Report of Roof System Condition Assessment

Incubator Building – North Roof Area Removal
6345 Grand Blvd.
New Port Richey, FL 34652

Issue Date:
June 12, 2017

BillerReinhart Project No. 16-502

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June 12, 2017

Mr. Scott Fish
City of New Port Richey – Public Works
6132 Pine Hill Rd.
Port Richey, FL 34668

Subject: **Report of Roof System Condition Survey**
Incubator Building – North Roof Area Removal
6345 Grand Blvd.
New Port Richey, FL 34652
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Introduction

Michael H. Biller, PE, RRC and Lee Levoir, PE of Biller Reinhart Engineering Group, Inc. observed the removal of the New Port Richey Public Works Incubator Building roof system, located at 6345 Grand Blvd., New Port Richey, Florida. The thermoplastic polyolefin (TPO) roof system removal was performed during the week of May 15, 2017.

The purpose of this investigation is to review and comment on the roof system's installation and to observe the condition of the underlying metal roof deck. Photographs were taken during the site assessment and are included in Appendix A of this report.

Roof System Removal Observations

The roof system removal was visually observed. Conditions observed are listed as follows:

1. Inadequate spacing of roof system fasteners along the building perimeter zones. Fastener markings were not utilized to space fasteners at 6 inches on center. Fasteners were spaced at approximately 12 inches on center (Figures A-1, A-2, A-3, and A-12).
2. Inadequate spacing of roof system fasteners within the field of the roof. Fastener markings were not utilized to space fasteners at 12 inches on center. Fastener spacing exceeded 12 inches on center (Figure A-13).
3. Lengthwise roof membrane seams were installed parallel to metal roof deck flutes. The membrane should have been installed perpendicular to the roof deck span to distribute wind forces over multiple roof deck panels (Figure A-4).

4. The roof system was installed over deteriorated (corroded) metal roof deck. Portions of the roof deck exhibited full section loss. Refer to Figures A-5, A-6, and A-7.
5. The roof membrane was installed over the perimeter detailing from a prior roof system. The perimeter detailing consisted of ½" plywood over an older built-up roof system (Figures A-8, A-9, and A-14).
6. Insulation panels were installed with their bottom sides facing upwards (Figure A-10).
7. Tapered insulation panels along the perimeter were installed with improper orientation. As a result, the roof sloped inward along the perimeter and ponding water resulted (Figure A-11).
8. Insulation was installed with large gaps (greater than ¼") in between insulation panels (Figures A-15, A-16, and A-17).
9. Debris under the roof membrane resulted in surface irregularity (Figure A-18)
10. Insulation panel fasteners were installed with inadequate panel edge distance (less than 12 inches) (Figures A-18 and A-19).
11. Insulation panel edges were not staggered (Figures A-20, A-21, and A-31).
12. Insulation panels spanned over open space between the metal roof deck and shim pieces – attempt to create a roof surface slope while accommodating for missing tapered panels (Figures A-22 and A-23).
13. Insulation panels installed with a bevel cut along panel edges – attempt to accommodate for missing tapered panels (Figure A-24).
14. Insulation panels installed with uneven edges resulted in roof surface elevation change between adjacent panels (Figures A-25 and A-26).
15. Water staining on insulation panel surfaces indicative of moisture intrusion (Figures A-27 and A-31).
16. Excessive distance between roof perimeter and first row of roof system fasteners (Figures A-28 and A-29).
17. Gaps between insulation panels filled with scrap pieces of roof insulation (Figure A-30).
18. Corrosion of insulation panel fasteners indicative of moisture intrusion (Figure A-31).
19. Moisture related deterioration of insulation panels (indicative of moisture intrusion) (Figure A-31).
20. Board segments used as shims as an attempt to create a roof surface slope while accommodating for missing tapered panels (Figure A-32).
21. Moisture related staining and deterioration of insulation panels under the top layer of insulation panels (indicative of moisture intrusion) (Figure A-32).
22. Insulation panel segment used to bridge over large gap between underlying insulation panels (Figure A-33).

23. Insulation panels spanned over open space between underlying insulation panels and shim pieces – attempt to create a roof surface slope while accommodating for missing tapered panels (Figure A-34).
24. Board and insulation panel shims along roof perimeter (Figures A-35 and A-36).
25. The existing expansion joint utilized tapered wood blocking over older flat wood blocking. Wood segments were utilized within the expansion joint space to fasten the tapered wood blocking, thus reducing the expansion joint's ability to contract during temperature changes (Figure A-37).

Conclusion/Recommendations

Proper installation of a roofing system (membrane, insulation, flashing, fasteners, etc.) in accordance with building codes, construction details, and manufacturer's specifications is critical to the performance of a roofing system as well as meeting manufacturer's warranty requirements. Product installation guidelines and good construction practices must be followed to ensure the integrity of the roofing system. Proper fastening and welds are required to resist wind pressures, meet warranty requirements, and to prevent water intrusion.

BillerReinhart performed a condition assessment of the roof surface on November 18, 2016. Our condition assessment report was subsequently issued on December 2, 2016. Based on the information obtained from observation of the roof system removal, additional deficiencies in the as-built construction of the new roofing system have been revealed. Based on our additional observations, BillerReinhart believes that the newly installed roof system did not function properly to protect the building for its intended use or withstand the life of its intended warranty. Defective workmanship whereas the contractor failed to comply with the manufacturer's instructions and specifications and accepted practices for good and workmanlike construction are attributed to these defects. Refer to the attached sheet S-3 (excerpt from BillerReinhart's roof replacement specifications) for information pertaining to proper installation of the specified TPO roofing system.

BillerReinhart believes that these additional observations substantiate our previous recommendation to remove and replace the existing TPO roofing system.

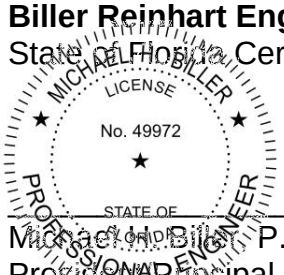
Neither the survey nor this report is intended to cover hidden defects, mechanical, electrical, or architectural features, nor environmental concerns. Unauthorized use of this report, without the permission of BillerReinhart, shall not result in any liability or legal exposure to Biller Reinhart Engineering Group, Inc.

Biller Reinhart Engineering Group, Inc. reserves the right to update the information contained in this report if deemed necessary due to modified site conditions or the availability of new/additional information.

Thank you for offering us the opportunity to provide our services for this project. Please contact our office if you have any questions regarding this report.

Sincerely,

Biller Reinhart Engineering Group, Inc.
State of Florida, Certificate of Authorization No. 9149



Michael Biller
Jun 12 2017 10:14 AM

Michael H. Biller, P.E., RRC
President/Principal Structural Engineer
Florida P.E. No. 49972

This item has been electronically signed using a Digital Signature.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Appendix A
Photographic Documentation

Figure A-1

Figure A-2

Figure A-3

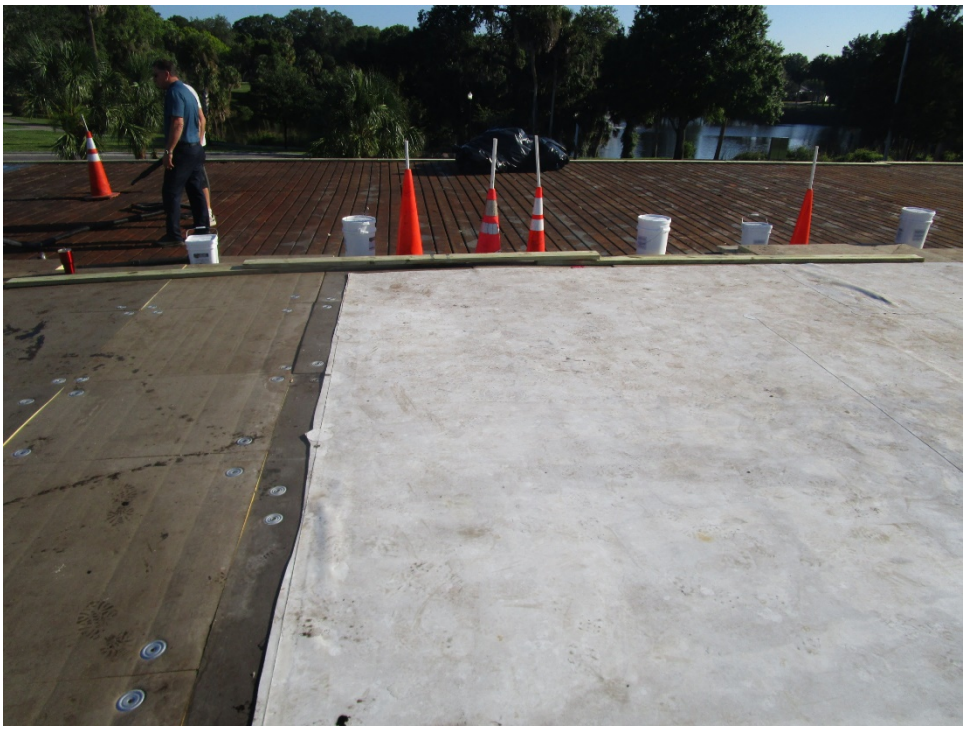


Figure A-4

Figure A-5

Figure A-6

Figure A-7

Figure A-8

Figure A-9

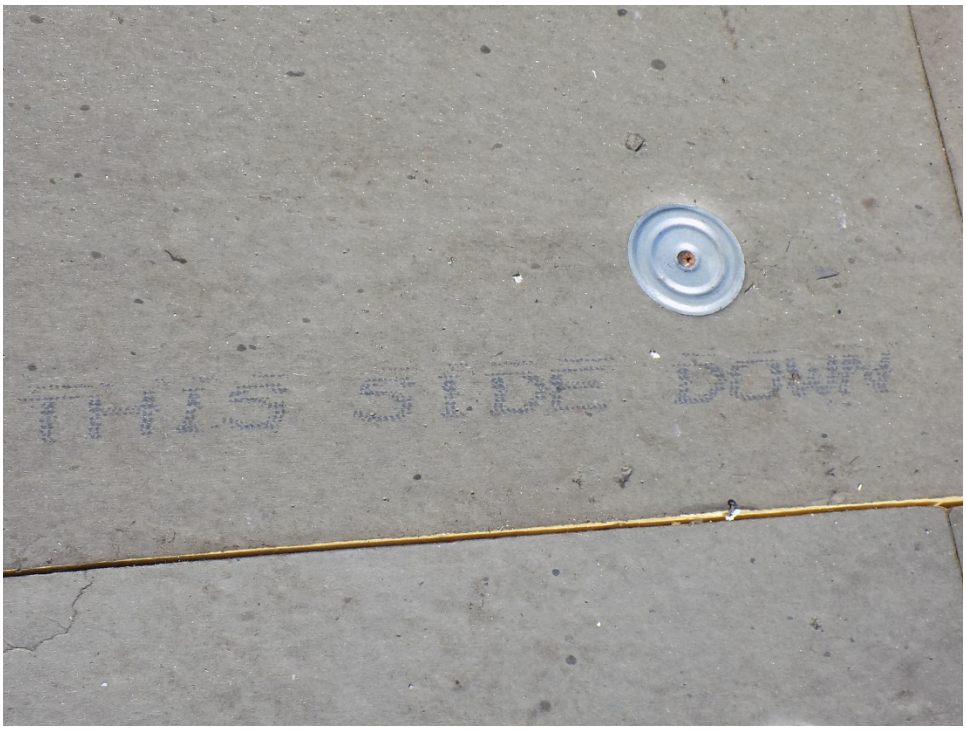


Figure A-10

Figure A-11

Figure A-12

Figure A-13

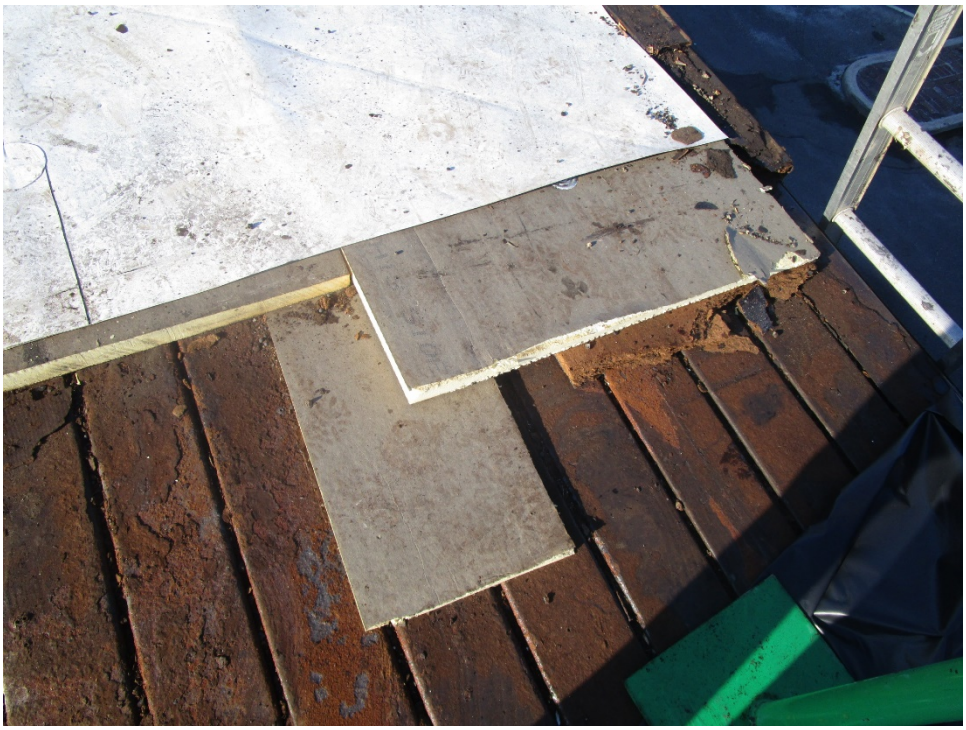


Figure A-14

Figure A-15

Figure A-16

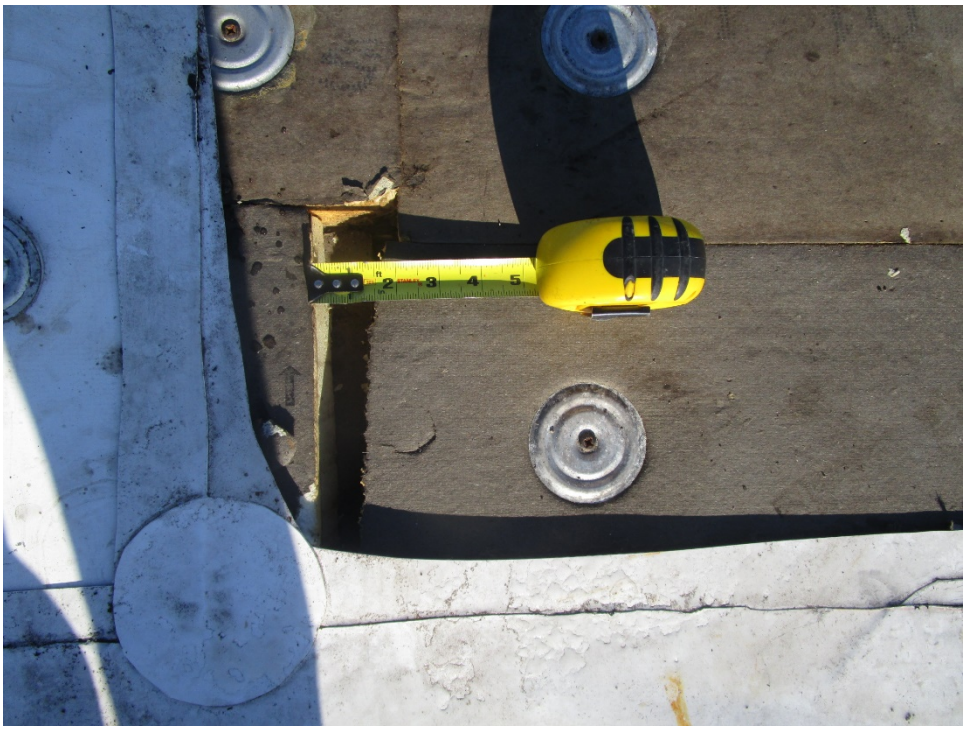


Figure A-17

Figure A-18

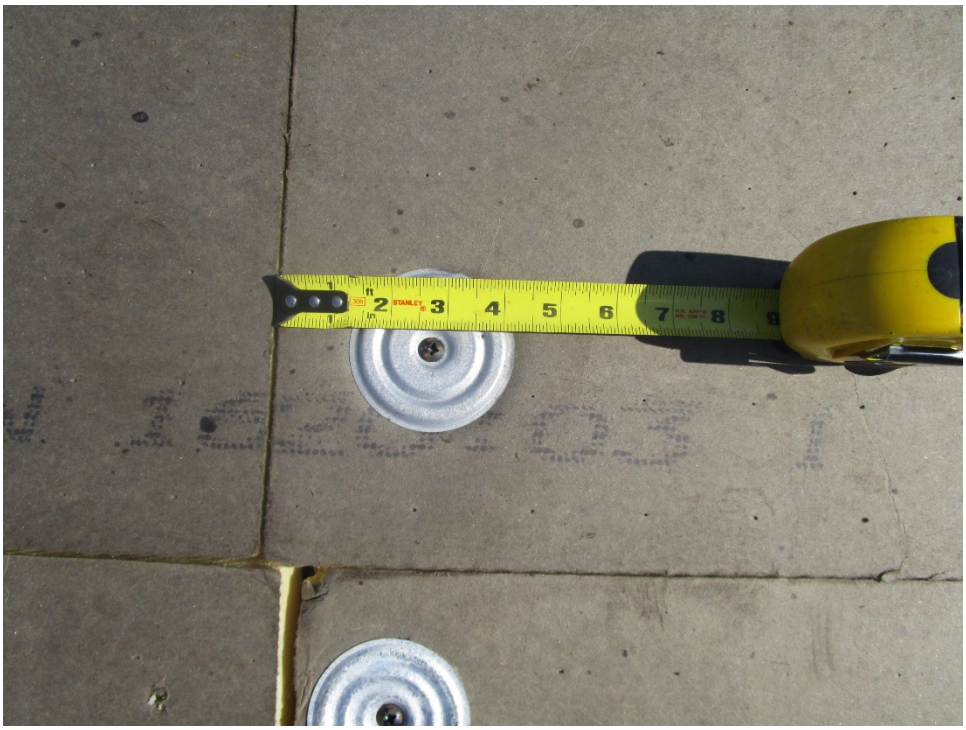


Figure A-19

Figure A-20

Figure A-21

Figure A-22

Figure A-23

Figure A-24

Figure A-25

Figure A-26

Figure A-27

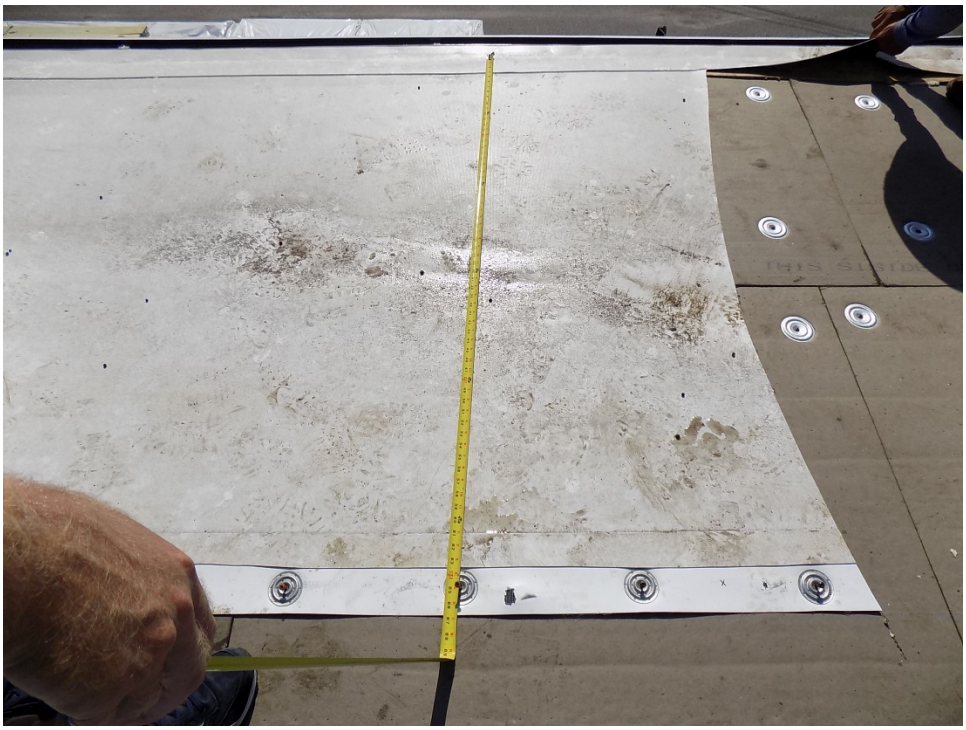


Figure A-28

Figure A-29

Figure A-30

Figure A-31

Figure A-32

Figure A-33

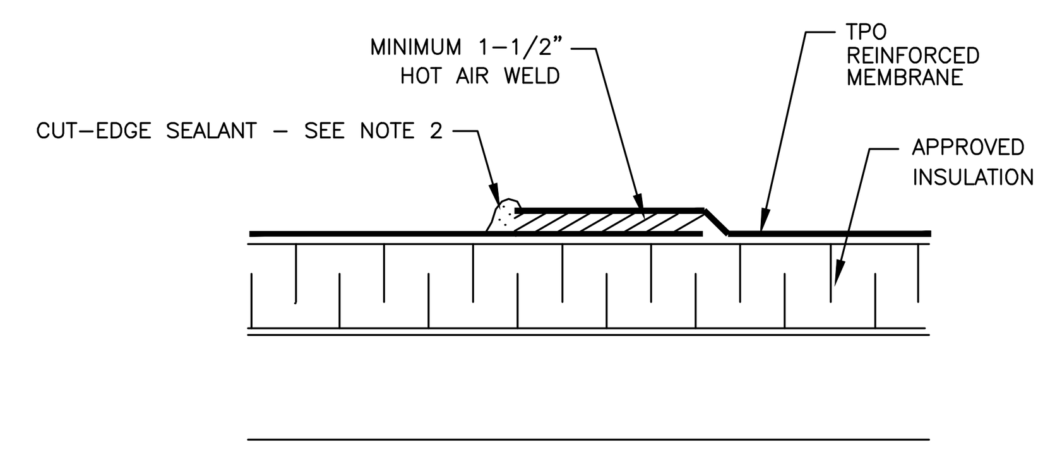
Figure A-34

Figure A-35

Figure A-36

Figure A-37

DETAIL 1 — NOT TO SCALE (1/S-3)



NOTE:

1. IT IS NOT NECESSARY TO FASTEN MEMBRANE AT END LAPS.
2. APPROXIMATELY 1/8" DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF TPO REINFORCED MEMBRANE.

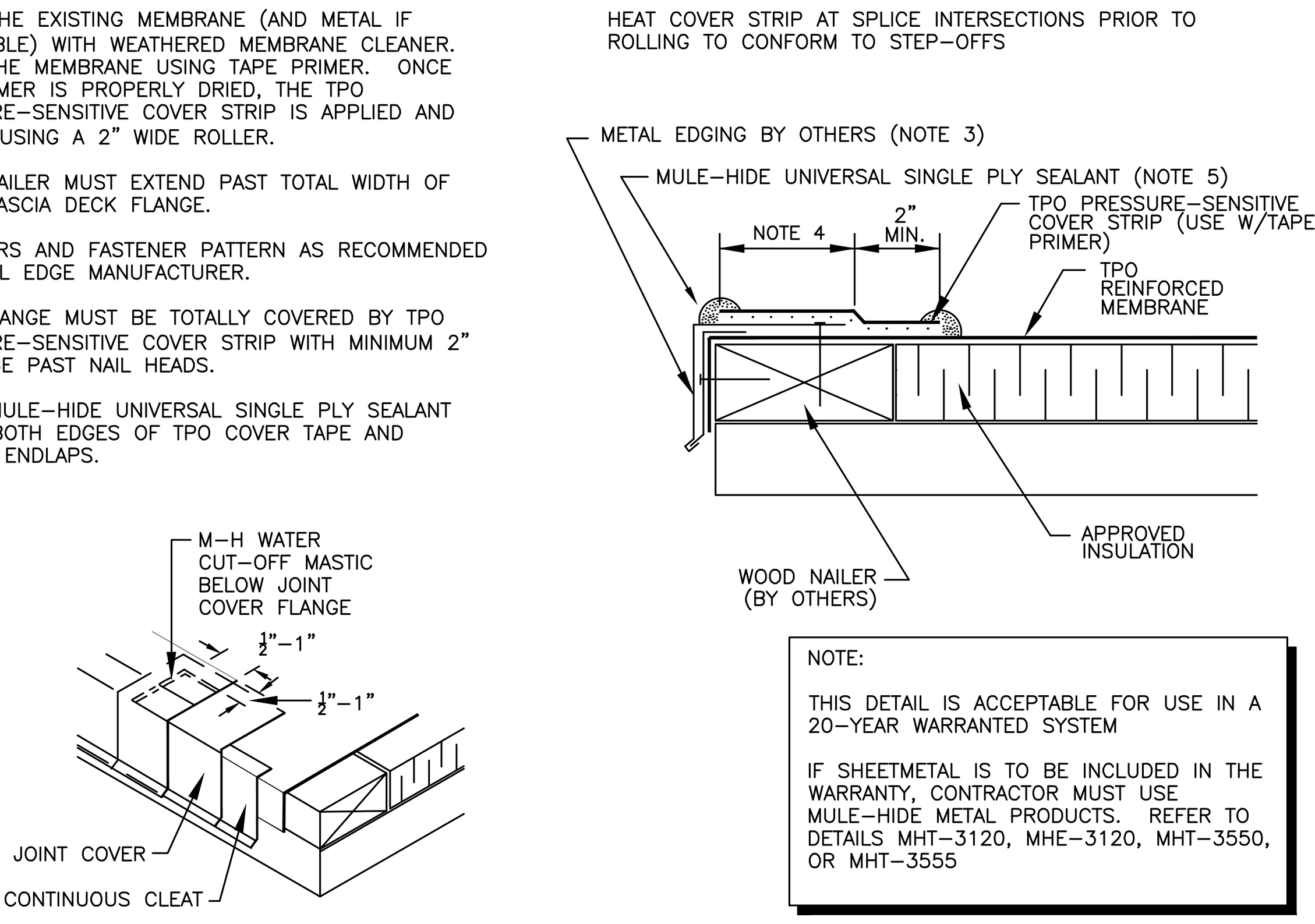
MULE-HIDE PRODUCTS CO., INC.	END LAPS SYSTEMS: ALL TPO SYSTEMS EXCEPT FLEECEBACK AND SELF ADHERING	DETAIL NO.: MHT-UN-104C REVISION DATE: 01/2013

DETAIL 2 — NOT TO SCALE (2/S-3)

NOTES:

1. CLEAN THE EXISTING MEMBRANE (AND METAL IF APPLICABLE) WITH WEATHERED MEMBRANE CLEANER. PRIME THE MEMBRANE USING TAPE PRIMER. ONCE THE PRIMER IS PROPERLY DRIED, THE TPO PRESSURE-SENSITIVE COVER STRIP IS APPLIED AND ROLLED USING A 2" WIDE ROLLER.
2. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF METAL FASCIA DECK FLANGE.
3. FASTENERS AND FASTENER PATTERN AS RECOMMENDED BY METAL EDGE MANUFACTURER.
4. DECK FLANGE MUST BE TOTALLY COVERED BY TPO PRESSURE-SENSITIVE COVER STRIP WITH MINIMUM 2" COVERAGE PAST NAIL HEADS.
5. APPLY MULE-HIDE UNIVERSAL SINGLE PLY SEALANT ALONG BOTH EDGES OF TPO COVER TAPE AND ACROSS ENDLAPS.

HEAT COVER STRIP AT SPLICE INTERSECTIONS PRIOR TO ROLLING TO CONFORM TO STEP-OFFS



NOTE:

THIS DETAIL IS ACCEPTABLE FOR USE IN A 20-YEAR WARRANTED SYSTEM

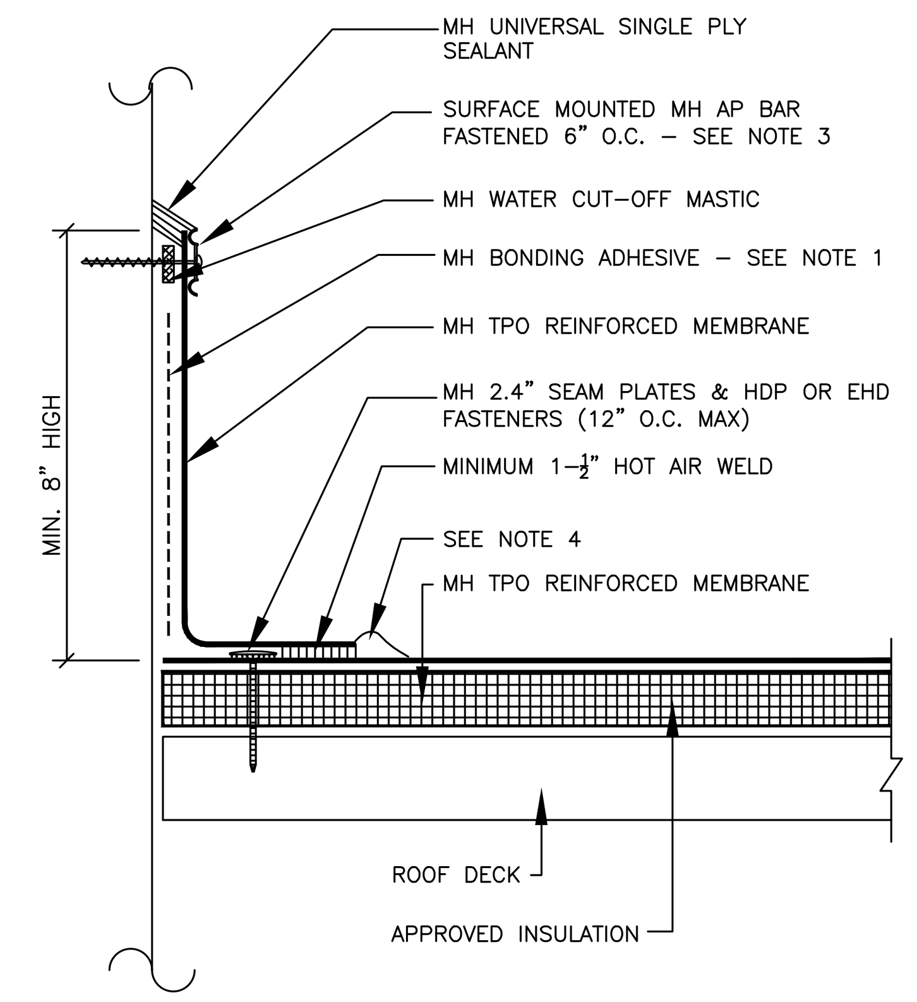
IF SHEETMETAL IS TO BE INCLUDED IN THE WARRANTY, CONTRACTOR MUST USE MULE-HIDE METAL PRODUCTS. REFER TO DETAILS MHT-3120, MHE-3120, MHT-3550, OR MHT-3555

MULE-HIDE PRODUCTS CO., INC.	DRIP EDGE TPO P/S COVER STRIP SYSTEMS: ALL TPO SYSTEMS	DETAIL NO.: MHT-UN-106B REVISION DATE: 01/2013

DETAIL 3 — NOT TO SCALE (3/S-3)

NOTES:

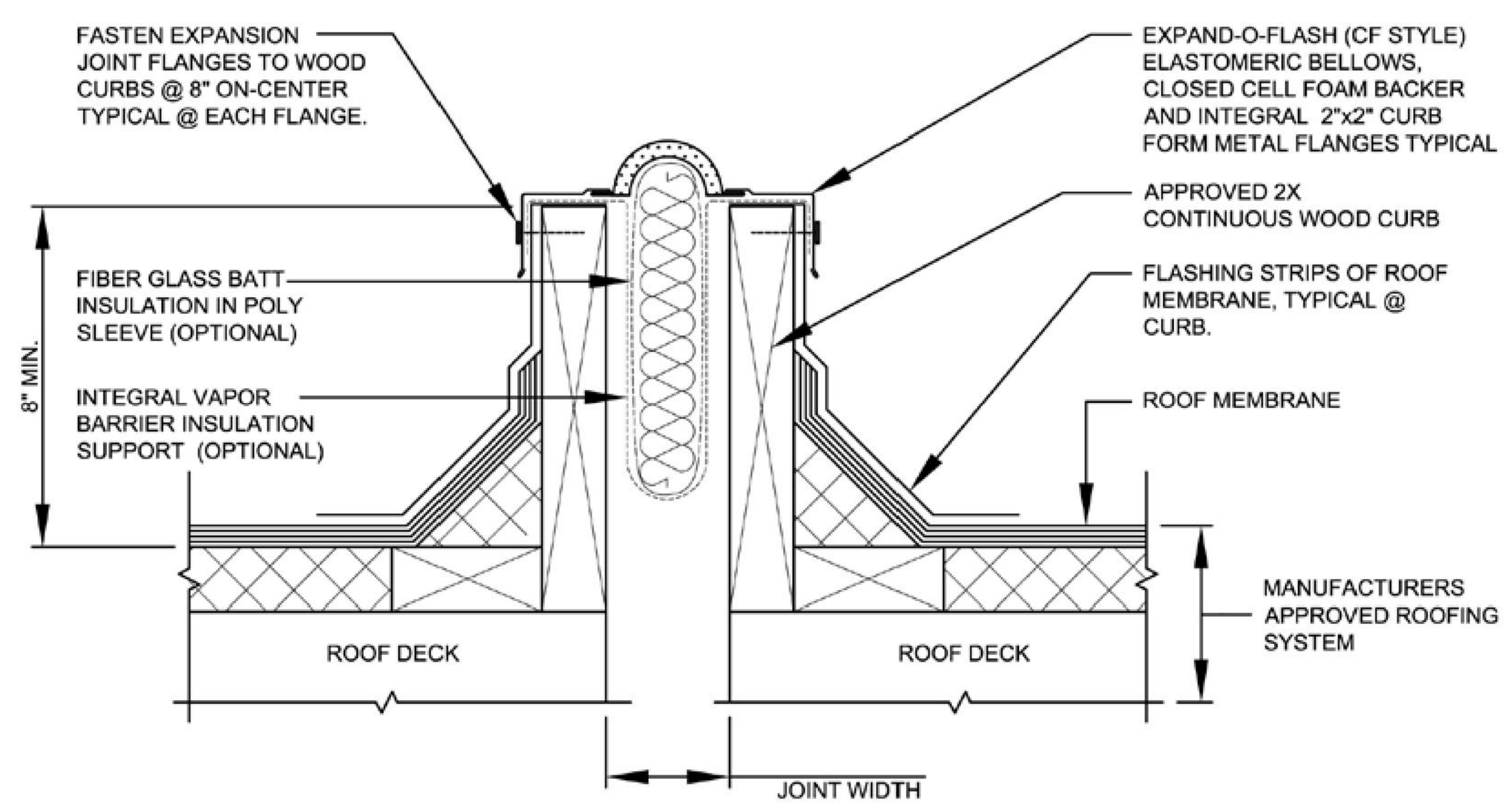
1. WHEN USING MULE-HIDE ALL-PURPOSE BAR TO TERMINATE WALL FLASHING, TPO BONDING ADHESIVE MAY BE ELIMINATED WHEN FLASHING HEIGHT IS 18" OR LESS.
2. FLASHING HEIGHT SHALL BE A MINIMUM OF 8" HIGH WHEN POSSIBLE. IF REMOVING COUNTERFLASHING DO NOT BLOCK OR COVER EXISTING WEEP HOLES. TERMINATION OF THE FLASHING MUST BE BELOW EXISTING WEEP HOLES.
3. ALL PURPOSE BAR FASTENED 6" ON CENTER IN 10' SECTIONS WITH ¼" GAP BETWEEN SECTIONS. ALL PURPOSE BAR IS TO BE INSTALLED WITH "BUMPS" FACING WALL. A FASTENER MUST BE LOCATED WITHIN 2" OF ENDS OF AP BAR. DO NOT BEND AP BAR AROUND INSIDE OR OUTSIDE CORNERS.
4. APPROXIMATELY 1/8" DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF TPO REINFORCED MEMBRANE.



MULE-HIDE PRODUCTS CO., INC.	WALL FLASHING WITH ALL-PURPOSE BAR SYSTEMS: ALL TPO SYSTEMS	DETAIL NO.: MHT-UN-312 REVISION DATE: 01/2013

DETAIL 4 — NOT TO SCALE (4/S-3)

EXPAND-O-FLASH BELLOWS WIDTH IS BASED ON THE CLEAR JOINT WIDTH. SEE BELLOWS WIDTH SELECTION TABLE BELOW.



BELLOWS WIDTH SELECTION TABLE	
JOINT WIDTH RANGES	BELLOWS SIZE (IN)
1" - 2⅜"	4"
2⅜" - 4"	6"
4⅛" - 5½"	8"
5⅝" - 6⅝"	10"
6¾" - 8"	12"

CHART NOTES:

- BELLOWS WIDTH SELECTION TABLE IS BASED ON 50% JOINT MOVEMENT. CONTACT EXPAND-O-FLASH TECHNICAL SERVICE AT 800-445-1500 FOR BELLOWS SELECTION REQUIRING GREATER THAN 50% JOINT MOVEMENT.
- BELLOWS SIZES LISTED ARE JOHNS MANVILLE STANDARD SIZES.
- LARGER BELLOWS SIZES ARE AVAILABLE AS A CUSTOM ORDER.

NOTES:

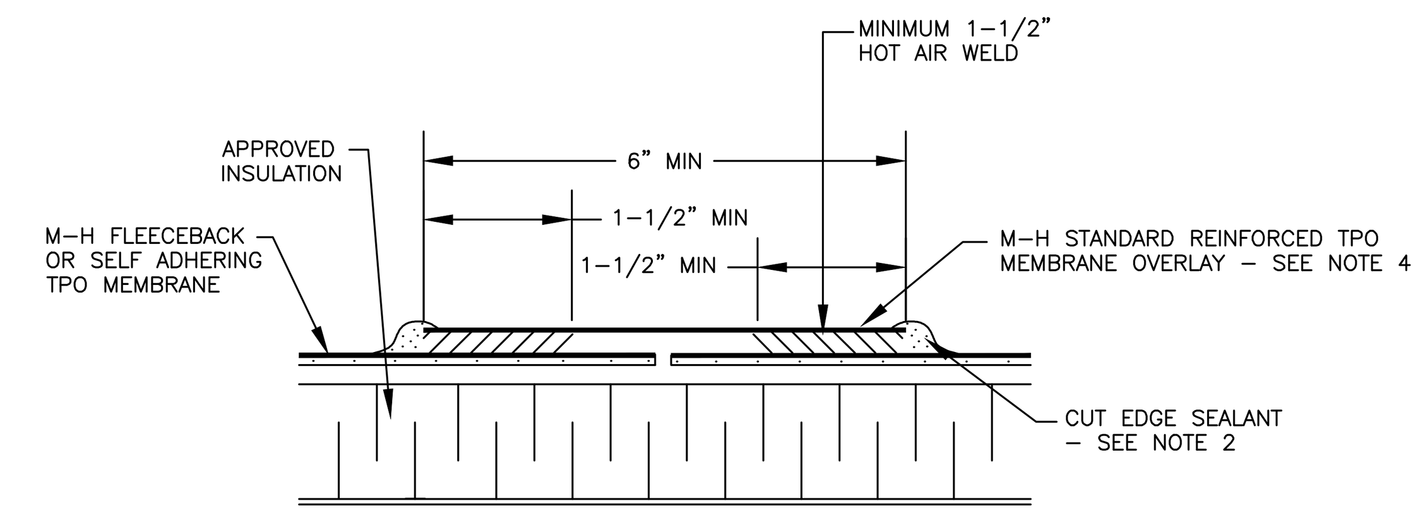
- FOR ADDITIONAL APPLICATION INFORMATION OR TECHNICAL SERVICE PLEASE CONTACT OUR EXPAND-O-FLASH TECHNICAL SERVICE AT 800-445-1500
- THIS JOHNS MANVILLE PRODUCT CAN BE INCLUDED IN THE JM PEAK ADVANTAGE GUARANTEE. PLEASE CONTACT A JM TECHNICAL SERVICES SPECIALIST AT 800-922-5922 FOR SPECIFIC ROOFING AND FLASHING REQUIREMENTS.
- THIS DRAWING IS FOR REPRESENTATION PURPOSES ONLY. CONSULT EXPAND-O-FLASH TECHNICAL SERVICE FOR DEVIATIONS FROM THE ABOVE DETAIL
- FACTORY FABRICATED TRANSITIONS, MITERS AND INTERSECTIONS ARE AVAILABLE, PLEASE CONTACT EXPAND-O-FLASH TECHNICAL SERVICE FOR ADDITIONAL INFORMATION.
- CONTACT JM EXPAND-O-FLASH TECHNICAL SERVICE FOR INSTALLATION INSTRUCTIONS.

EXPAND-O-FLASH; CURB TO CURB (STYLE CF)

DRAWING NO.	SCALE	ISSUE DATE	REV. NO.
CF-CC	NTS	5/8/12	---
	CAD FILE: STANDARD EOF CUT SHEETS.DWG		

JM Johns Manville

DETAIL 5 — NOT TO SCALE (5/S-3)

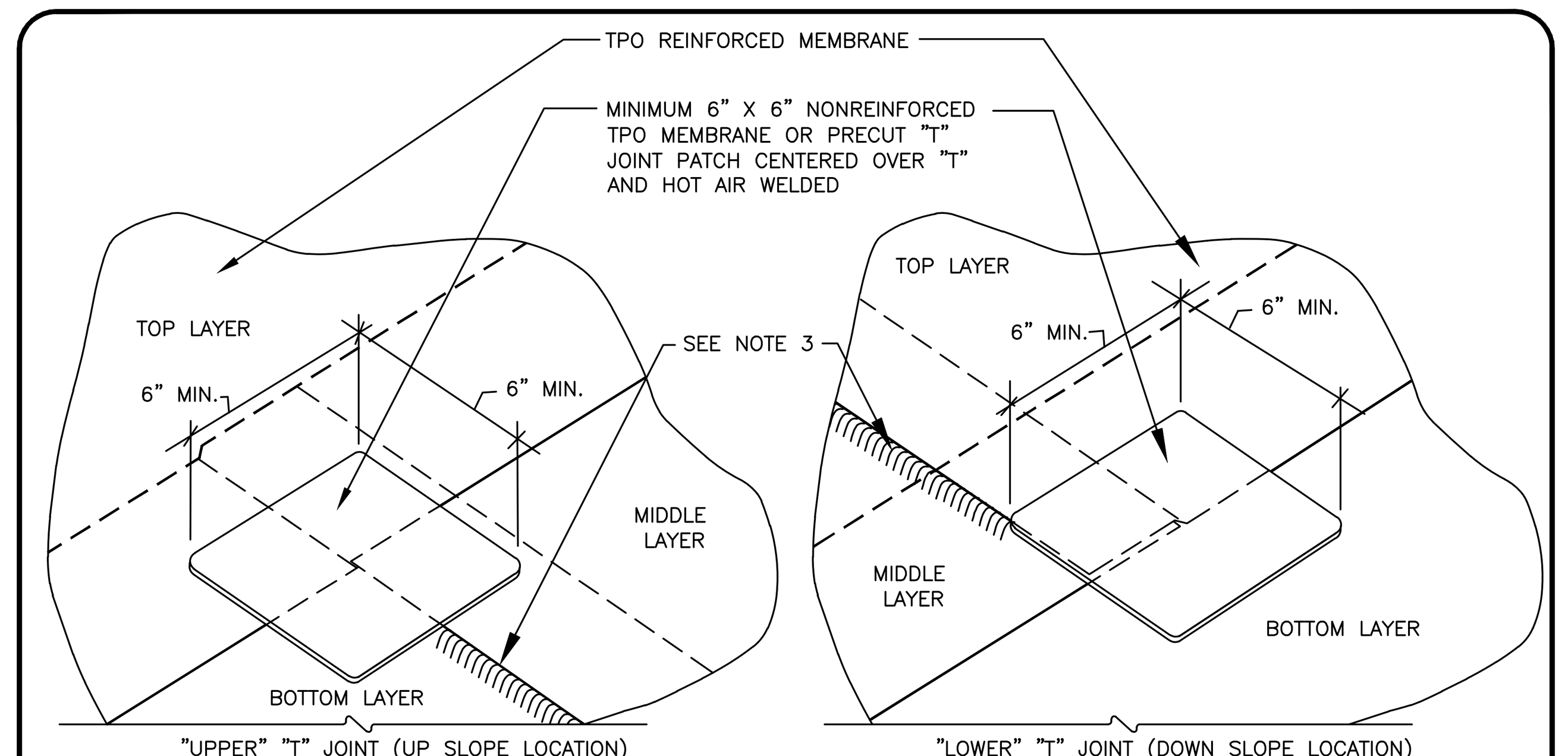


NOTE:

1. IT IS NOT NECESSARY TO FASTEN MEMBRANE AT END LAPS.
2. APPROXIMATELY 1/8" DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF TPO REINFORCED MEMBRANE.
3. A ROBOTIC WELDER MUST BE USED TO COMPLETE ALL FIELD SEAMS ON ALL WARRANTED PROJECTS.
4. THICKNESS OF STANDARD REINFORCED TPO MEMBRANE TO MATCH THICKNESS OF FLEECEBACK OR SELF ADHERING TPO MEMBRANE.

MULE-HIDE PRODUCTS CO., INC.	END LAPS SYSTEMS: ALL TPO FLEECE BACK AND SELF ADHERING	DETAIL NO.: MHT-UN-104E REVISION DATE: 05/2016

DETAIL 6 — NOT TO SCALE (6/S-3)

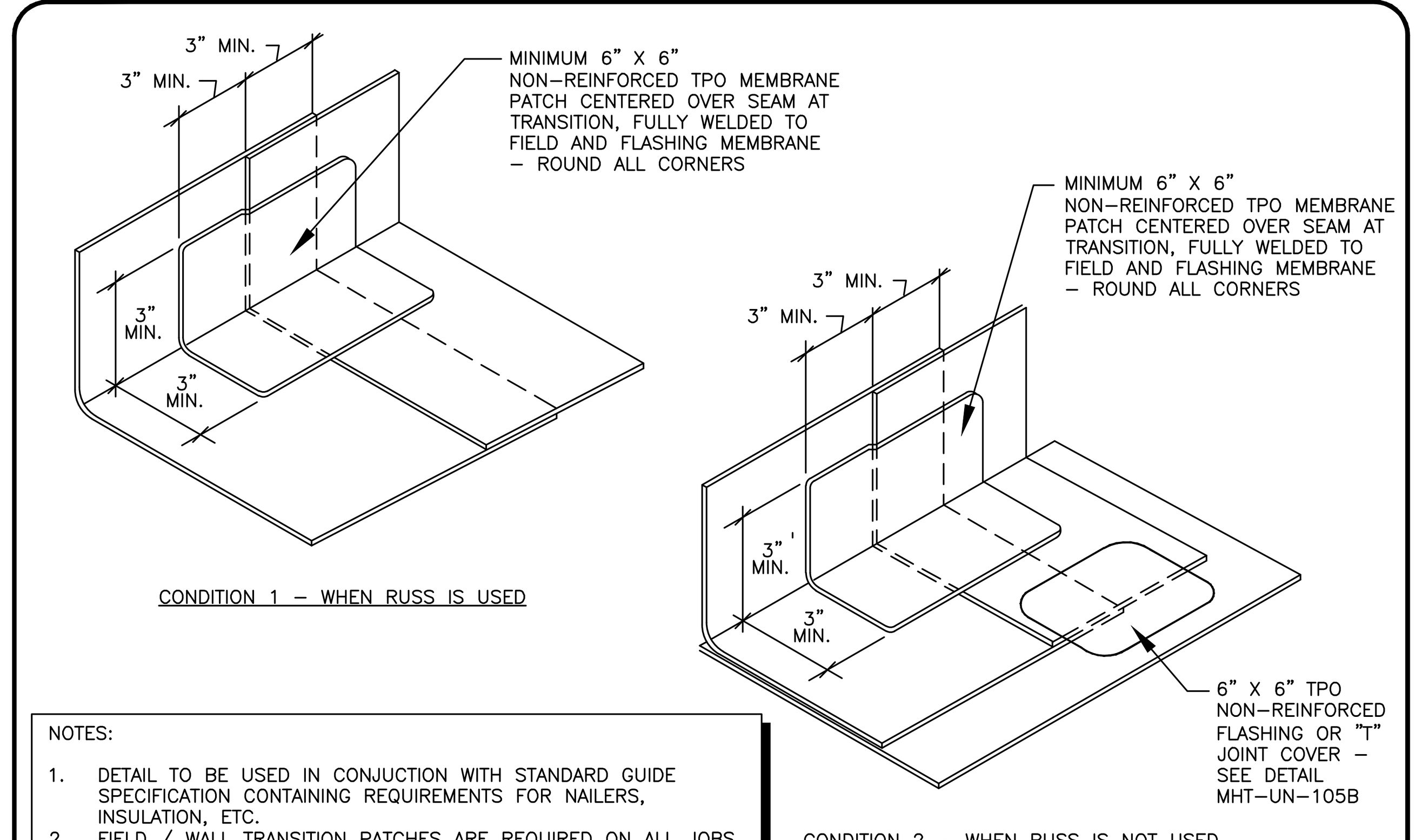


NOTES:

1. DETAIL TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATION CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, ETC.
2. "T" PATCHES ARE REQUIRED ON ALL .060" AND .080" MEMBRANES AND ON ALL PROJECTS WITH WARRANTIES LONGER THAN 15 YEARS.
3. APPROXIMATELY ⅛" DIAMETER BEAD OF CUT EDGE SEALANT IS REQUIRED ON CUT EDGES OF TPO REINFORCED MEMBRANE.

MULE-HIDE PRODUCTS CO., INC.	"T" JOINT COVER PATCH .060" (60 MIL) OR THICKER MEMBRANES SYSTEMS: ALL TPO SYSTEMS	DETAIL NO.: MHT-UN-105B REVISION DATE: 01/2013

DETAIL 7 — NOT TO SCALE (7/S-3)



NOTES:

1. DETAIL TO BE USED IN CONJUCTION WITH STANDARD GUIDE SPECIFICATION CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, ETC.
2. FIELD / WALL TRANSITION PATCHES ARE REQUIRED ON ALL JOBS.

MULE-HIDE PRODUCTS CO., INC.	SEAM PATCH AT FIELD / WALL TRANSITION SYSTEMS: ALL TPO SYSTEMS	DETAIL NO.: MHT-UN-105C REVISION DATE: 01/2013

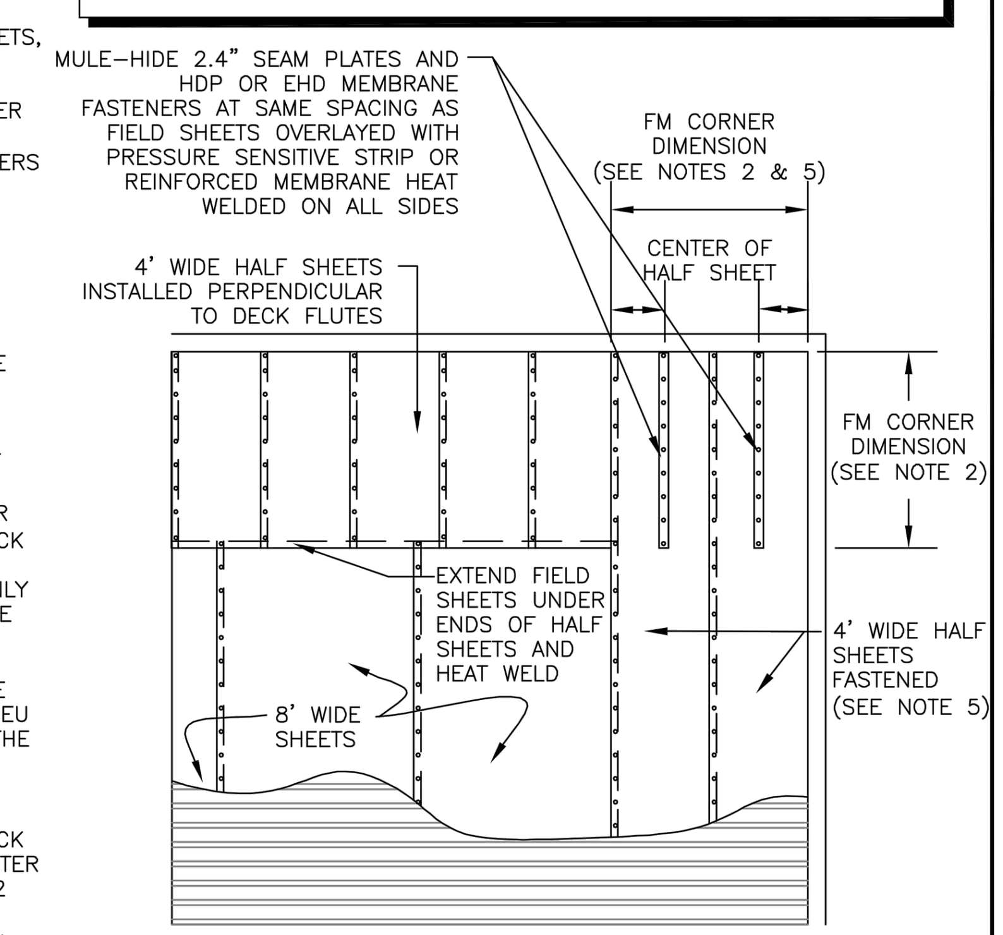
DETAIL 8 — NOT TO SCALE (8/S-3)

NOTES:

1. DETAILS TO BE USED IN CONJUNCTION WITH STANDARD GUIDE SPECIFICATIONS CONTAINING REQUIREMENTS FOR NAILERS, INSULATION, SLIPSHEETS, ETC.
2. ACCORDING TO PROJECT CONDITIONS, THE SPECIFIER AND/OR APPLICATOR MUST IDENTIFY THE WIDTH DIMENSIONS OF THE ROOF PERIMETERS AND CORNERS IN ACCORDANCE WITH FM DATA SHEETS 1-28 AND 1-29 BASED UPON THE FOLLOWING FORMULA:
   - 0.4 TIMES THE BUILDING HEIGHT OR
   - 0.1 TIMES THE BUILDING'S LESSER PLAN DIMENSION, WHICHEVER IS SMALLER

   THE MINIMUM PERIMETER/CORNER WIDTH SHALL BE NO LESS THAN 3 FEET
3. FOR STEEL DECKS:
   - ALL FASTENERS MUST ENGAGE TOP FLUTES OF DECK
   - IN THE FIELD OF THE ROOF, SEAMS (FASTENER ROWS) MUST RUN PERPENDICULAR TO THE DECK FLUTES
   - PERIMETER HALF SHEETS ARE TO BE USED ONLY WHEN THE SEAMS RUN PERPENDICULAR TO THE DECK FLUTES
4. 10" WIDE TPO PRESSURE-SENSITIVE RUSS CAN BE USED BENEATH FIELD OR PERIMETER SHEETS IN LIEU OF FASTENERS AND PLATES INSTALLED THROUGH THE MEMBRANE.
5. USE ADDITIONAL 4' WIDE HALF SHEETS INSTALLED WITH SEAMS RUNNING PERPENDICULAR TO THE DECK FLUTES TO MEET OR SLIGHTLY EXCEED FM PERIMETER DIMENSION REQUIREMENTS AS OUTLINED IN NOTE 2 ABOVE. EACH 4' WIDE HALF SHEET EQUATES TO APPROXIMATELY 3'-6" OF COVERAGE FACTORING IN THE REQUIRED OVERLAP.

REFER TO MULE-HIDE TECHNICAL BULLETIN #TPO-MA02-2006 FOR PERIMETER HALF SHEET REQUIREMENTS



MULE-HIDE PRODUCTS CO., INC.	FM CORNER / PERIMETER FASTENING ENHANCEMENTS - OPTION B SYSTEMS: TPO MECHANICALLY ATTACHED USING 8' WIDE FIELD SHEETS	DETAIL NO.: MHT-FM-308B REVISION DATE: 01/2013

Title Block

REVISIONS		
NO.	DATE	COMMENTS
△		
△		
△		
△		

NORTH ROOF RE-ROOFING PROJECT

CITY OF NEW PORT RICHEY
INCUBATOR BUILDING
6345 GRAND BLVD.
NEW PORT RICHEY, FL 34652

billerreinhart ENGINEERING GROUP, INC.
3434 colwell avenue suite 100, tampa, florida 33614
telephone : 813.908.7203 fax : 813.931.5200
email : info@billerreinhart.com
State of Florida Certificate of Authorization No. 9149

TO THE BEST OF THE ENGINEER'S KNOWLEDGE, THE PLANS AND SPECIFICATIONS COMPLY WITH THE APPLICABLE MINIMUM BUILDING CODES

MICHAEL H. BILLER
FL P.E. NO. 49972

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED USING A DIGITAL SIGNATURE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

DETAILS

DATE: 3-1-17 DRAWN BY: R.M.
JOB NO: 16-502 DESIGN BY: M.B.

SHEET NO.

S-3