

# 2012 NC ENERGY CODE

CHAPTER 1  
TABLE 201.1  
ZONE 4 REQUIRES R-30 MINIMUM CONTINUOUS INSULATION ABOVE ROOF DECK

EXISTING ROOF CONSTRUCTION:  
BUILT UP ROOF MEMBRANE (2) LAYERS 3/4" FIBERGLASS INSULATION, VAPOR BARRIER,  
1/2" GYPSONUM AND 1/2" 26GA METAL DECK WITH STRUCTURAL SLOPE  
EXISTING INSULATION TO BE REMOVED AND REPLACED WITH:  
5" POLYISOCYANURATE INSULATION (in a minimum of 2" depth) = R-20  
5" POLYISOCYANURATE HIGH DENSITY COVER BOARD TOTAL = R-31.5

## 2012 NC ENERGY CONSERVATION CODE

101.2 REVISIONS IN TABLE  
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 OF THE EXISTING BUILDING OR BUILDING SYSTEM TO CONFORM WITH THIS CODE. (EMPHASIS ADDED)  
MNCOI ENGINEERING UPDATE NEWSLETTER DATED MAY 30, 2012 PROVIDES REWORKING SCENARIOS AS EXAMPLES OF THE SECTION NOTED ABOVE:  
SCENARIO 1: REMOVE EXISTING ROOF MEMBRANE AND ROOF INSULATION. INSTALL NEW ROOF MEMBRANE AND NEW ROOF INSULATION.  
SCENARIO 2: REMOVE EXISTING ROOF MEMBRANE AND ROOF INSULATION. INSTALL NEW ROOF MEMBRANE AND SOLUTION 3: NEW INSULATION MUST MEET CURRENT CODE REQUIREMENTS. HARDWARES 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 REWORK, I.E. HAVING TO RAISE WINDOWS IN AN ADJOINING WALL OR REQUIRING EXTENSIVE REWORK 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)
FIBER GLASS BATT 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	3.6 to 4 (avg. 3.8)
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 (avg. 1.82)
VERMICULITE LIGHTWEIGHT CONCRETE	9 to 149
GYPSONUM	.6
CONCRETE	.3



# ENKA HIGH SCHOOL

RE-ROOFING AREAS K AND K1

475 ENKA LAKE ROAD CANDLEM, NC 28715

## PROJECT DESCRIPTION:

BASE BID WORK INCLUDES REMOVAL OF THE EXISTING BUILT UP ROOF TO METAL DECK & INSTALLATION OF NEW GYPSONUM BOARD INSULATION LIMITED TAPERED INSULATION COVER BOARD AND FULLY ADHERED .680 TPO MEMBRANE ROOF SYSTEM ON APPROX. 13,800 SQ FEET OF ROOF AREAS K AND K1.

A NEW ANTI-SPIRIT TESTED METAL EDGE IS REQUIRED IN THE REEROOF AREAS AND SHALL BE COVERED BY THE ROOF SYSTEM MANUFACTURER'S FULL SYSTEM WARRANTY. NEW WOOD WALLERS & METAL EXPANSION JOINT COVERS ARE REQUIRED. NEW CURBS AND WALL PUPS 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:

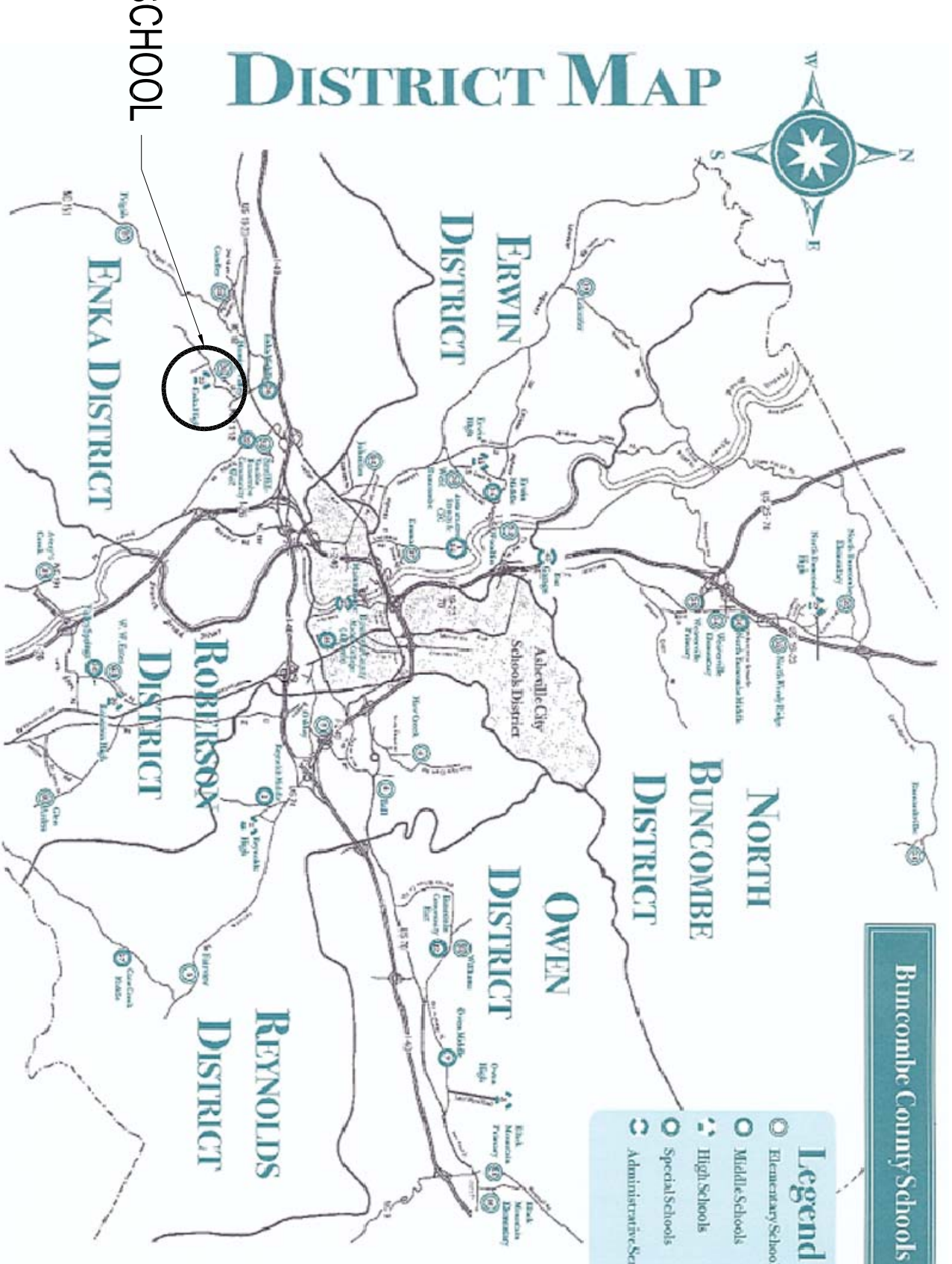
MARY BETH KINGSTON, AIA, PRQ, LEED AP  
ASST. FACILITIES DIRECTOR, BUNCOMBE COUNTY SCHOOLS  
PHONE: 828-255-5916  
FAX: 828-255-5923

## BIDDING & ADMINISTRATIVE CONTACT:

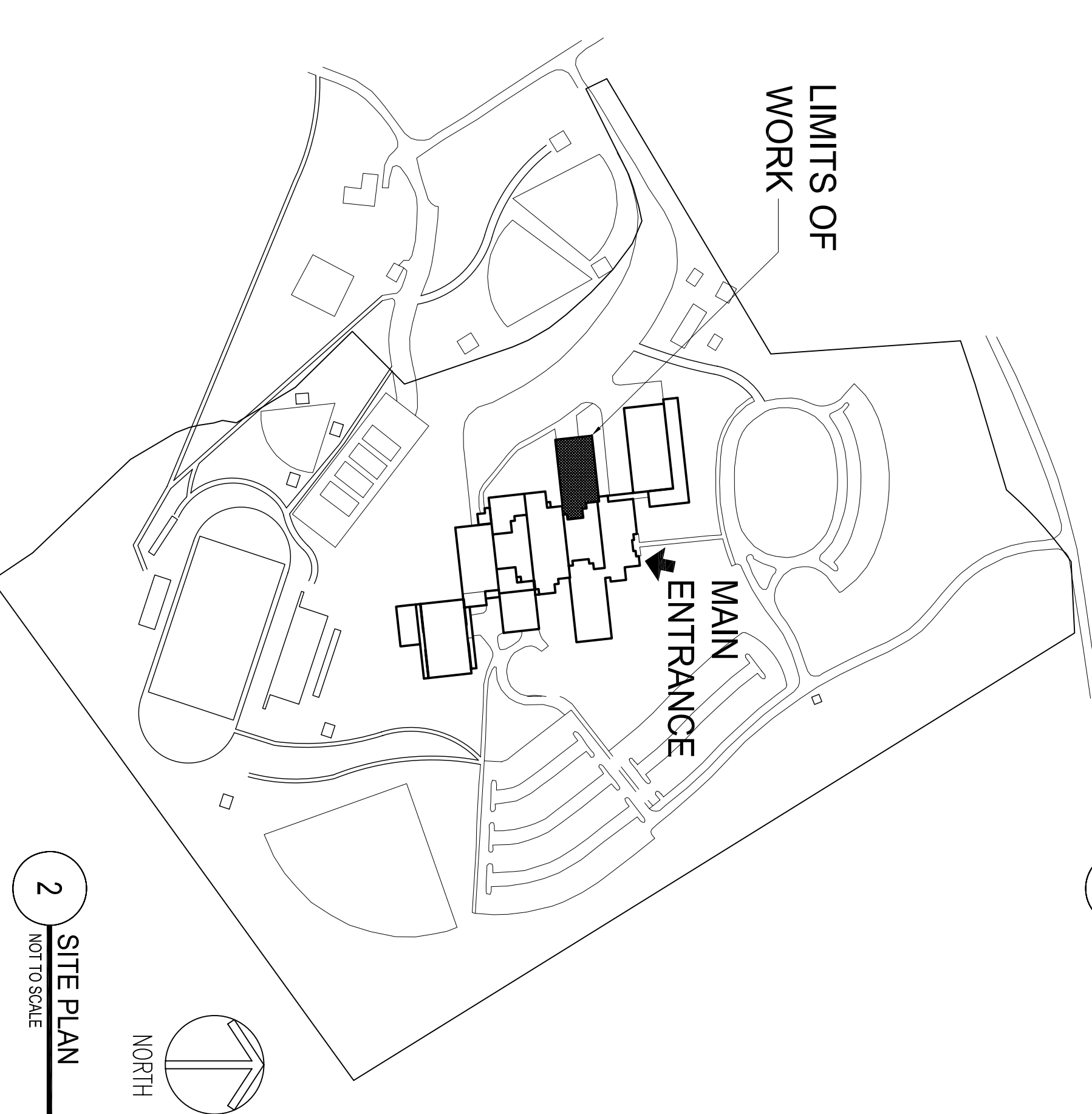
RON VENTURELLA  
PURCHASING OFFICER  
PHONE: 828-255-5891  
FAX: 828-251-1730

## SHEET SCHEDULE:

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



1 VICINITY MAP  
NOT TO SCALE



2 SITE PLAN  
NOT TO SCALE

3 ENERGY CODE  
SCALE: 1" = 40'-0"



## WOOD WALLER 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 wallers at the perimeter of the roof. Factory Mutual (FM) publishes design recommendations for the attachment of wood wallers to the roof deck. The design details are shown in Figures 1 through 5. For additional information, refer to Factory Mutual Loss Prevention Data Bulletin 1-48, "Wood Waller Attachment Method." The information listed below should be referenced when selecting an appropriate perimeter attachment method.

### General Criteria

- Wood wallers 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 wallers should be Douglas Fir, Southern Yellow Pine or a 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 waller 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 1 (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 wallers are needed, refer to Figure 5 for attachment of additional wood wallers.

**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 3/8 inch outside diameter) to be used in conjunction with galvanized screws. This requirement is not recognized in most cases and most often forgotten. The staggered fastening pattern should be increased within 8 feet from outside corners as shown in Figure 3.

If the perimeter waller is to 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 Wallers:** When additional wood wallers are required, they must be attached with galvanized nails or lag screws that penetrate into the bottom waler 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 wallers are attached in compliance with the above criteria. If not, existing wood wallers should be re-attached using the options and additional wood wallers must be secured following Figure 5.

Wood wallers 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 wallers, but also for the securement of metal edging, especially those which are shop fabricated.

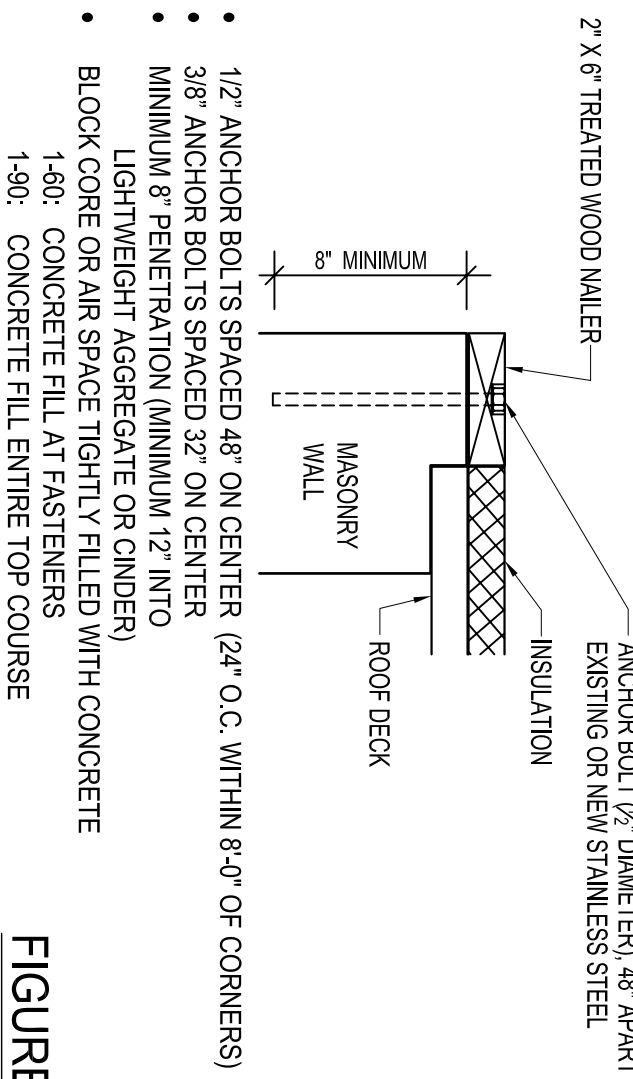
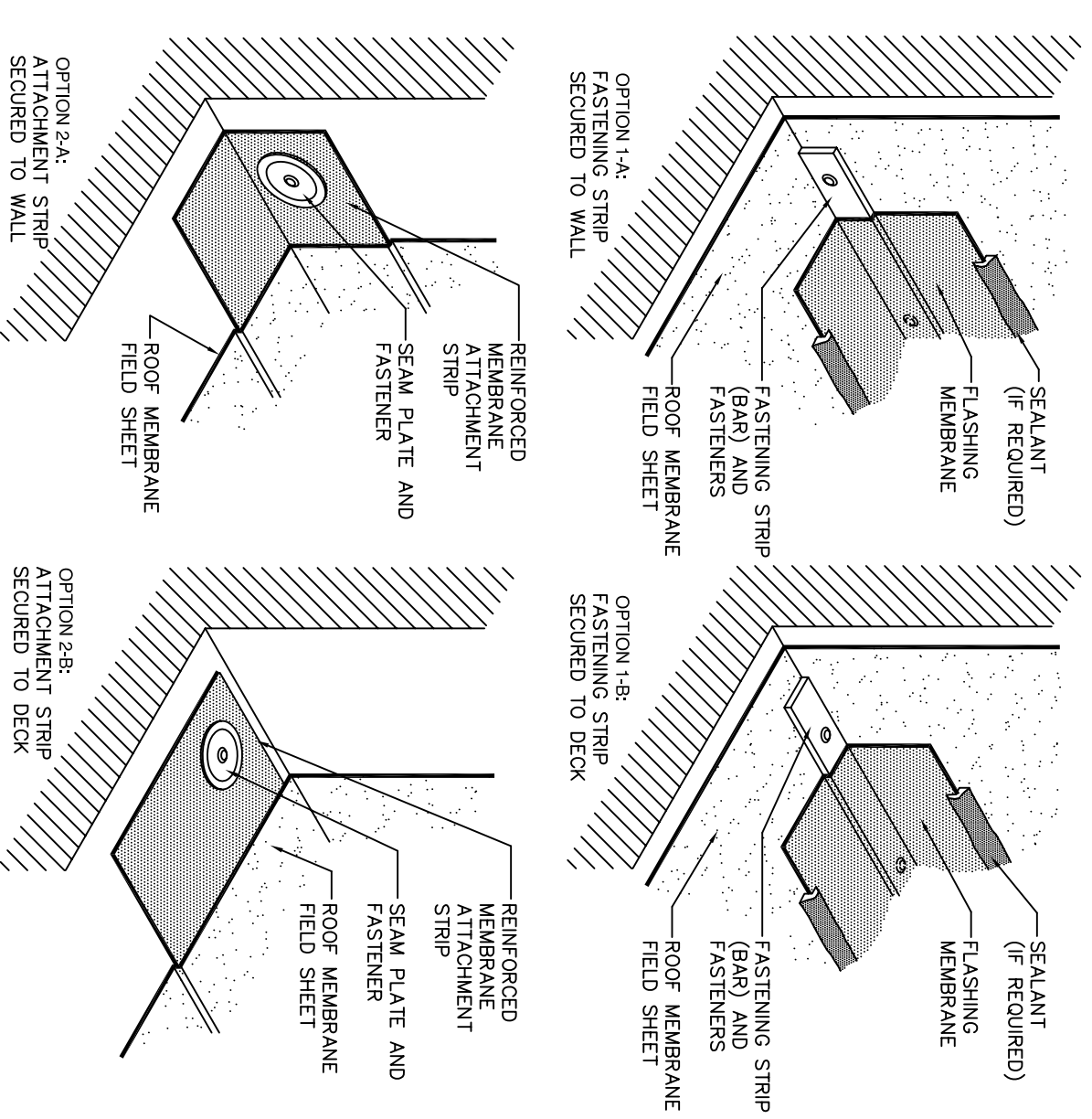


FIGURE 1

## 1 FM 1-49 ROOF EDGE RECOMMENDATIONS

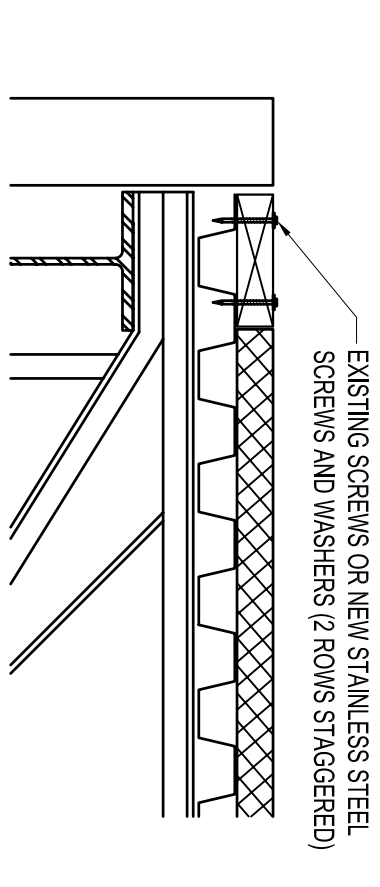
NOT TO SCALE



## 6 BASE SECUREMENT OPTIONS

NOT TO SCALE

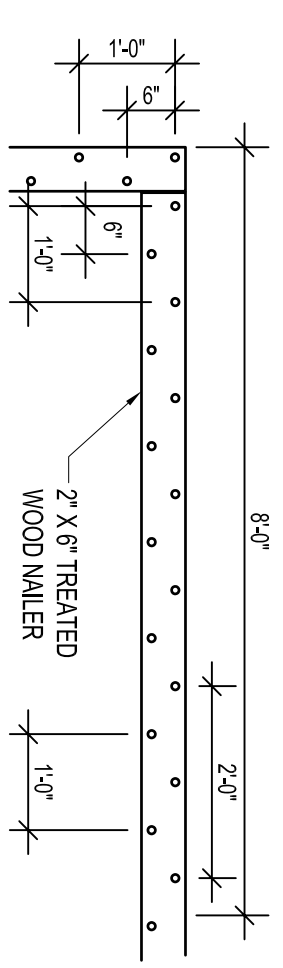
## ATTACHMENT TO STEEL AND WOOD DECKING - BASE WALER



- WOOD WALLERS ATTACHED WITH 2 ROWS OF NO. 10 STAINLESS STEEL SCREWS IN EACH ROW SHALL NOT EXCEED 24 INCHES.
- AT 8 CORNERS, FASTENERS DOUBLED (MAXIMUM 1/2" ON CENTER IN EACH ROW).
- PROVIDE 1/2" STAINLESS STEEL WASHERS UNDER SCREW HEADS OR PANCAKE SCREWS.

FIGURE 2

## FASTENING ENHANCEMENTS AT 8'-0" CORNERS - ADDITIONAL WALER



## FASTENERS SPACED 24" O.C. OUTSIDE CORNER AREA

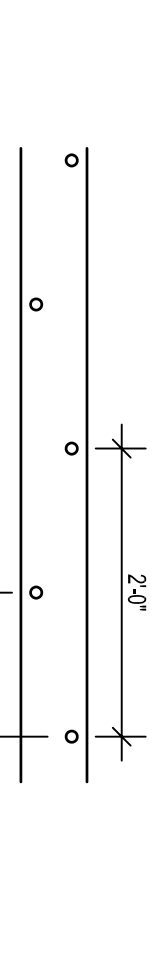


FIGURE 3

## FASTENERS THROUGH STEEL ANGLE - BASE WALER

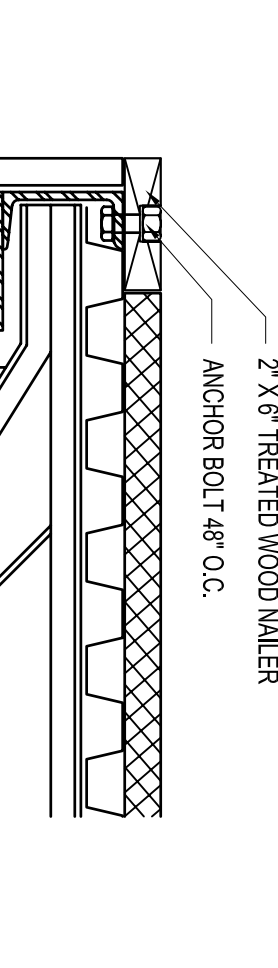


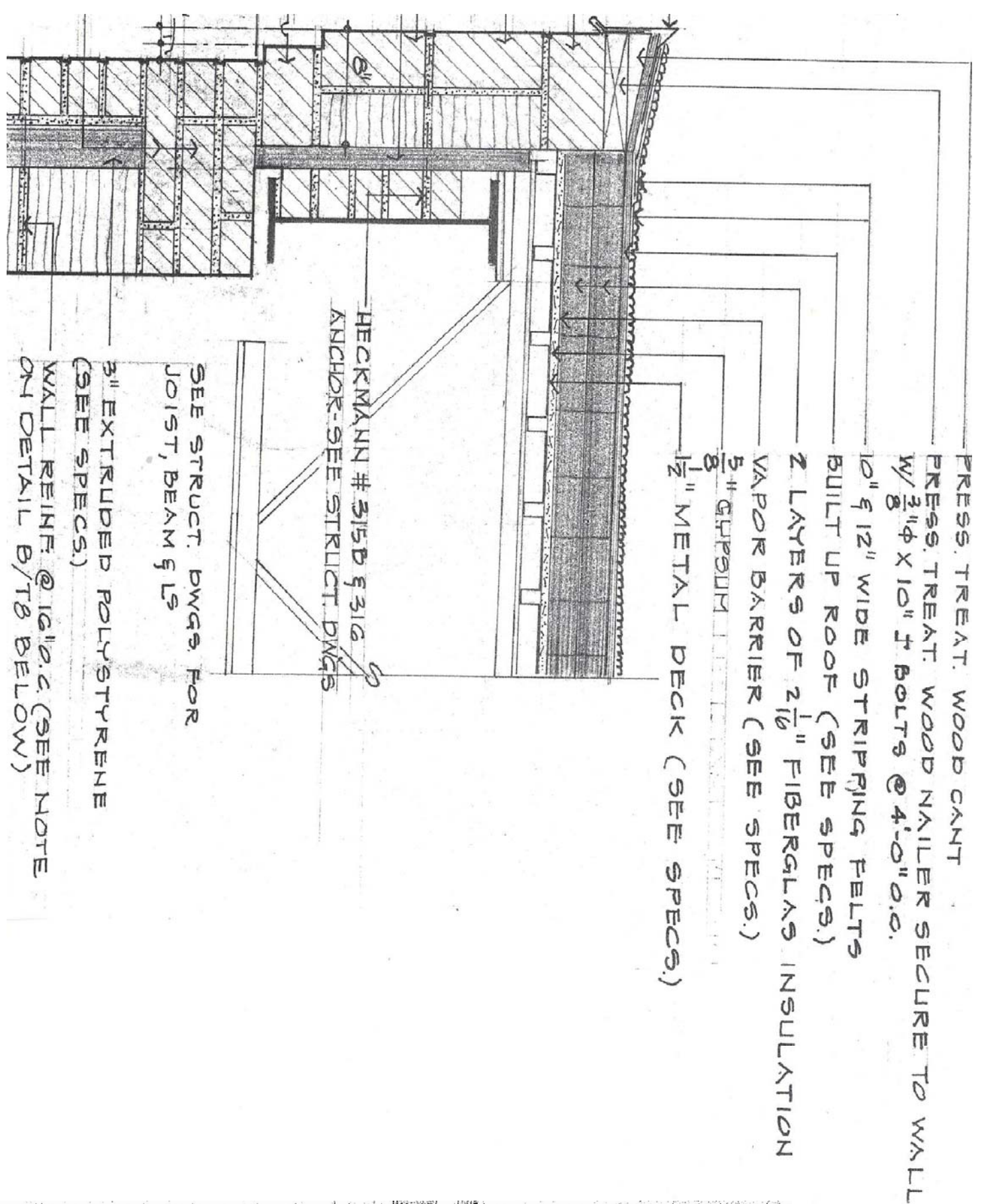
FIGURE 4

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



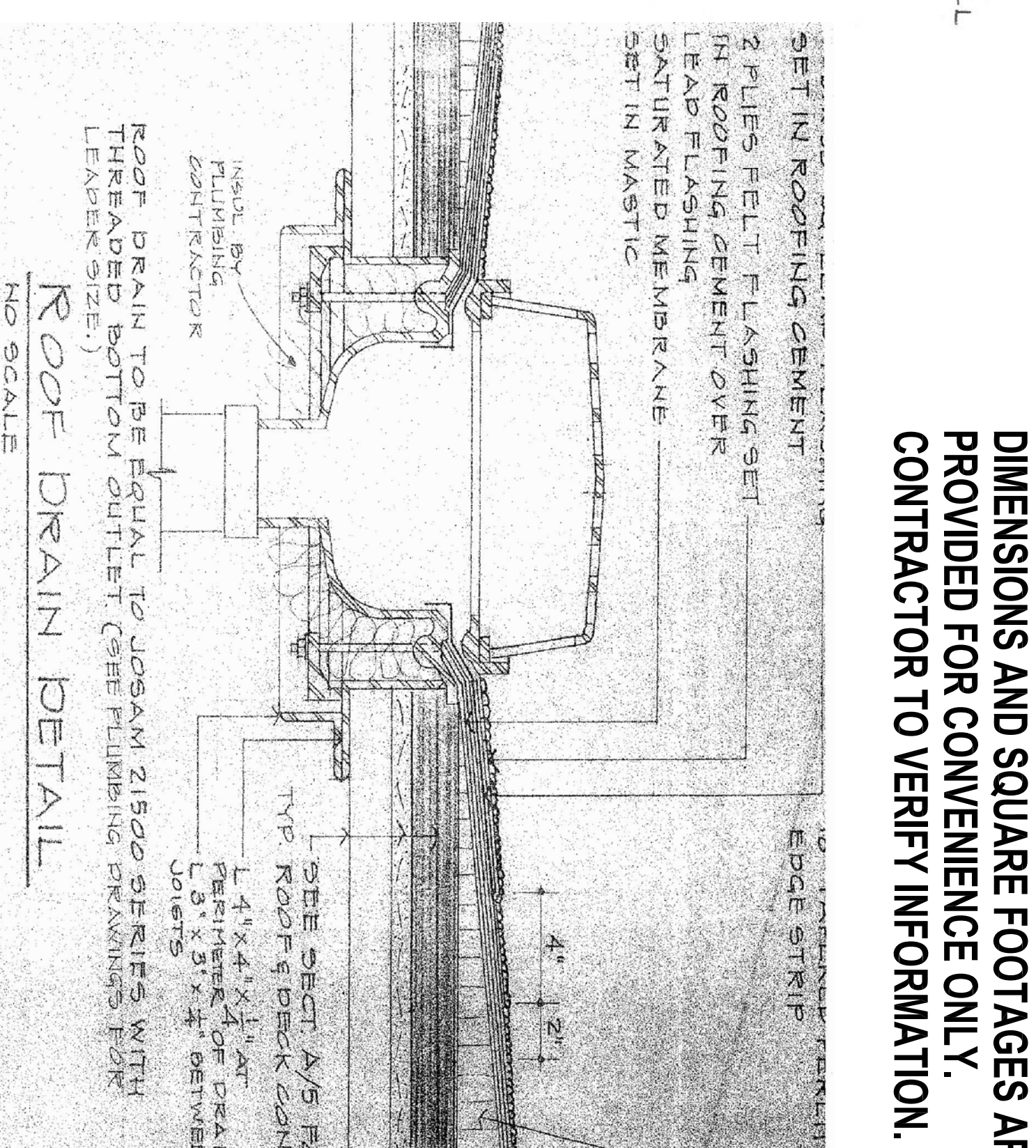
- SECURE ADDITIONAL WALLERS WITH 2 ROWS OF STAINLESS STEEL NAILS OR LAG SCREWS.
- SPACING OF FASTENERS IN EACH ROW 24" MAXIMUM.
- AT 8'-0" CORNERS, FASTENING DOUBLED (1/2" O.C. MAXIMUM).
- MINIMUM FASTENER PENETRATION INTO BOTTOM WALER 1/4"

FIGURE 5



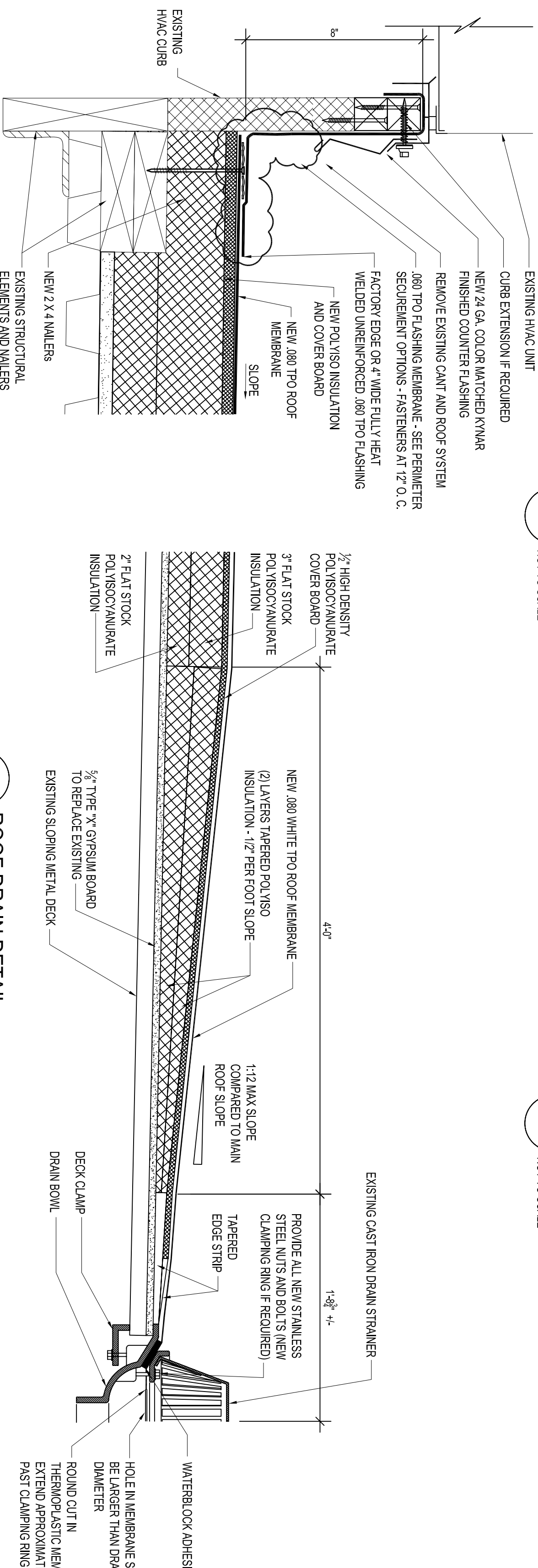
## 2 EXISTING ROOF DETAIL

NOT TO SCALE



## 3 EXISTING ROOF DRAIN DETAIL

NOT TO SCALE

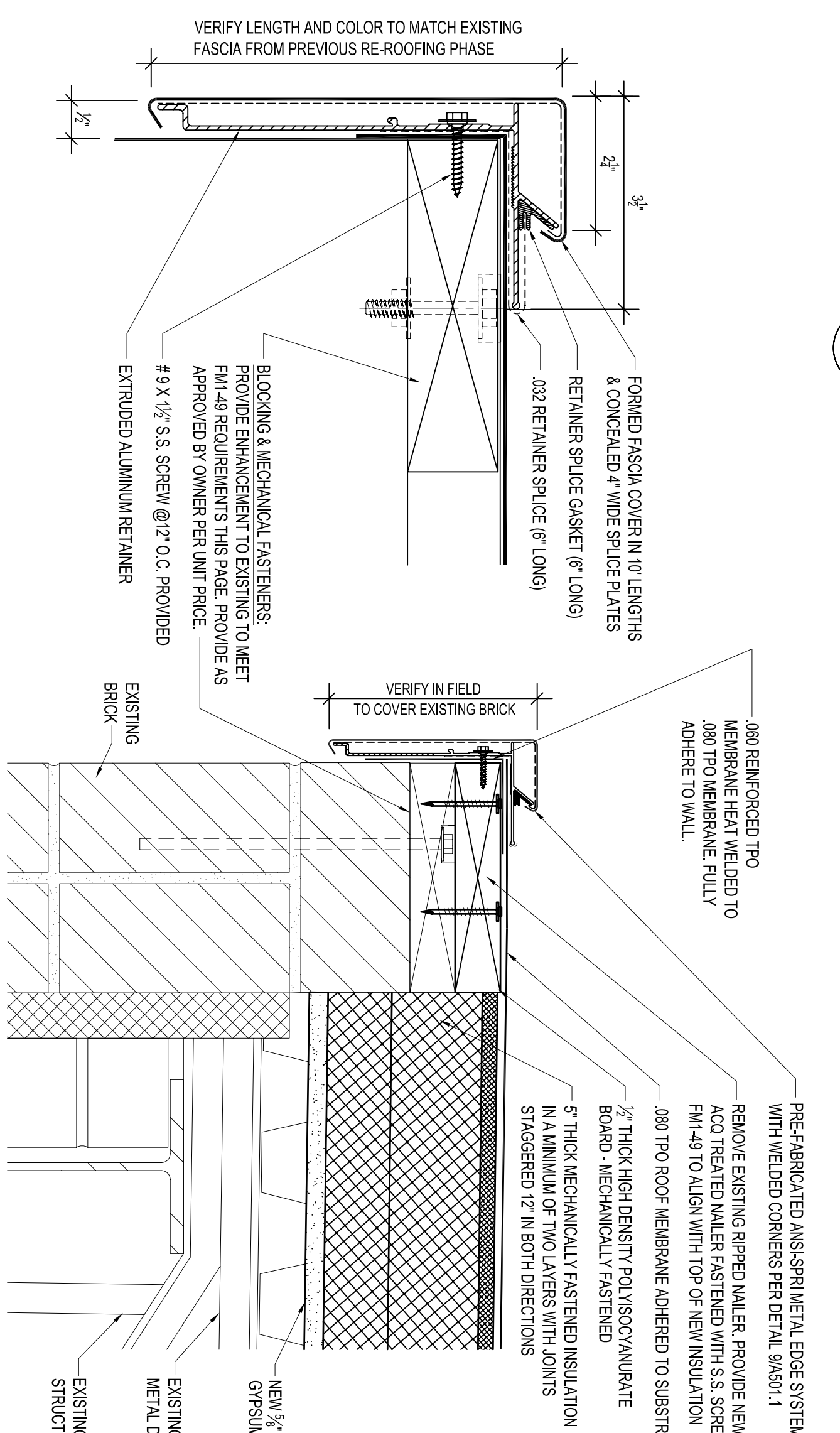


## 4 TYPICAL CURB EXTENSION

SCALE: 3/8" = 1'-0"

## 5 ROOF DRAIN DETAIL

1/12" = 1'-0"

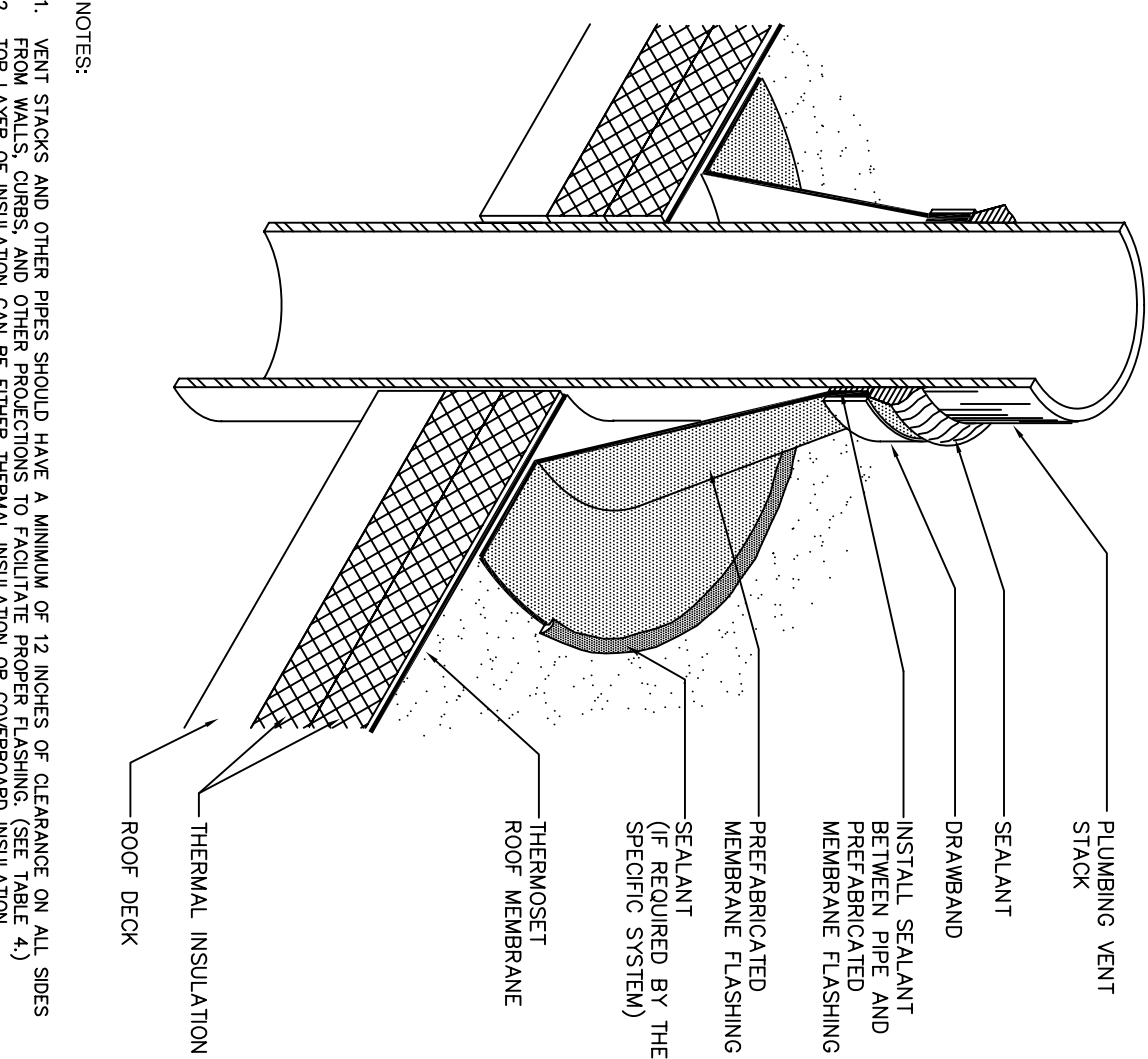


## 10 TYPICAL ROOF EDGE DETAIL

SCALE: 3/8" = 1'-0"

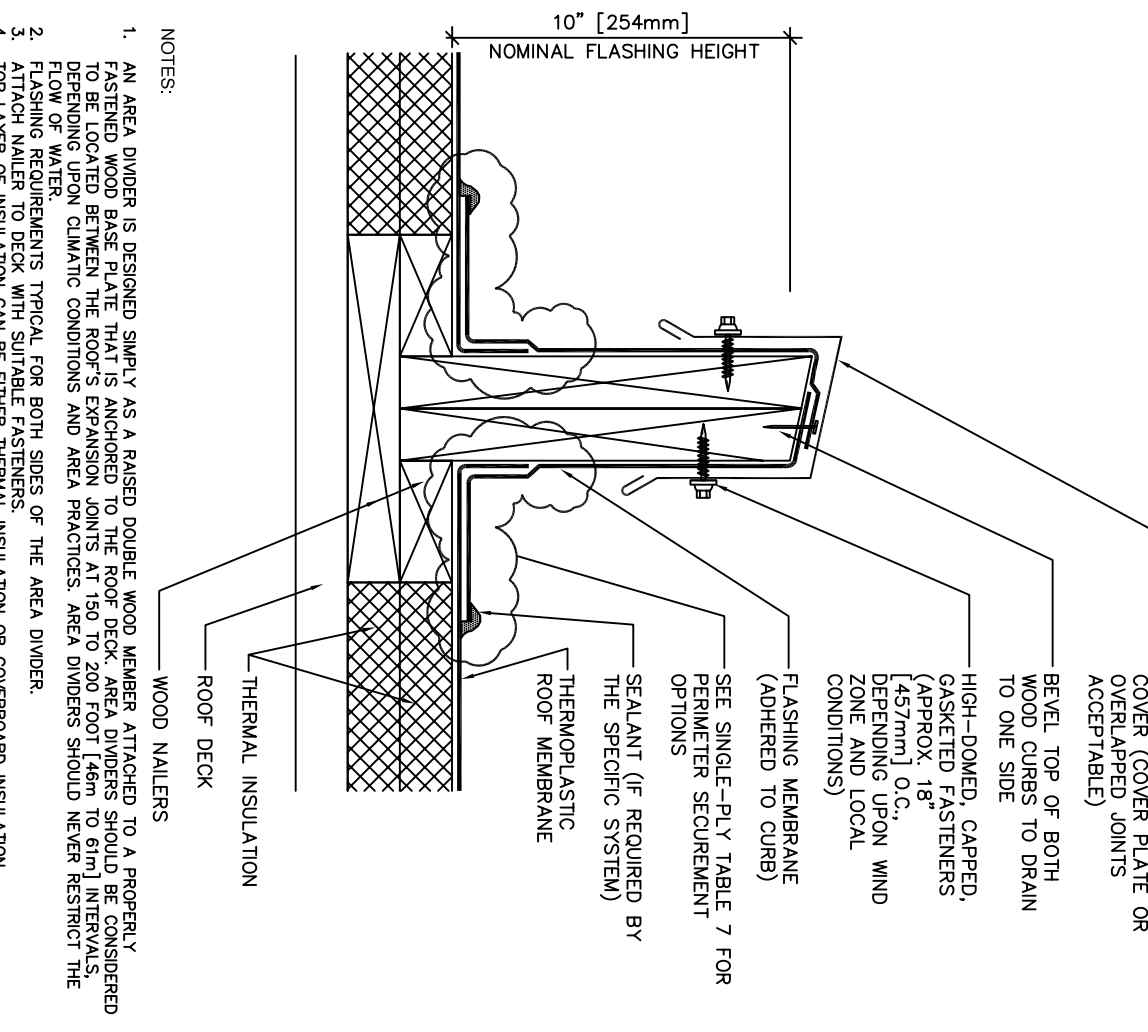
## 8 PIPE PENETRATIONS

NOT TO SCALE



## 7 ROOF AREA DIVIDER

NOT TO SCALE



## 6 BASE SECUREMENT OPTIONS

NOT TO SCALE

## 8 PIPE PENETRATIONS

NOT TO SCALE

## 9 METAL EDGE DETAIL

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

## 10 TYPICAL ROOF EDGE DETAIL

SCALE: 3/8" = 1'-0"

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