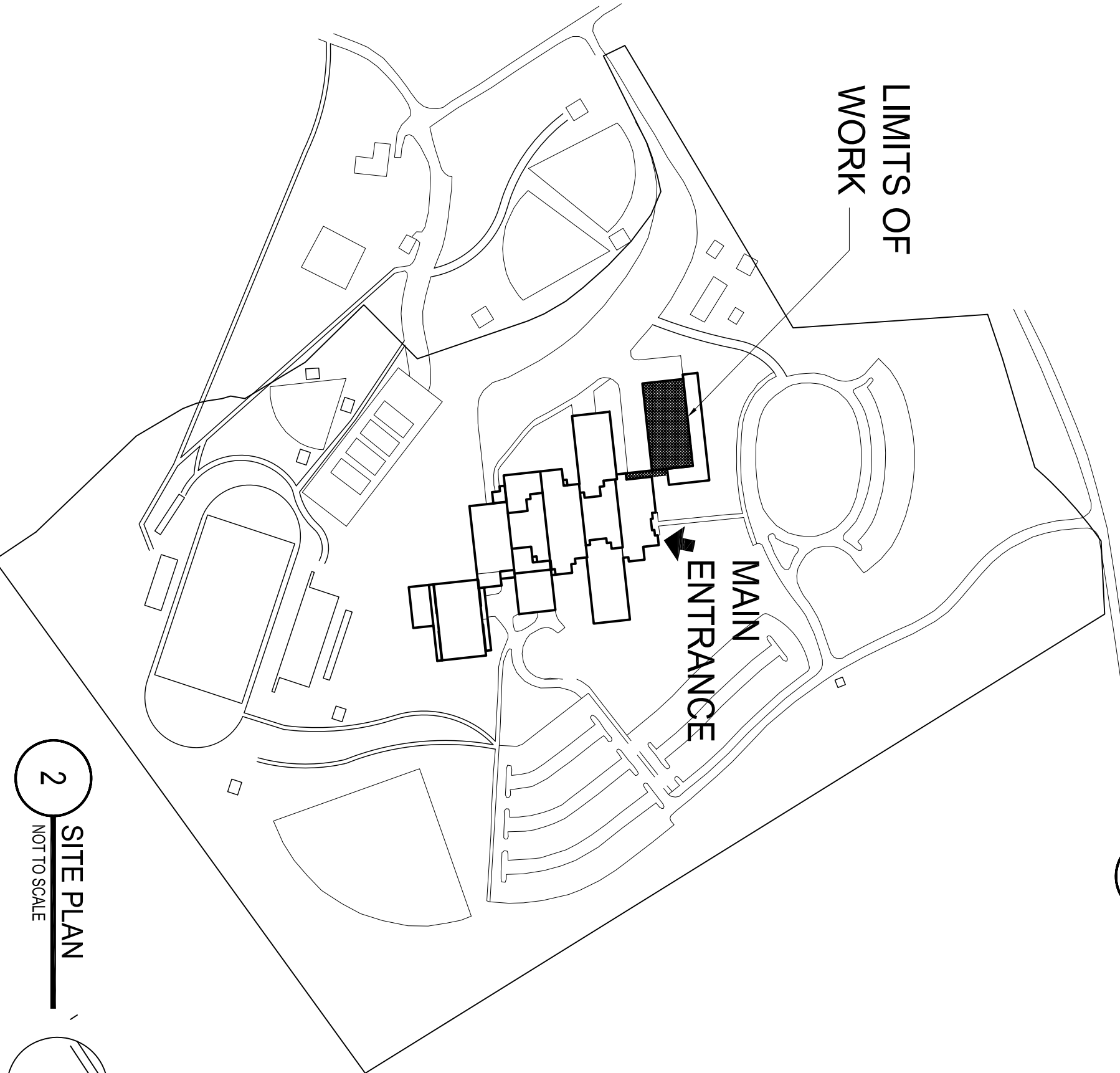


1 VICINITY MAP
NOT TO SCALE

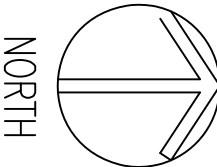
LIMITS OF
WORK

MAIN
ENTRANCE

3 OVERALL ROOF PLAN
SCALE: 1" = 40'-0"



2 SITE PLAN
NOT TO SCALE



LEGEND

---	LINE OF STRUCTURE BELOW
=====	PARAPET WALL
---	ROOF EDGE
---	CONDUIT
---	DRAIN PIPING
---	CONTROL/EXPANSION JOINT
---	ROOF AREA DIVIDER
---	DOWNSPOUT
---	THRU-WALL SCUPPER
⊗	PRIMARY ROOF DRAIN
⊙	PIPE PENETRATION
⊗	SOIL STACK
•	CONDUIT GAS PRES
•	PITCH POCKET
⊗	GRAVITY VENT VENTILATOR
⊗	EQUIPMENT CURB
⊗	ROOF HATCH
⊗	SKYLIGHT
⊗	SUPPORT CURB (SLEEPERS)
⊗	CHIMNEY
⊗	VACANT CURB
⊗	DETAIL NUMBER
⊗	PHOTOGRAPH LOCATOR
⊗	ROOF LADDER
•	SECONDARY ROOF DRAIN
⊗	HOT STACK
▲	ELEVATION CHANGE
⊗	OVERFLOW ROOF DRAIN PIPE
⊗	THRUEDGE SCUPPER
⊗	WALKPAD
(M)	SECTOR DESIGNATION

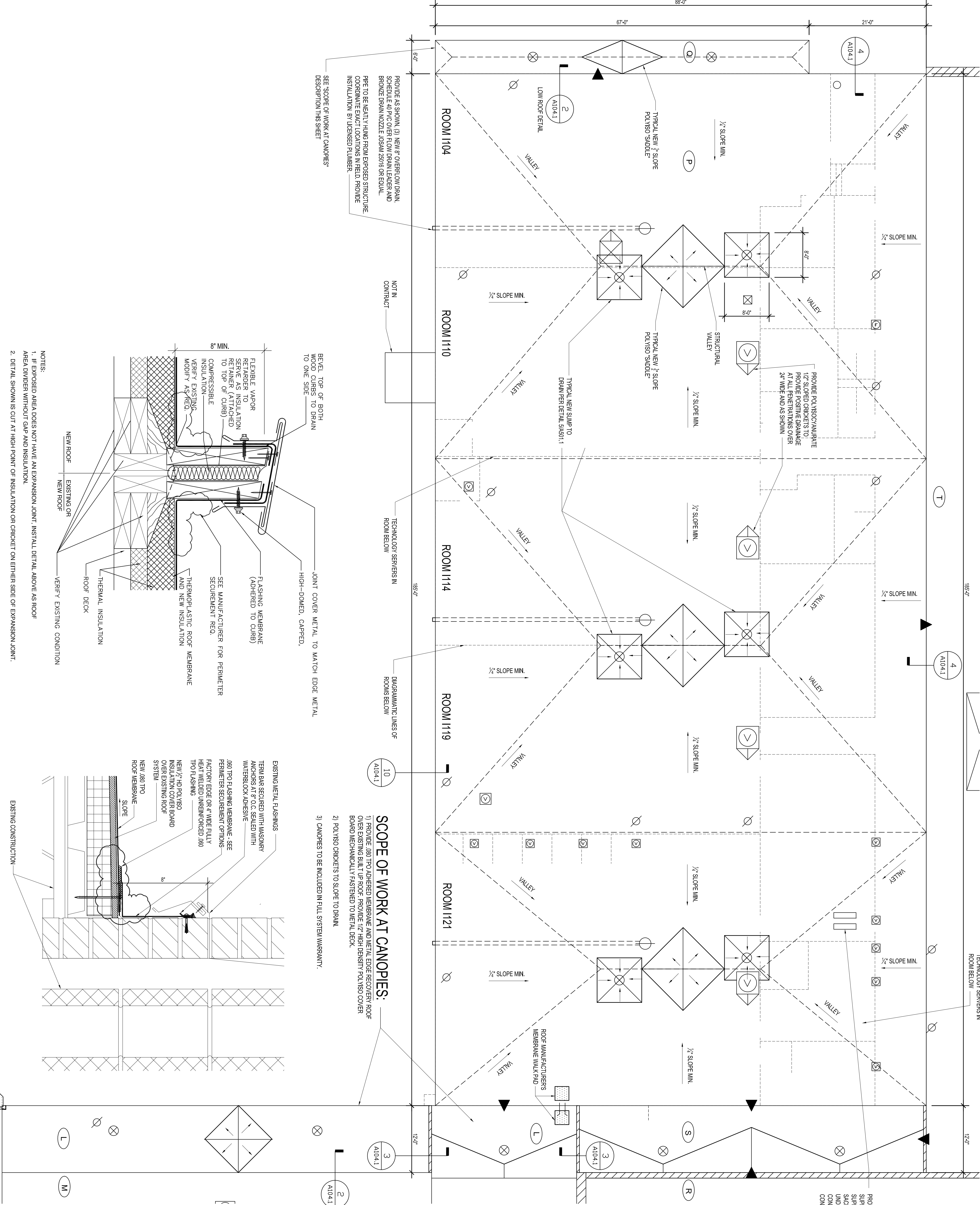
**EXISTING ROOF
CONSTRUCTION INFORMATION**

SURFACING: BALLASTED BUILT-UP ROOF
INSULATION: 4" FIBERGLASS AND TAPERED PERLITE
VAPOR BARRIER: POLYETHYLENE
ROOF DECK: 2 1/2" CEMENTITIOUS WOOD FIBER

GENERAL NOTES:

1. PROVIDE POSITIVE DRAINAGE AT ALL POINTS ON ROOF.
2. PROVIDE .060 TPO MEMBRANE, MINIMUM R-30 INSULATION EXCEPT AT SUMP AREAS, .060 TPO FLASHINGS.
3. PROVIDE #4 OR 3/4" STAINLESS STEEL FASTENERS WHERE IN CONTACT WITH PRESSURE TREATED WOOD. TREATED WOOD TO BE ACP- COPPER AZOLE TREATED AND KILN DRIED AFTER TREATMENT (KDAT).
4. EXTEND EXISTING PIPES PER DETAIL #A601.1 AS REQUIRED TO PROVIDE LENGTH OF 12" ABOVE DECK.
5. EXTEND CURBS AS REQUIRED TO REMAIN ABOVE DECK 8" MINIMUM PER DETAIL #A601.1. COORDINATE WITH RCS MAINTENANCE IF ASSISTANCE IS REQUIRED TO TURN OFF MECHANICAL EQUIPMENT.
6. CONTRACTOR TO VERIFY CONDITION OF EXISTING WALLS. IF DECAYED, CONTACT OWNER TO VERIFY AND REPLACE PER UNIT PRICE. PROVIDE BY UNIT PRICE AND ALLOWANCE IN THE BASE BID. ADDITIONAL WATER SEQUENCEMENT OF STAINLESS STEEL THREADED ROD EMBEDDED IN MASONRY AS REQUIRED TO MEET FM-48.
- PROVIDE IN THE BASE BID: ADDITIONAL STAINLESS STEEL THREADED ROD SEQUENCEMENT OF EXISTING WALLS TO EXTEND INTO MASONRY AS NOTED IN FM-48. ASSUME EXISTING CONDITION HAS ONLY (1) THREADED ROD SECUREMENT AT 8'-0" O.C.
7. NO CROSSING OF SURROUNDING ROOFS WILL BE PERMITTED BY CONTRACTOR. SURROUNDING ROOFS MAY BE UNDER WARRANTY. DAMAGES TO ROOFS SHALL BE REPAIRED AS REQUIRED FOR ROOFS UNDER WARRANTY OR NRCA RECOMMENDED DETAILS AND COST BORNE BY THE CONTRACTOR.
8. PROVIDE ROOF DRAIN ALTERATIONS AT ROOF DRAINS. PROVIDE ALL NEW STAINLESS STEEL BOLTS. PROVIDE NEW CAST IRON CLAMPING RING AND DOWNE IF REQUIRED AS PER DETAIL #A601.1.
9. PROVIDE NEW 1/2" SLOPE PANEL, TAPERED POLYISO CRICKETS ADHERED WITH 2 COMPONENT POLYURETHANE ADHESIVE AS SHOWN.
10. DURING EXISTING ROOF SYSTEM REMOVAL, CONTRACTOR TO HAVE (6) TALL SIZE CEMENTIOUS WOOD FIBER PANELS ON SITE THAT MATCH THE EXISTING. CONTRACTOR TO REPLACE PANELS AFTER SYSTEM REMOVAL. CONTRACTOR TO ALERT OWNER IF ADDITIONAL PANELS ARE REQUIRED. CONTRACTOR TO OBTAIN OWNER APPROVAL.
11. PULL TESTING WILL BE REQUIRED PRIOR TO INSULATION INSTALLATION TO CONFIRM SPACING OF ROOF MANUFACTURERS FASTENERS TO MEET JURISDICTIONAL BUILDING CODE REQUIREMENTS.

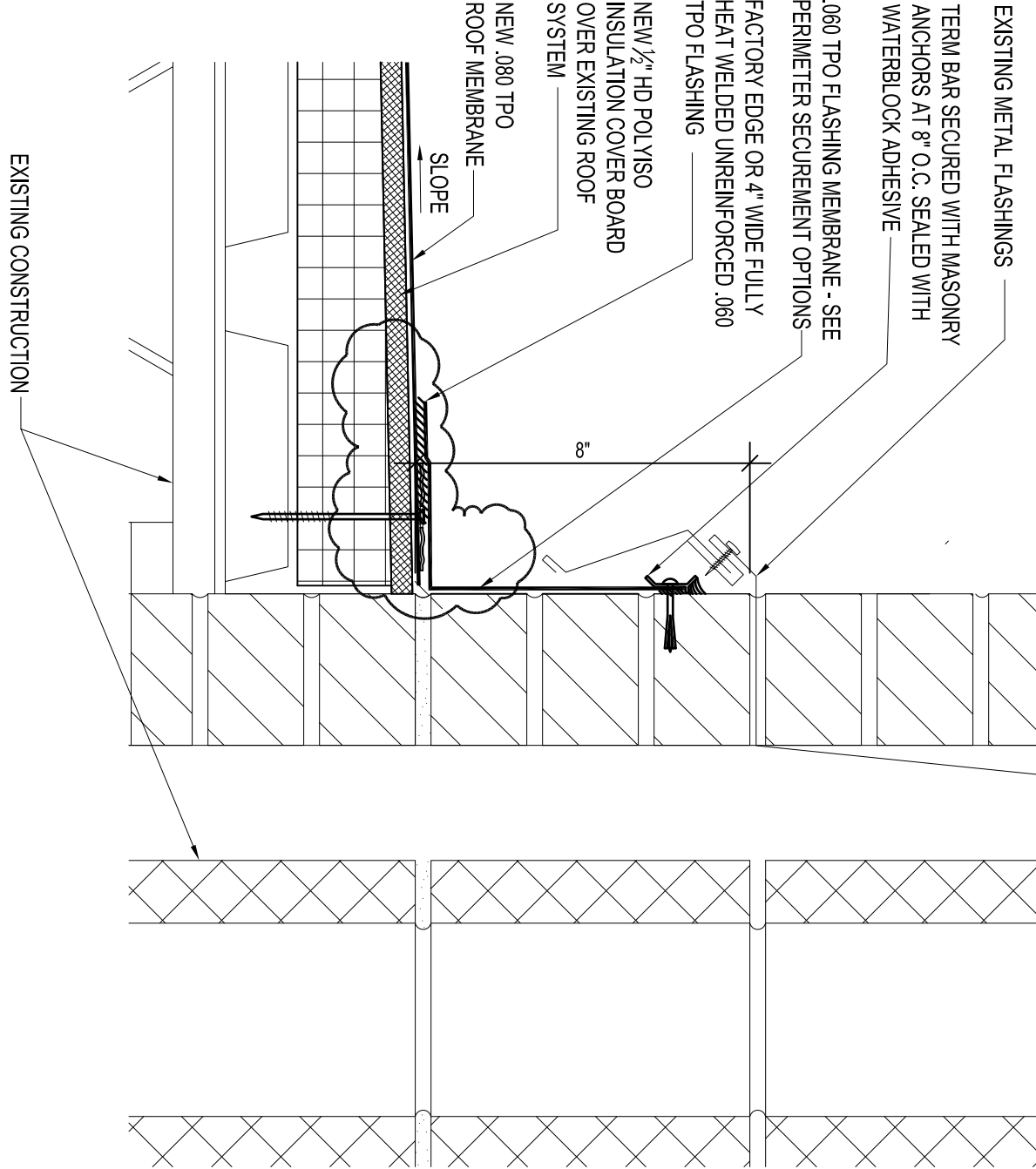
**DIMENSIONS AND SQUARE FOOTAGES
ARE PROVIDED FOR CONVENIENCE ONLY.
CONTRACTOR TO VERIFY INFORMATION.**



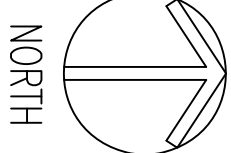
3 EXPANSION JOINT DETAIL
SCALE: 3"=1'-0"

- NOTES:
1. IF EXPOSED AREA DOES NOT HAVE AN EXPANSION JOINT, INSTALL DETAIL ABOVE AS ROOF AREA DIVIDER WITHOUT GAP AND INSULATION.
 2. DETAIL SHOWN IS CUT AT HIGH POINT OF INSULATION OR CRICKET ON EITHER SIDE OF EXPANSION JOINT.

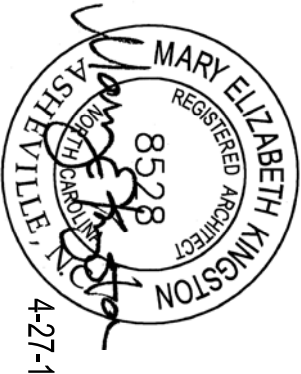
2 WALL FLASHING DETAIL
SCALE: 3"=1'-0"



1 ROOF PLAN
SCALE: 1/8"=1'-0"



A104.1



WOOD NAILER SECUREMENT CRITERIA

REQUIREMENTS BASED ON FACTORY MUTUAL LOSS PREVENTION DATA BULLETIN WITH MODIFICATIONS

One of the most often overlooked details on a roofing system is the attachment method for wood nailers at the perimeter of the roof. Factory Mutual (FM) publishes design recommendations for the attachment of wood nailers to existing masonry walls. The following table provides design details to be used in conjunction with the information located in Factory Mutual's Loss Prevention Data Bulletin 1-42. In accordance with that bulletin, the information listed below should be referenced when selecting an appropriate perimeter attachment method.

General Criteria

- Wood nailers that are anchored to steel, wood or masonry decking should not be less than 2" X 6" nominal (minimum 1-1/2" X 5-1/2").
- Wood nailers should be Douglas Fir, Southern Yellow Pine or of wood having similar decay resistant properties.

Attachment to Masonry Walls

When fastening to a masonry wall, a 1/2 inch anchor bolt is placed 48 inches on center at an 8 inch minimum depth (12 inches minimum when masonry walls are composed of lightweight aggregate or cinder) as shown in Figure 1. Each anchor bolt is positioned (staggered) if the wood nailer is wider than 6 inches) a block core or air space and tightly filled with concrete to the depth of the bolt.

Note: Plastic parts must not be used with masonry anchors.

Factory Mutual has specific requirements concerning tilting of cores or voids in the top course of cinder blocks.

For example:

Projects located in Zone 2 (FM 1-90 securement) - fill the entire top course.
Projects located in Zone 1 (FM 1-60 securement) - fill only required where anchor bolts are positioned (48 inches on center in the field, 24 inches on center at roof corners)

At outside corners, the fastening density must be increased within the first 8 feet in each direction by positioning anchor bolts 24 inches on center.

An alternate method may be used by installing 3/8 inch diameter anchor bolts spaced 32 inches apart. For outside corners, bolts are fastened 16 inches apart, 8 feet from each side of the corner. If additional wood nailers are needed, refer to Figure 5 for attachment of additional wood nailers.

Attachment to Steel and Wood Decking: Penetration of the fasteners should be to the top flutes only. The fasteners must be staggered as shown in Figure 2.

Caution: Attention should be paid to the Factory Mutual requirement which calls for galvanized steel washers (minimum 5/8 inch outside diameter) to be used in conjunction with galvanized screws. This requirement is not recognized in most cases and must often be forgotten. The staggered fastening pattern should be increased within 8 feet from outside corners as shown in Figure 3.

If the perimeter nailer is the be secured to a steel angle, anchor bolts must be positioned at 48 inch centers as shown in Figure 4.

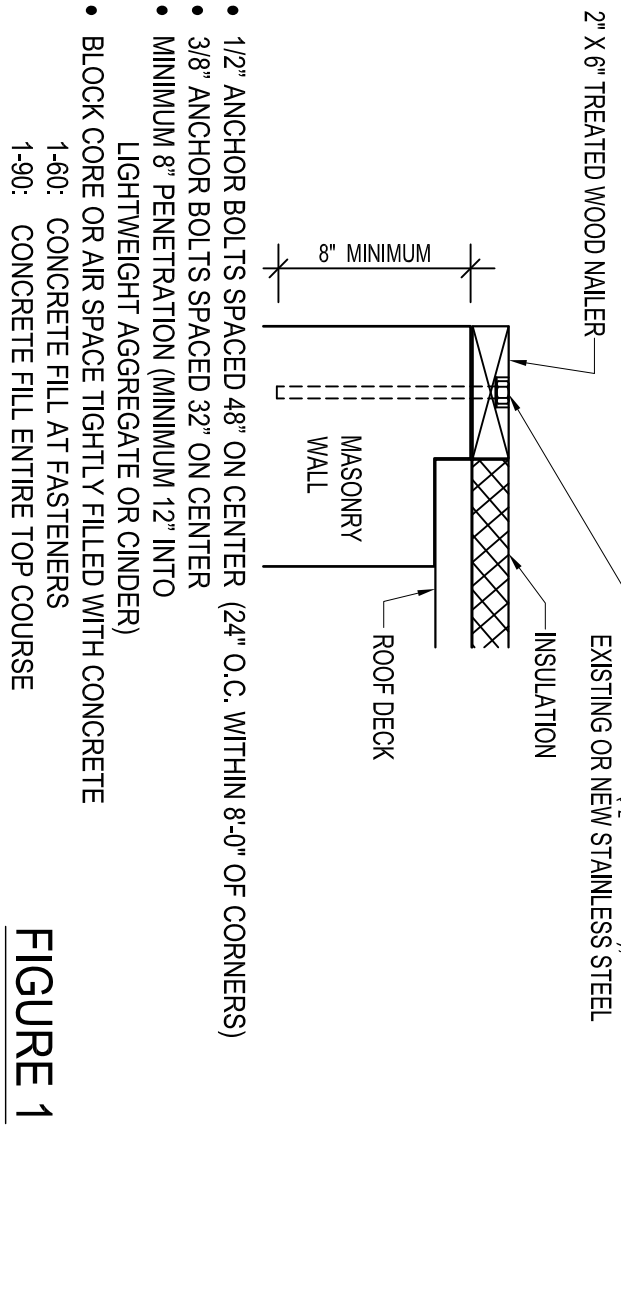
On wood decks, the staggered fastening pattern with galvanized steel screws should be utilized as shown in Figure 2.

Attachment of Additional Wood Nailers: When additional wood nailers are required, they must be attached with galvanized nails or lag screws that penetrate into the bottom nailer at 1-1/4 inches using a staggered fastening pattern in two rows at 24 inches apart as shown in Figure 5.

The increased fastening density within 8 feet from outside corners is still required and must comply with Figure 3.

Even though not emphasized in the bulletin, contractors should examine or question existing conditions to determine if existing wood nailers are attached in compliance with the above criteria. If not, existing wood nailers should be released using of these options and additional wood nailers must be secured following Figure 5.

Wood nailers play a major role in the performance of the roofing system and contribute to the wind uplift resistance of the roof edge which is the first line of defense during wind storms. It is important to comply with the above requirements and periodically check various updates published by Factory Mutual not only for the attachment of wood nailers, but also for the securement of metal edging, especially those which are shop fabricated.

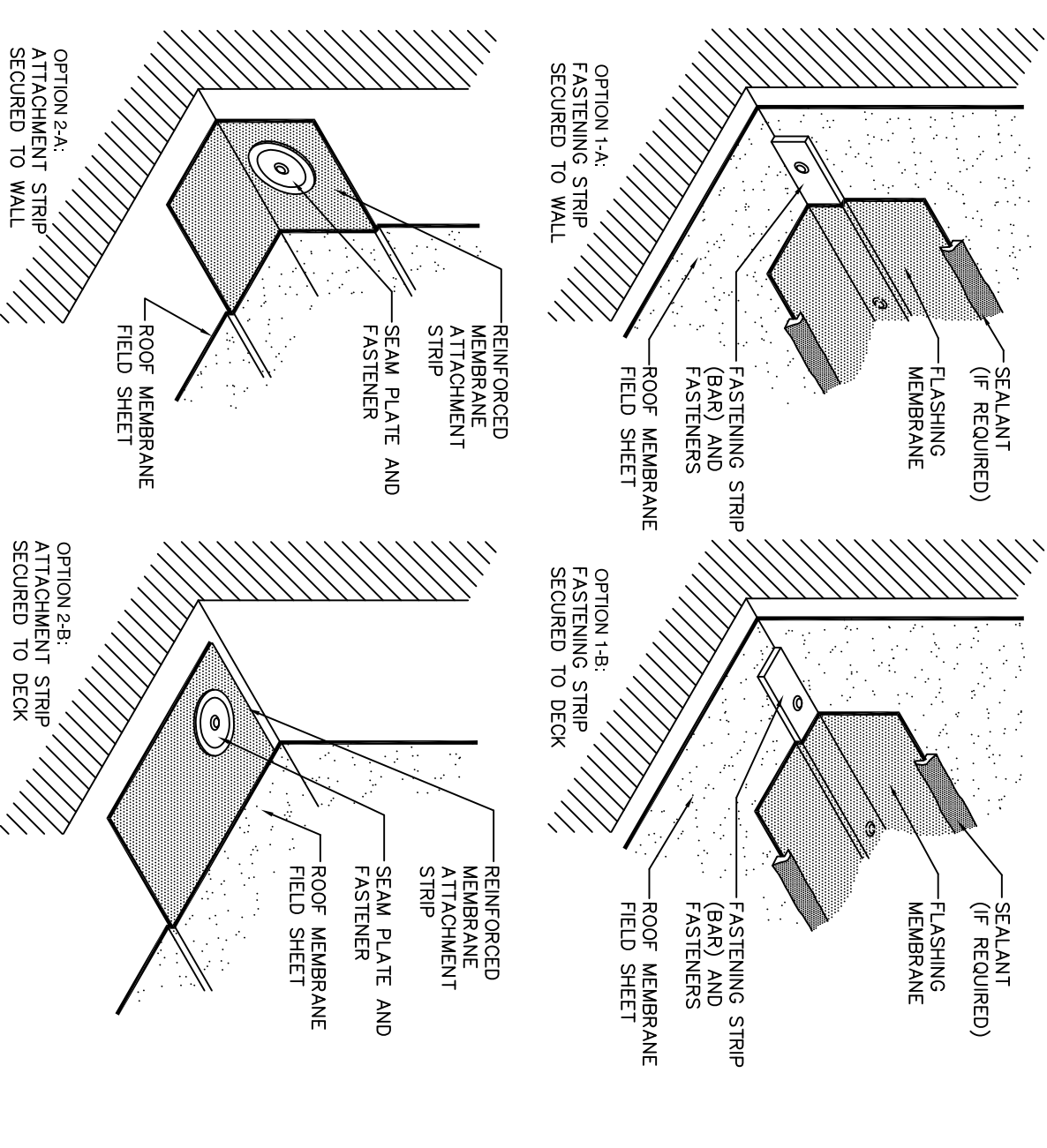


- 1/2" ANCHOR BOLTS SPACED 48" ON CENTER (24" O.C. WITHIN 8'-0" OF CORNERS)
- 3/8" ANCHOR BOLTS SPACED 32" ON CENTER
- MINIMUM 8" PENETRATION (MINIMUM 12" INTO LIGHTWEIGHT AGGREGATE OR CINDER)
- BLOCK CORE OR AIR SPACE TIGHTLY FILLED WITH CONCRETE
- 1-80. CONCRETE FILL AT FASTENERS
- 1-90. CONCRETE FILL ENTIRE TOP COURSE

FIGURE 1

1 FM 1-49 ROOF EDGE RECOMMENDATIONS

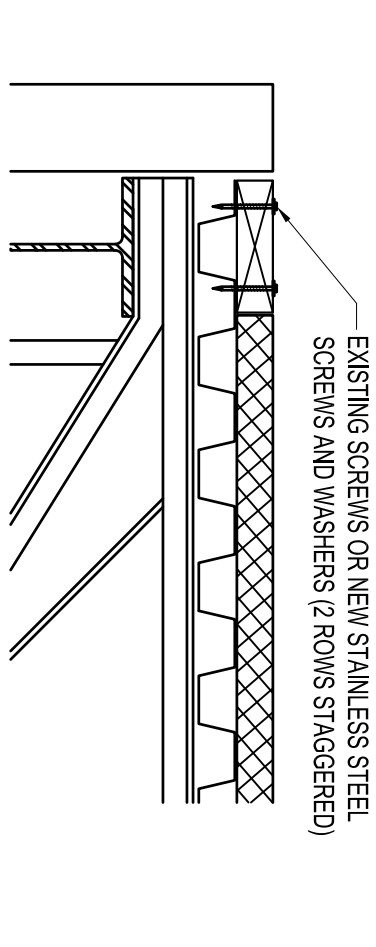
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6 BASE SECUREMENT OPTIONS

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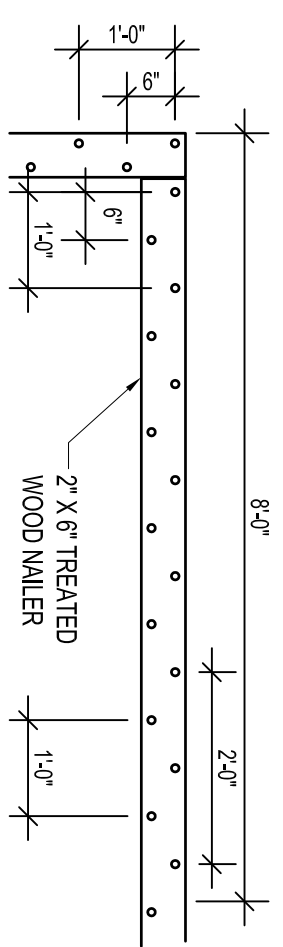
ATTACHMENT TO STEEL AND WOOD DECKING - BASE NAILER



- WOOD NAILERS ATTACHED WITH 2 ROWS OF NO. 10 STAINLESS STEEL SCREWS
- SPACING OF FASTENERS IN EACH ROW SHALL NOT EXCEED 24 INCHES.
- AT 8' CORNERS, FASTENERS DOUBLED (MAXIMUM 12" ON CENTER IN EACH ROW)
- PROVIDE 3/8" STAINLESS STEEL WASHERS UNDER SCREW HEADS OR PANCAKE SCREWS.

FIGURE 2

FASTENING ENHANCEMENTS AT 8'-0" CORNERS - ADDITIONAL NAILER



FASTENERS SPACED 24" O.C. OUTSIDE CORNER AREA

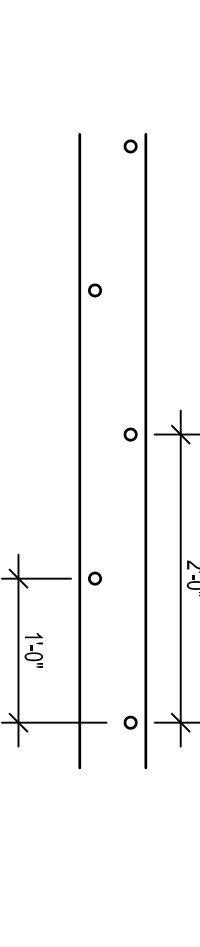
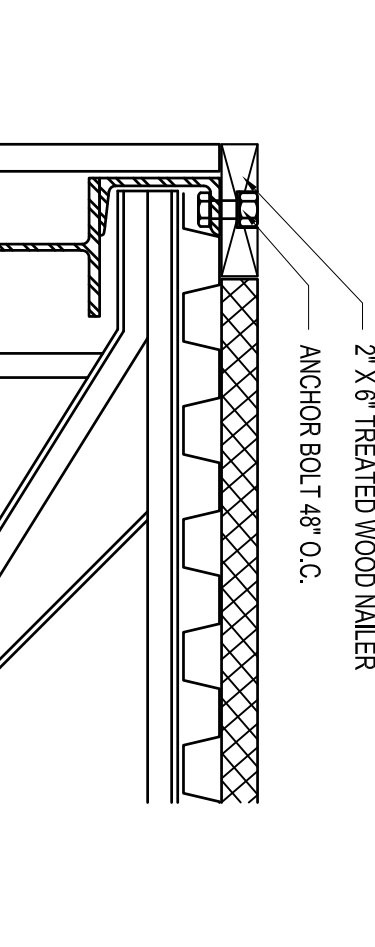


FIGURE 3

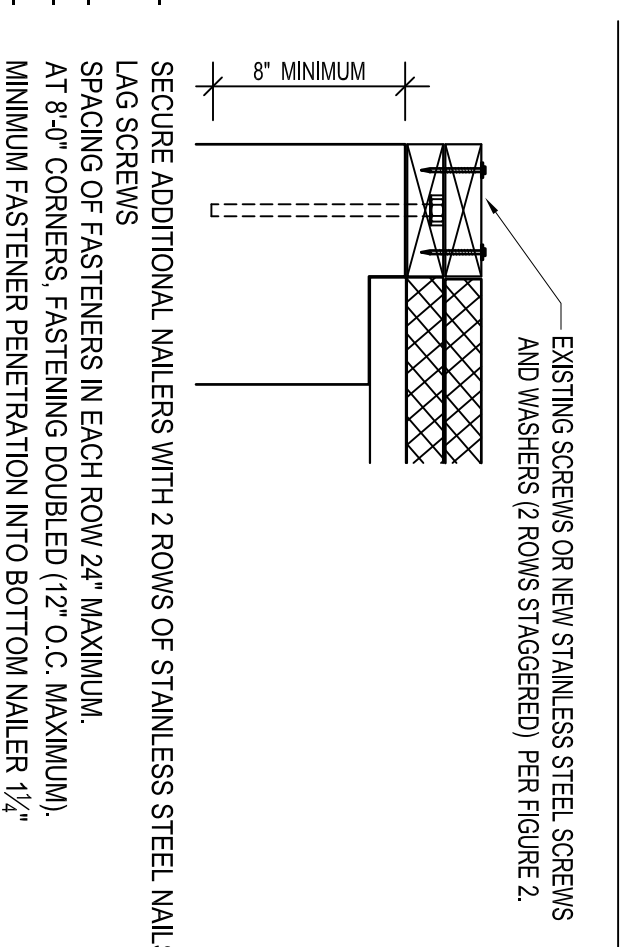
FASTENERS THROUGH STEEL ANGLE - BASE NAILER



FASTENING DOUBLED (2" MAX.)

FIGURE 4

- 3/4" ANCHOR BOLTS SPACED 48" ON CENTER
- AT 8'-0" CORNERS, FASTENING DOUBLED (2" MAX.)

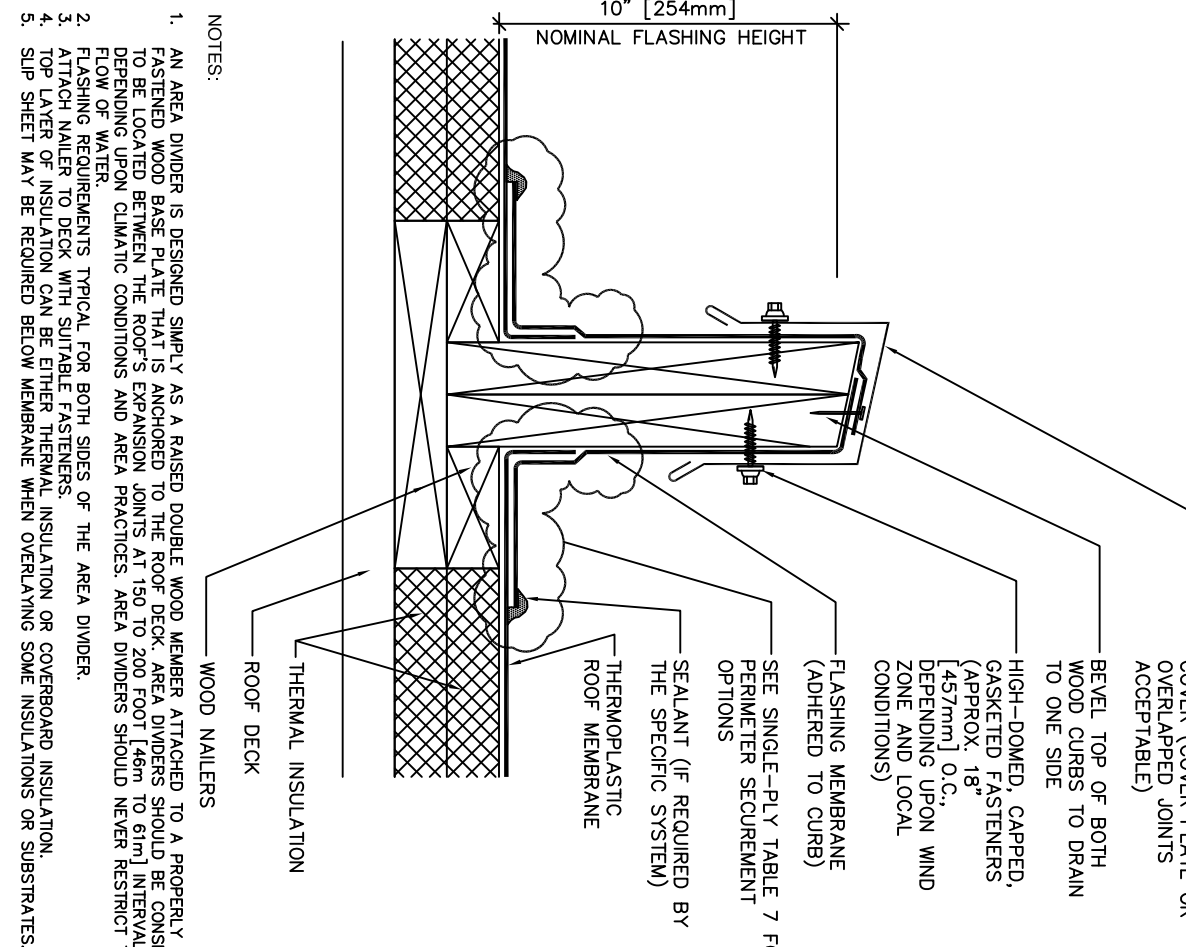


- SECURE ADDITIONAL NAILERS WITH 2 ROWS OF STAINLESS STEEL NAILS OR LAG SCREWS
- SPACING OF FASTENERS IN EACH ROW 24" MAXIMUM
- AT 8'-0" CORNERS, FASTENING DOUBLED (12" O.C. MAXIMUM)
- MINIMUM FASTENER PENETRATION INTO BOTTOM NAILER 1/2"

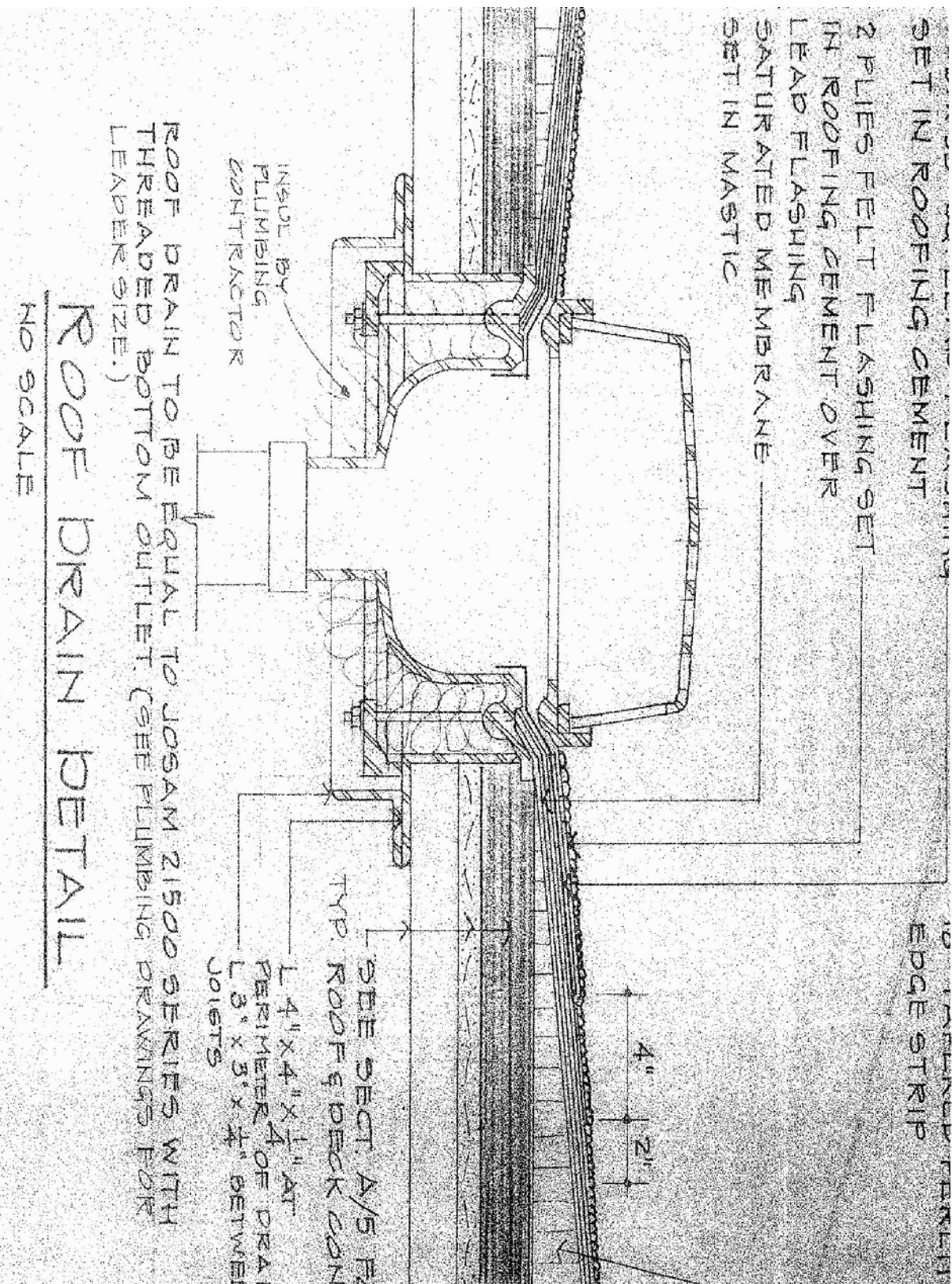
FIGURE 5

7 ROOF AREA DIVIDER

NOT TO SCALE



DIMENSIONS AND SQUARE FOOTAGES ARE PROVIDED FOR CONVENIENCE ONLY. CONTRACTOR TO VERIFY INFORMATION.



3 EXISTING ROOF DRAIN DETAIL

NOT TO SCALE

5 ROOF DRAIN DETAIL

1/12" = 1'-0"

4 TYPICAL CURB EXTENSION

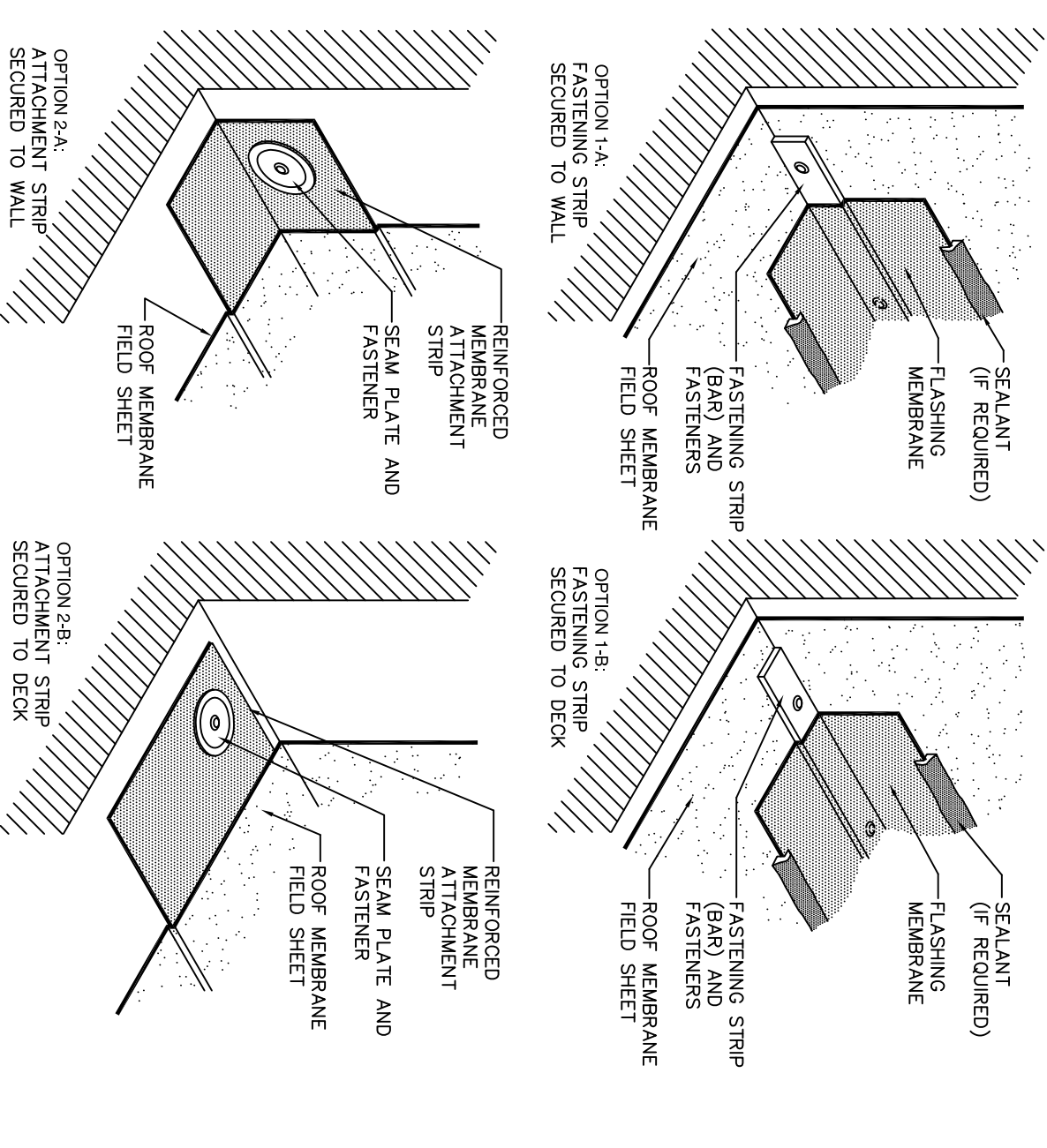
SCALE 3/8" = 1'-0"

2 EXISTING ROOF DETAIL

NOT TO SCALE

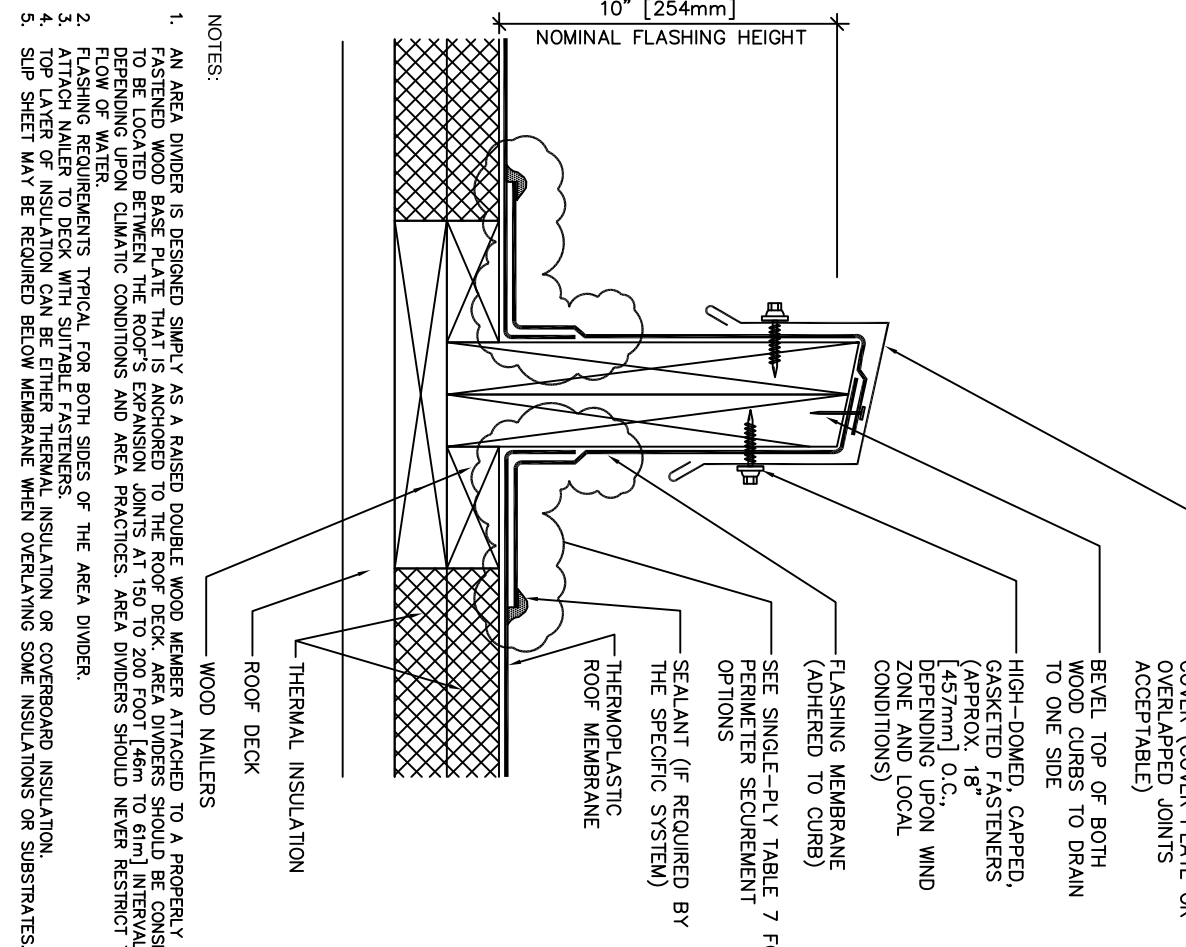
1 FM 1-49 ROOF EDGE RECOMMENDATIONS

NOT TO SCALE



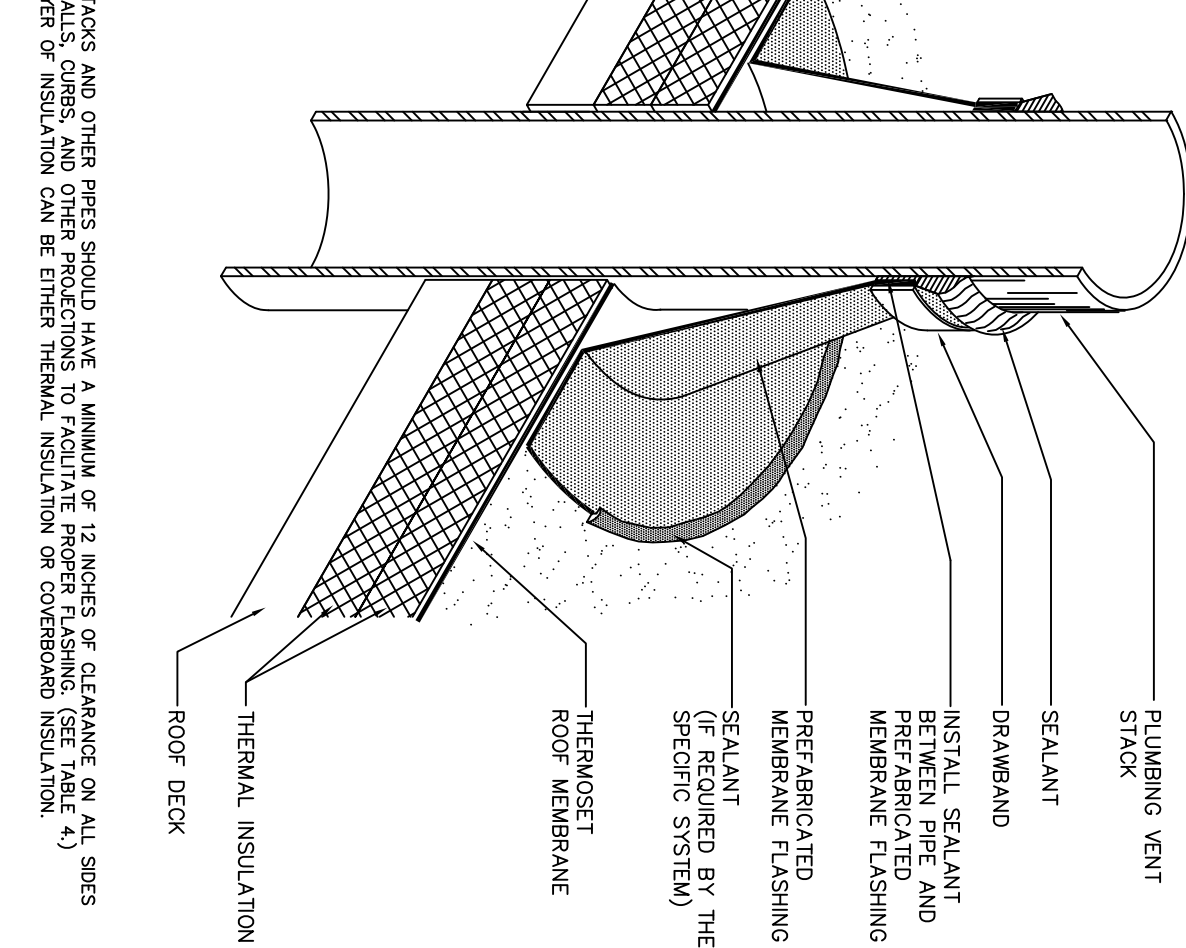
6 BASE SECUREMENT OPTIONS

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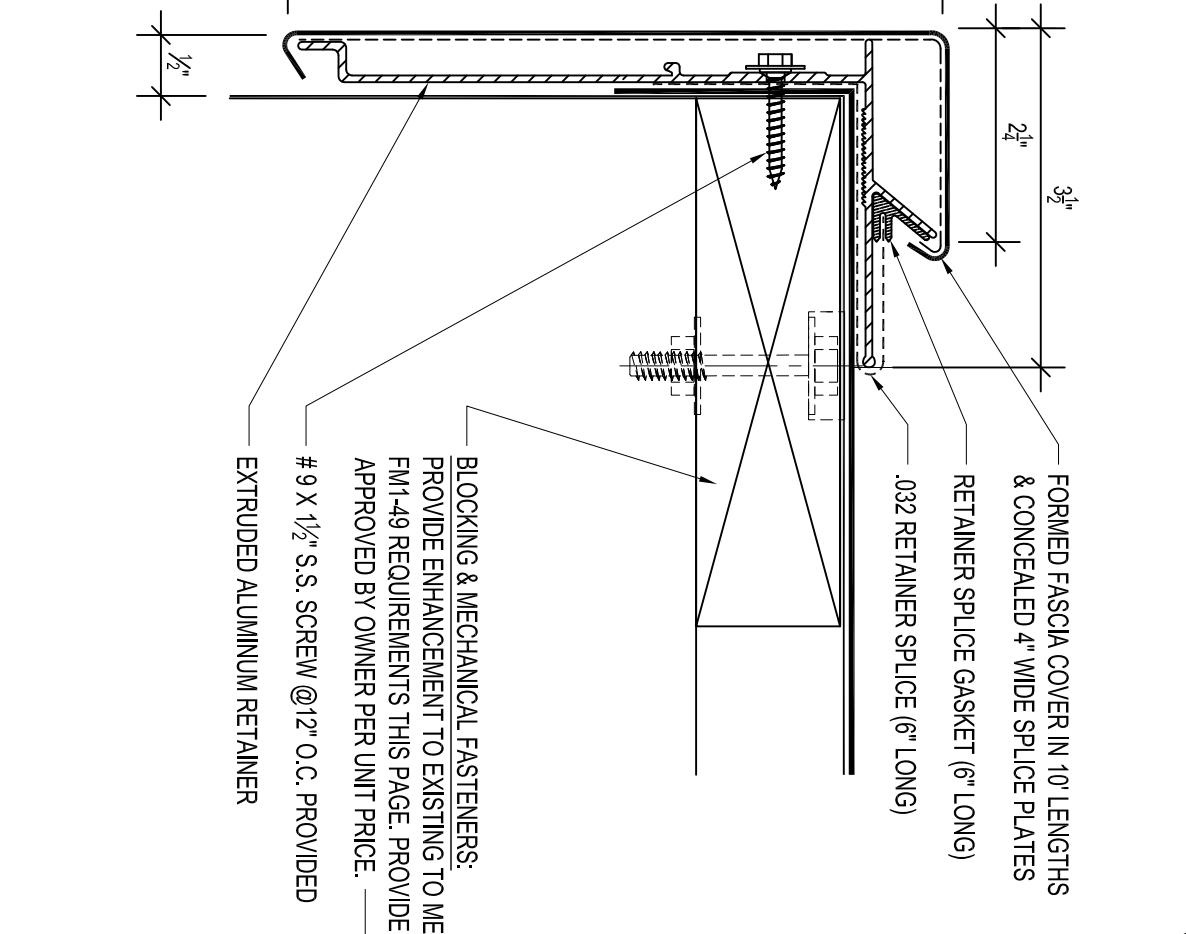
8 PIPE PENETRATIONS

NOT TO SCALE



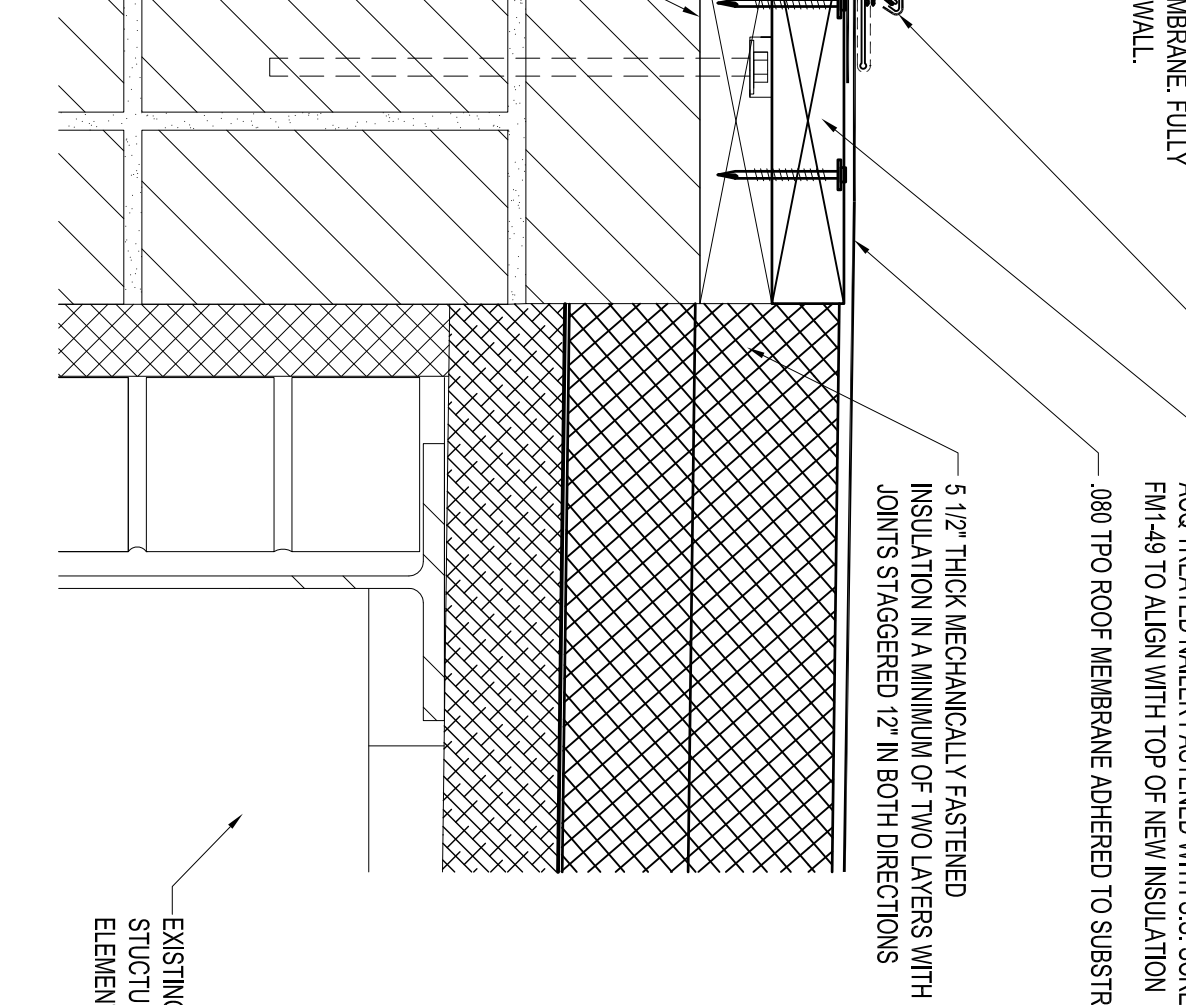
9 METAL EDGE DETAIL

SCALE 3/8" = 1'-0" (HICKMAN BASIS FOR DESIGN)



10 TYPICAL ROOF EDGE DETAIL

SCALE 3/8" = 1'-0"



Buncombe County Schools Facilities and Planning

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