



METAL ROOFING

S y s t e m s , I n c

Faster. Smarter. Better. Period.

Wake County EMS Station 2

Raleigh, NC



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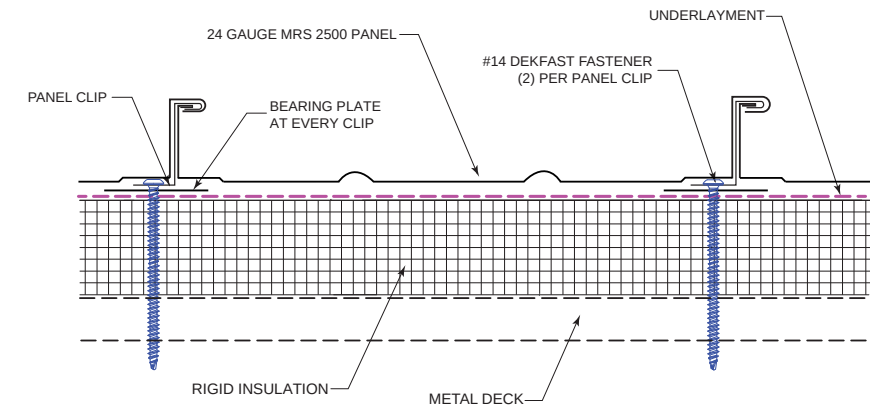
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Job #:	CDW
Drawn By:	JULY 24, 2026
Date:	AS SHOWN
Scale:	

Wake County EMS Station 2
Raleigh, NC
Drawing Title: COVER SHEET

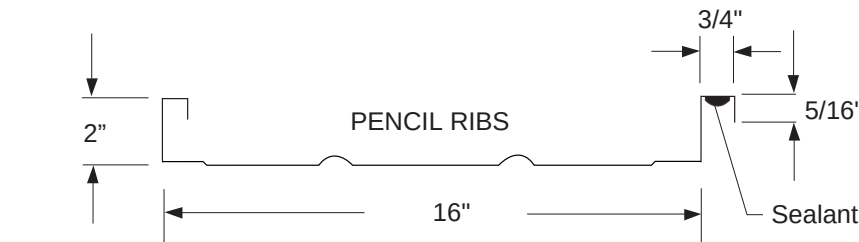
SHEET:
01
OF: 06

Metal Roof System



SYSTEM: MRS 2500 PANEL
MATERIAL: 24 GA. GALVALUME
COLOR: STANDARD

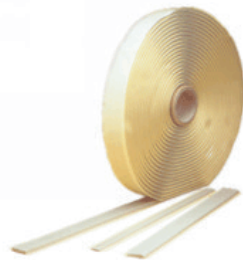
Roof Panel Profile



SYSTEM: MRS 2500 PANEL
MATERIAL: 24 GA. GALVALUME
COLOR: STANDARD

Butyl Tape

TYPICAL PROPERTIES			SPECIFICATION COMPLIANCE:
Property	Typical Values	Test Method	
Specific Gravity:	1.47	ASTM D 792	Federal Specification TT-C-1796A, Type II, Class B UL Approval for SMS227 has been granted on sizes up to and including 1/2" width x 1/2" thick
Density:	13.54 Lbs./Gal. 1.62 kg./liter	SM Lab Test	
Percent Solids:	100%	SM Lab Test	AAMA 800
Panel Adhesion PW (N/mm ²) / % Cohesive Separation	16 (2.8) / 100		AAMA 800
Anodized Aluminum	16 (2.8) / 100		
Mil Finish Aluminum	16 (2.8) / 100		AAMA 800
Polyvinylidene Fluoride	17 (2.8) / 100		
PVC Plastisol	17 (2.8) / 100		AAMA 800
Polyester	16 (2.8) / 100		
Siliconized Polyester	16 (2.8) / 100		ASTM C 907
Tensile Adhesive Strength PSI (kPa) % Cohesive Separation	20 (138) 95		
Yield Strength PSI (kPa)	8 (55)	ASTM C 908	ASTM C 908
% Elongation	>100%		
Sag	None	AAMA 800	AAMA 800
Vehicle Migration	Panel <1/8" (3.2 mm)		
Water Resistance	No Effects	AAMA 800	AAMA 800
Hardness (Shore D)	50-55		
Crazing to Acrylic plastics	None	MIL-S-11300C	ASTM D 217 300 g cone (5 Sec)
Cone Penetration (0.1mm) @77°F (25°C) @120°F (48.8°C) @90°F (-17.7°C)	85-100 125-135 45-55		
Application Temperature Range	5°F to 120°F (-20°C to 48°C)	SM Lab Test	SM Lab Test
Service Temperature Range	-40°F to 200°F (-40°C to 93°C)		
Color	Grey	Visual SM Test	SM Lab Test
Weatherability QUV, 340A lamp 1000 hrs	Excellent, chalking, wash-off or flow (pass)		
6" Static Water Pressure	Pass - No Leakage	ASTM Proposed Test Method	ASTM E 1548 ASTM E 1580
Water Penetration	Pass - No Leakage		
Air Leakage	At 1.57 PSF 0.068 CFM/FT ² At 6.24 PSF 0.1024 CFM/FT ² 0.1985 CFM/FT ²		ASTM E 1580
Shelf Life	100°F (38°C)		



Titebond Sealant

Meets or exceeds the requirements of:
Passes ASTM C920, Type S, Grade NS, Class 50, Use NT, M, T, G and A
ASTM C510, ASTM C639, ASTM C661, ASTM C679, ASTM C717, ASTM C719, ASTM C793, ASTM C794, ASTM C1183, ASTM C1193, ASTM C1246, ASTM D412, ASTM D624 and ASTM G155.
Passes Federal Specification TT-S-00230C, Type II, Class A
Passes CAN/CGSB-19 13-M87, Classification MCG-2-25-A-N, No.81026
AAMA 808.3-92 Exterior Perimeter and AAMA 802.3-92 Type II Back-Bedding Compound and
USDA approved for use in meat and poultry areas

Physical Properties

Type: Advanced polymer (reactive)
State: Medium-viscosity caulk
Color: Over 50 colors
Solids: 99%
Viscosity: 500,000

Calculated VOC (less water): 9 g/L (<2% wt.)
Weight/gallon: 13.85 lbs.
Flashpoint: > 200°F.
Freeze/thaw stability: Stable
Storage life: More than 12 months in tightly closed containers @ 75°F (24°C)

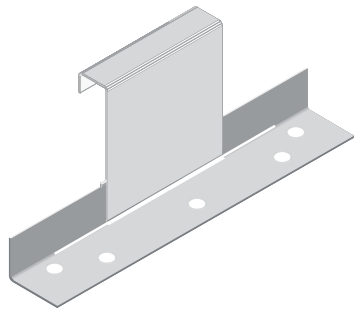
Coverage (maximum): Approximate length of bead according to bead diameter:
Container

	1/4" bead	3/8" bead	1/2" bead
10.1 oz. Cartridge	31 ft.	13.5 ft.	7.5 ft.
20 oz. Sausage Pack	61 ft.	27 ft.	15 ft.

Roof Panel Clips

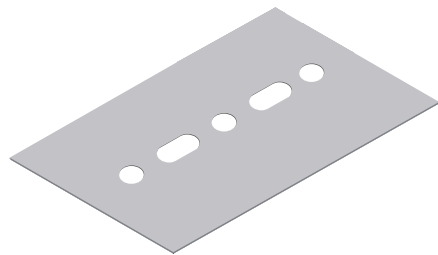
2" Floating Panel Clip

Base fabricated from 18 ga Galvanized Steel.
Upper tab fabricated from 22 ga Galvanized Steel.

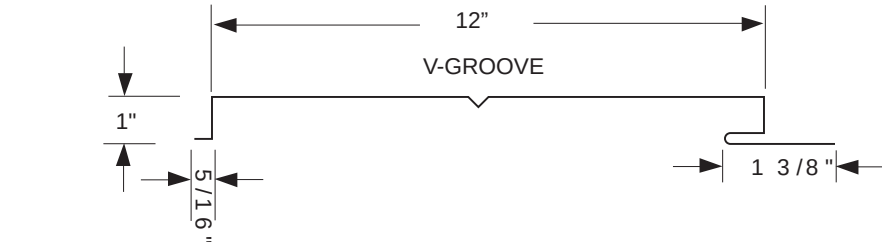


Bearing Plate

20 GA G90 Galvanized. 3 in. wide by 6 in. long. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.



Soffit Panel Profile



SYSTEM: MRS FLUSH SEAM PANEL
MATERIAL: 24 GA. GALVALUME
COLOR: STANDARD

Panel Clip Fasteners

#14 DekfastFasteners

Materials:

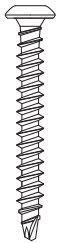
- Steel thickness from 22 ga (.028 in.) through 18 ga (.045 in.):
Min penetration: 3/4"
- Plywood: Min thickness: 3/4"
FR treated; min through penetration: 1/4"
- Wood 2x (1-1/2" thick):
Min penetration: 1"
- Structural concrete:
Min penetration: 1"

Head: #3 Phillips
Head Height: .118" max
Head Dia: .448" max
Thread Major Dia: .238"
Shank Dia: .180"

Strength (lbs ult.):
Tensile: 3600
Torsional: 110 in-lbs min
Shear: 2630

Pull-out: (lbs avg.):
22 ga: 540
20 ga: 630
18 ga: 900

4000 psi concrete (1" penetration): 850
3/4" plywood (through penetration): 590
2x dimensional lumber (1" penetration): 605



#10 Type A: Pancake Head 2 1/2 Quadrex Drive Carbon Steel, Zinc Plated Metal to wood

Head Height: .080 – .068
Head Dia: .447 – .423
Thread Major Dia: .194 – .188
Thread Minor Dia: .133 – .126

Strength (lbs ult.): Carbon
Tensile: 1825
Torsional: 48 in-lbs
Shear: 1535

#10 Type A, Pull-out (lbs ult.):
SPF wood:
1" penetration: 821



#10 Self-Drill: Pancake Head 2 1/2 Quadrex Drive Carbon Steel, Zinc Plated Metal to metal

Min projection: 3/8" of threads below substrate

Head Height: .080 – .068
Head Dia: .447 – .423
Thread Major Dia: .194 – .188
Thread Minor Dia: .133 – .126

Strength (lbs ult.):
Tensile: 1825
Torsional: 48 in-lbs
Shear: 1535

#10 Self Drill, Pull-out (lbs ult.):
12 ga (.105): 1782
14 ga (.075): 1072
16 ga (.060): 782



OILCANNINGPOSITIONPAPER

"Oil canning" can be defined as a perceived waviness in the flat areas of roofing and siding panels. Generally the period and amplitude of the wave depend on the continuous width of the flat.

Oilcanning is an inherent part of light gauge cold formed metal products, particularly those with broad flat areas. Profiles having wide flat surfaces are often referred to as "architectural" roofing and siding panels. Such panels are distinguished from corrugated shapes as the latter are more fluted in design, have much narrower flats, and are less likely to exhibit oilcanning.

BACKGROUND

Oil canning has a number of causes:

1. Metal Coil:

Residual stresses induced during coil production can contribute. Examples of other contributing features are:

- Full center – the coil is longer in the middle of the strip. This is the most common example. (The gradation manifests as ripples or buckles near mid coil.)
- Wavy edge – the coil is longer on the edge of the strip.
- Camber – the deviation of a side edge from a straight line. (This is not always a problem.)

These conditions exist to some extent in all metal and tend to become more exaggerated as the strength level of the rolled sheet product increases and also for thinner and wider sheet product. When excessive, each circumstance can cause oil canning after roll forming by the manufacturer.

2. Fabrication:

- Slitting – the slitting of a mater coil can release and redistribute residual forces. The coil's response can create or increase oilcanning. The economics of drilling and coating wider coils makes slitting almost mandatory.

- Forming – New residual stresses can be created during some forming operations. Architectural panel profiles typically require more forming along sides than in the middle, and more often require more forming along one side than the other. This dictates that forming commences along the sides. This sequential "working" of the sheet will have a tendency to "trap" uneven metal contained within the coil in the panel central areas (corrugated ribbed profiles are most often worked from the center out, thereby "pushing" the uneven metal to the edges).

3. Installation:

- Misalignment of the support system – structural supports that are produced, fabricated and installed within allowable tolerances can create a "non-planar" or contoured bearing surface. Stresses induced when panels conform to this surface can contribute to oil canning.
- Over engagement of panels – Most panels accommodate transverse thermal expansion by flexing of webs and by "take up" at side joints. When panels are over engaged, these relief features are hindered or eliminated. In the extreme the "over engagement" process itself can generate waviness. Either cause can contribute to oil canning.
- Over driving of fasteners – This operation creates stresses in the panel and provides a "leading line" at the fasteners.
- Longitudinal Expansion – The surface temperature of exposed panels cycles throughout the year and even fluctuates daily. The temperature and the cycle depend on many variables, e.g. project location and orientation, cloud cover, panel inclination, surface finish or color, system thermal insulation characteristics. The panels' physical response is to expand or contract. If panels are restrained by " thru-fasteners", clips, or perimeter details, they try to accommodate a

relieve thermal forces through several mechanisms, i.e., "slotting" around fasteners, out-of-plane "bowing", local distortion of flat areas -- "waviness". The magnitude of thermal force depends on the restraint provided (hence the panel stiffness and support stiffness), on the base materials' physical properties, and on the temperature differential between the support structure and the external sky.

Waviness can be amplified when there is uneven fastener restraint along the panel. Such restraint is common on "concealed fastener" systems having fasteners along one edge and an interlock along the other. Waviness caused by thermal forces differs from other forms of oil canning in that waves can appear and

disappear as the sun rises and moves around the building.

- Movement of the primary structure – Excessive differential deflection, racking, drift, or settlement within the primary structure can cause noticeable waviness within panel flats. This distortion can be temporary or sustained.

- Handling – Carrying of panels in the flat or twisting of panels can induce a wavy appearance to a previously flat panel. Twisting can occur if one corner of a panel is used to lift a panel or to remove the panel from a bundle.

Coil producers and panels manufacturers attempt to minimize these conditions and produce quality products. On going research seeks improved production methods. Regardless all of the above factors can and do occur and can cause oil canning in architectural roofing or siding product. While a number of factors are dictated by the panel design, there are steps that the designer, panel manufacturer, architect or contractor can take to reduce the chances of oil canning:

1. Coil:

Tension or stretcher leveling, a process whereby the metal is "stretched" in cold form beyond its yield point, will provide a flatter surface less prone to oil canning. In general the heavier the gauge the less likely a product is oil can. The possibility of oil canning can be reduced by ordering tension leveled and resquared material.

2. Design:

The addition of stiffening beads or other configuration "breaks-up" the flat surface and makes oil canning less apparent. Embossing will also help hide surface waviness in the metal. The selection of lower gloss coatings and lighter colors tend to minimize the visual effect of oil canning.

3. Installation:

More stringent specification regarding the alignment of the supporting structure will focus attention on this critical aspect. Instructions to the erection forces regarding proper handling, spacing and fastening should be a part of the manufacturer's delivery packet.

CONCLUSION

Oil canning is an aesthetic problem. Normally structural integrity is not affected. However, structural integrity must be reviewed if the distortion results form an extreme external influence. Since many uncontrollable factors are involved, no manufacturer can realistically assure the total elimination of oil canning. With careful attention to the production and selection of material, to the panel design, and to installation practice, oil canning can be effectively minimized. Unless specified tolerance have been accepted by the panel provider and panel manufacturer and are incorporated into the contract documents prior to fabrication, and if reasonable precautions have been taken, oil canning is not grounds for panel rejection.

BIBLIOGRAPHY

- American Iron & Steel Institute, "Sheet Steel Coils & Cut Lengths". Steel Products Manual, October 1979.
- USS "USS Sheet & Strip Handbook" July 1983.

Note: This position paper was written and furnished by the Metal Construction Association (MCA).

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CDW

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Scale: N.T.S.

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Raleigh, NC

PRODUCT DATA

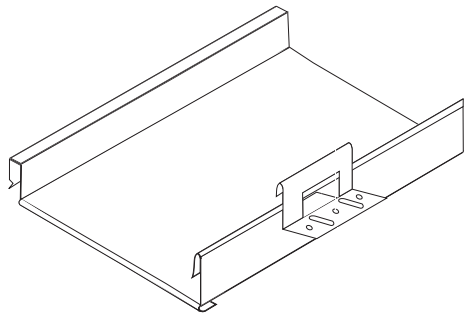
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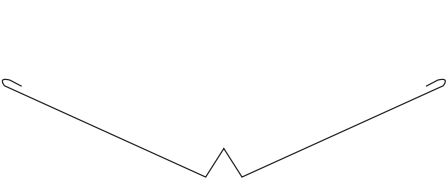
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Roof Installation Videos

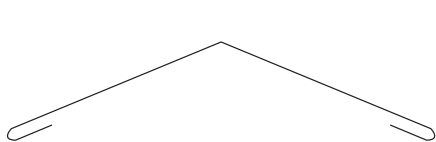
SCAN CODES TO VIEW INSTALLATION VIDEOS



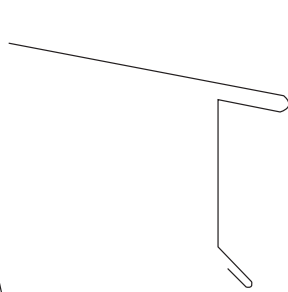
PANEL INSTALLATION



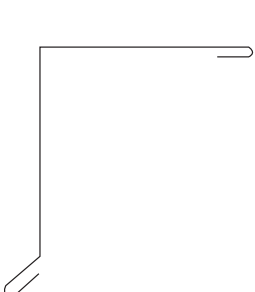
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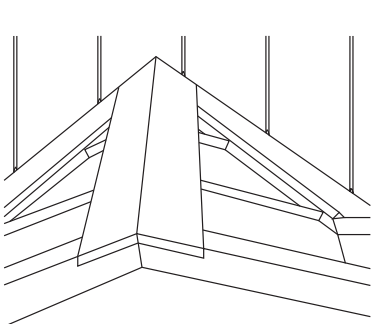
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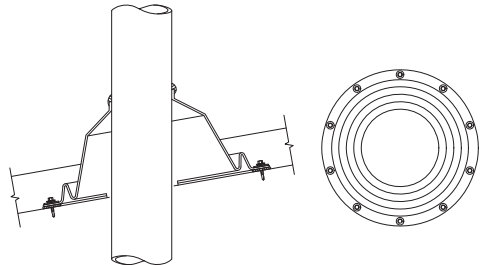
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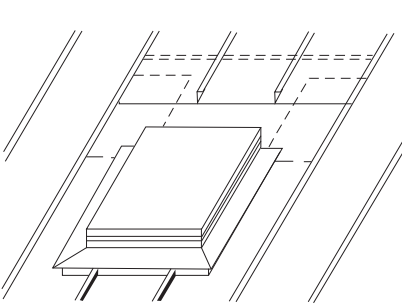
RAKE INSTALLATION



RIDGE TO VALLEY INST.



PIPE BOOT INSTALLATION



CURB INSTALLATION

FLASHING INSTALLATION

QR CODE VIDEOS

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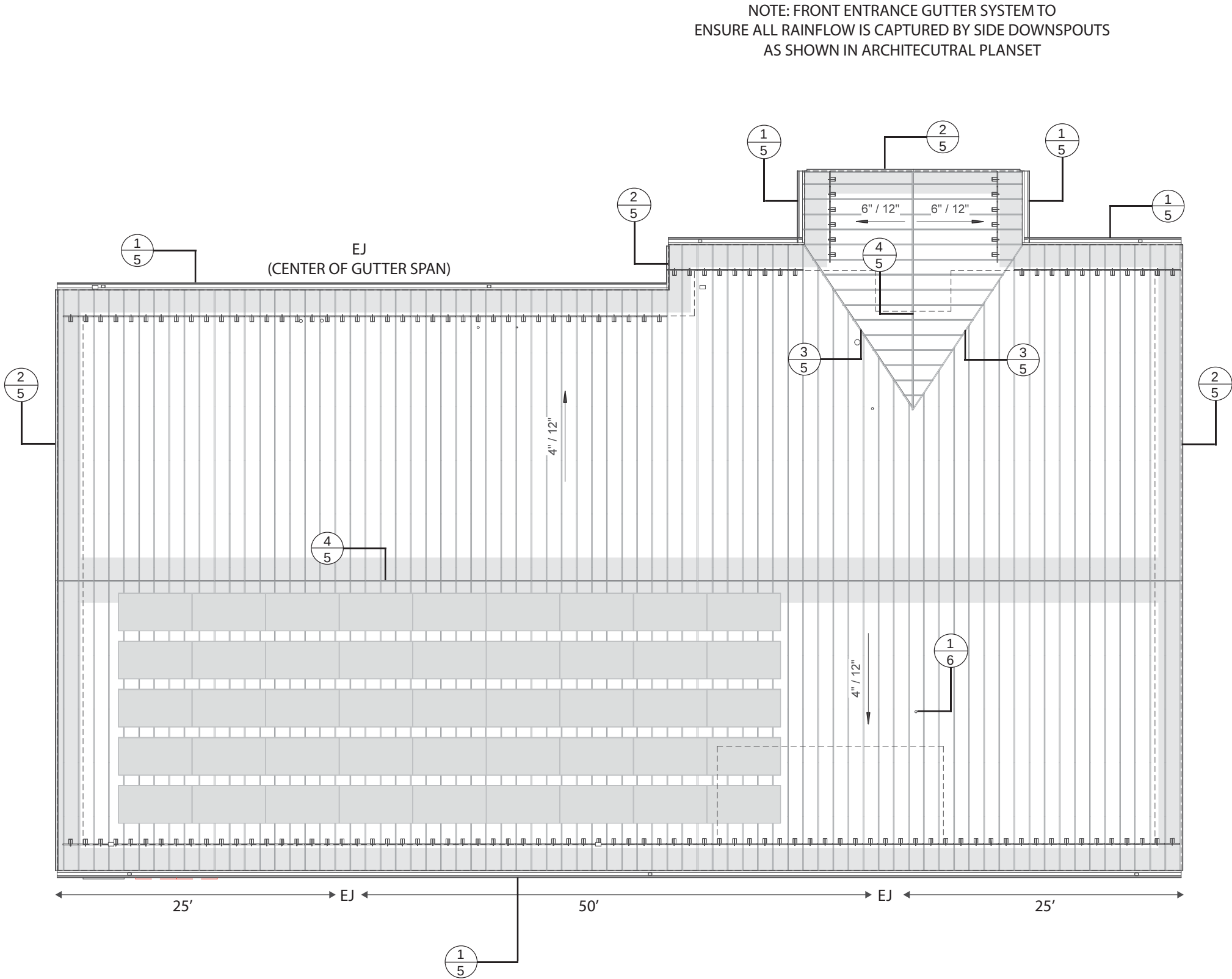
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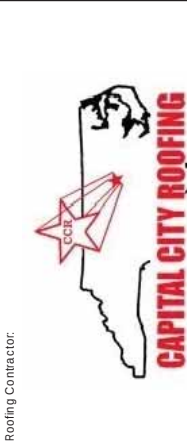
03
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Roof Plan



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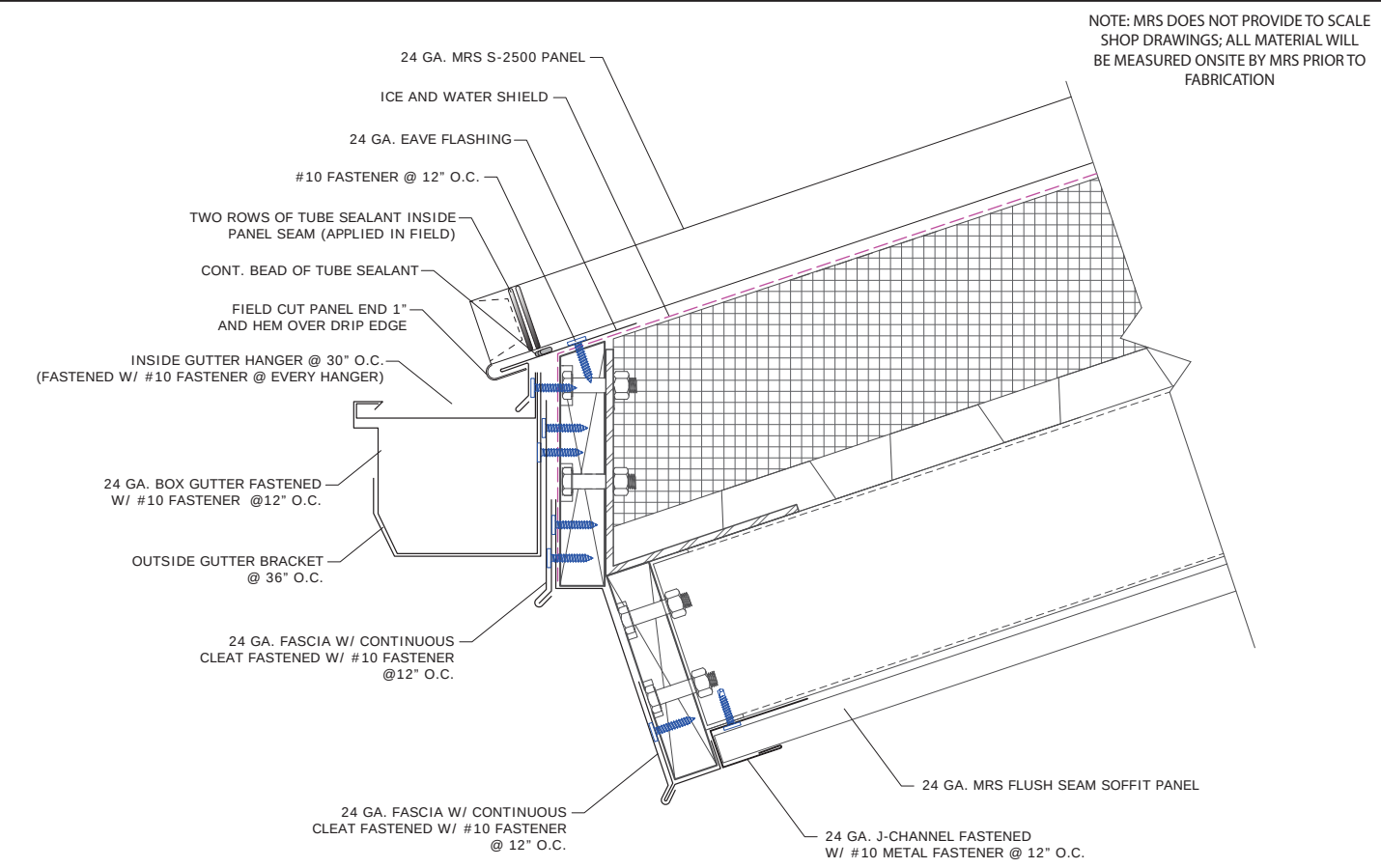


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Drawing Title: **ROOF PLAN**

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04
OF: 06

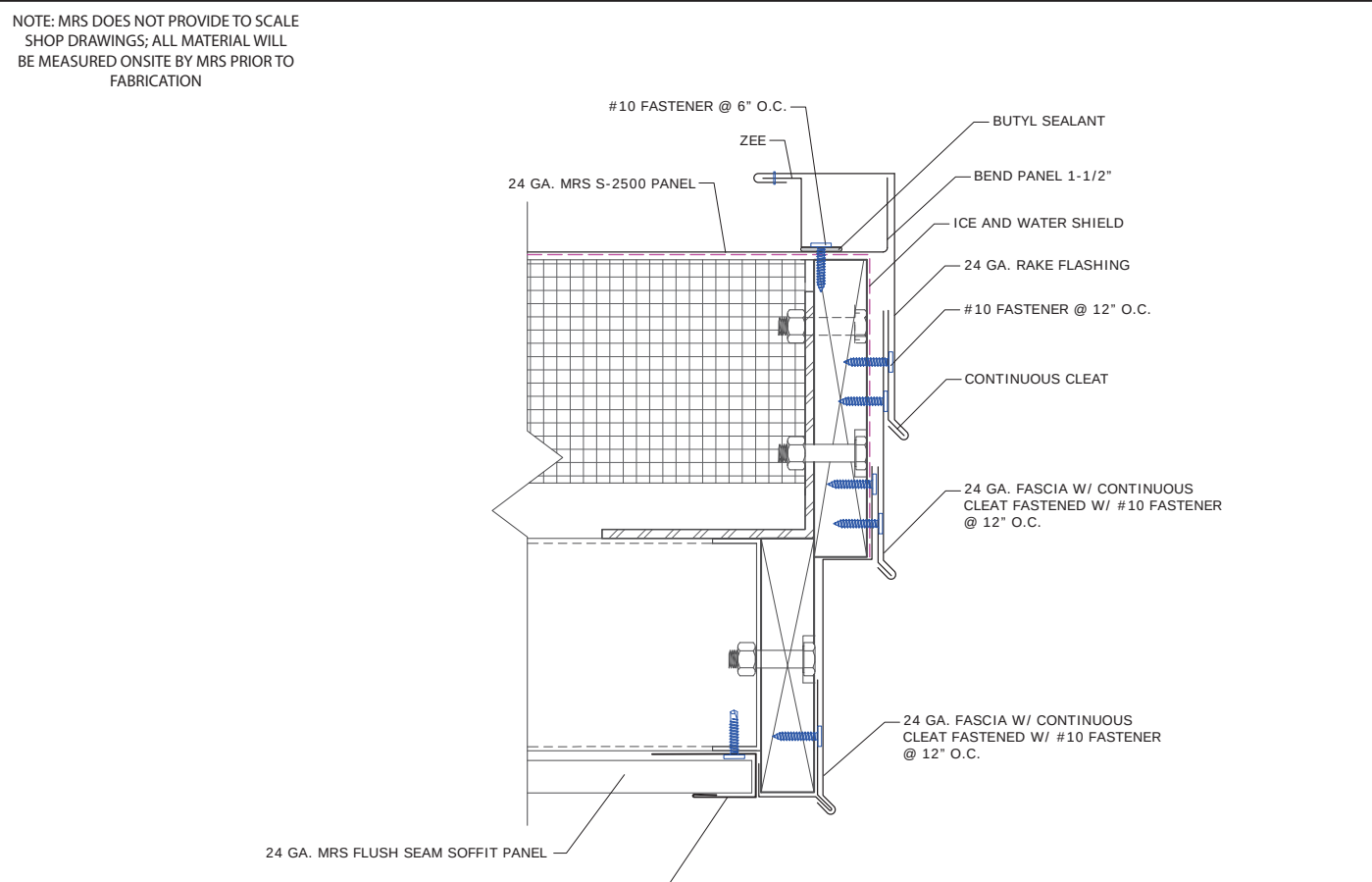


1 Eave w/ Gutter

NOTE: MRS DOES NOT PROVIDE TO SCALE SHOP DRAWINGS; ALL MATERIAL WILL BE MEASURED ONSITE BY MRS PRIOR TO FABRICATION

NOTE: MRS DETAILS ARE SHOWING THE PANELS BEING PINNED AT THE HIGH SIDE (RIDGE) AND FLOATING ON THE LOW SIDE (EAVE, VALLEY) THIS ALLOWS FOR THE PANELS TO FLOAT AT THE EAVE AND VALLEY

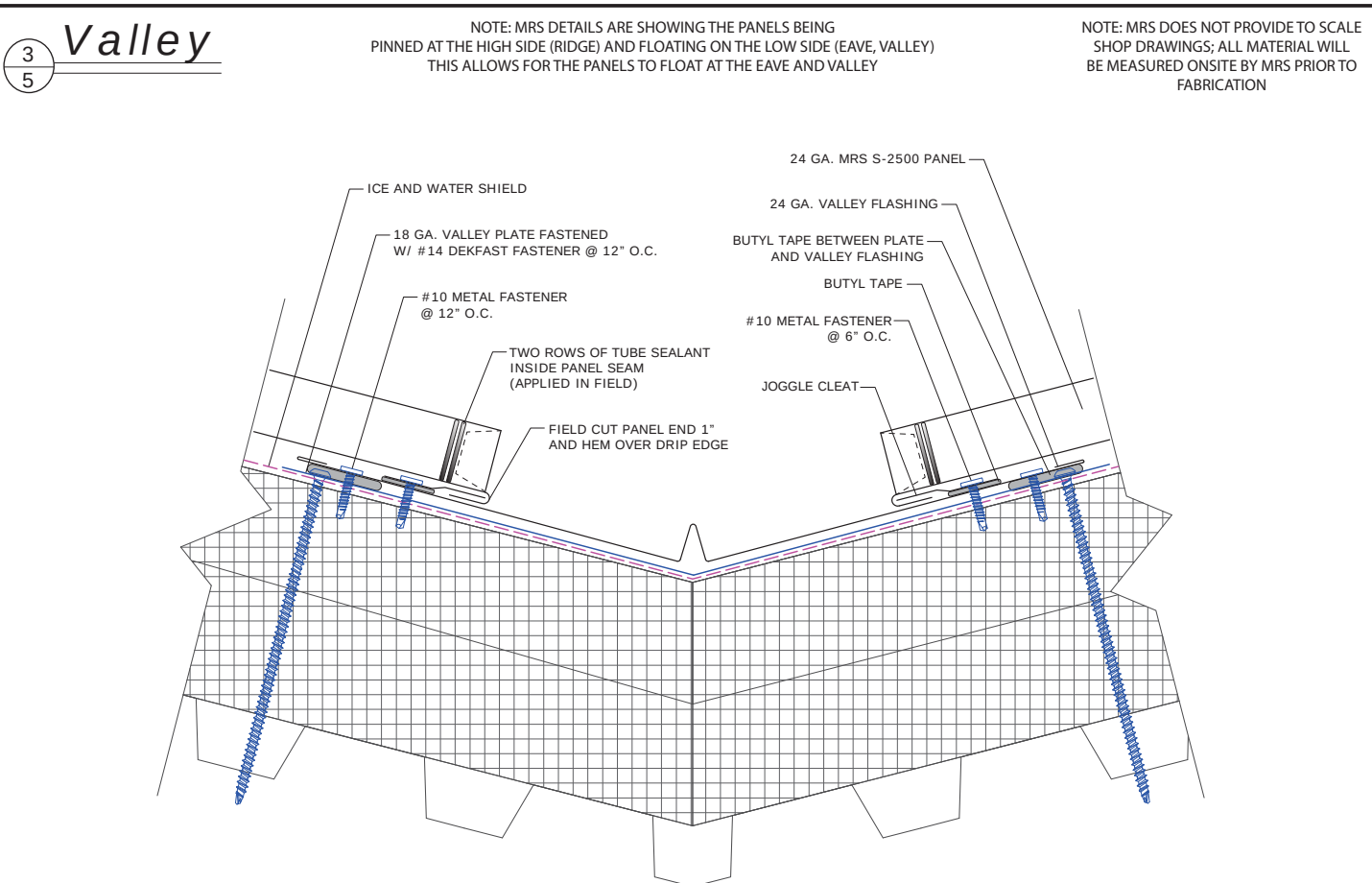
2 / A121



2 Rake

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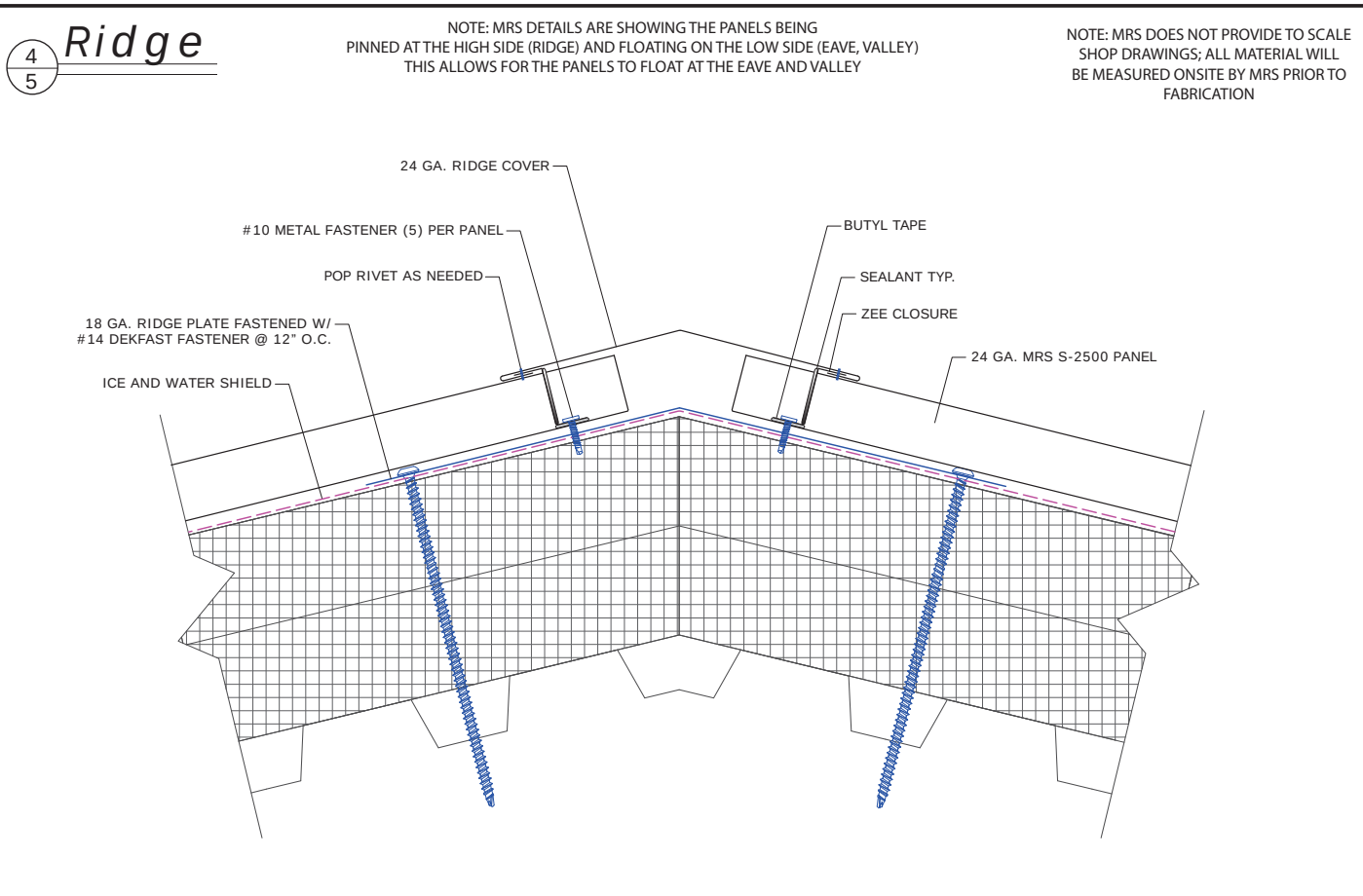


3 Valley

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4 / A121



4 Ridge

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4 / A121

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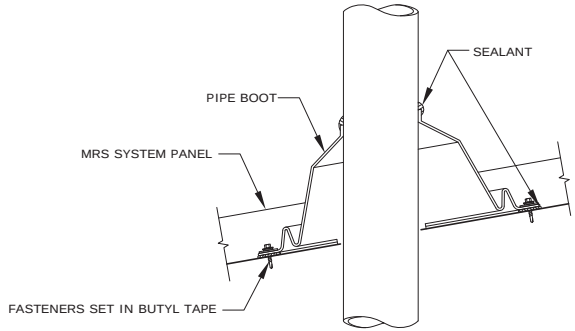
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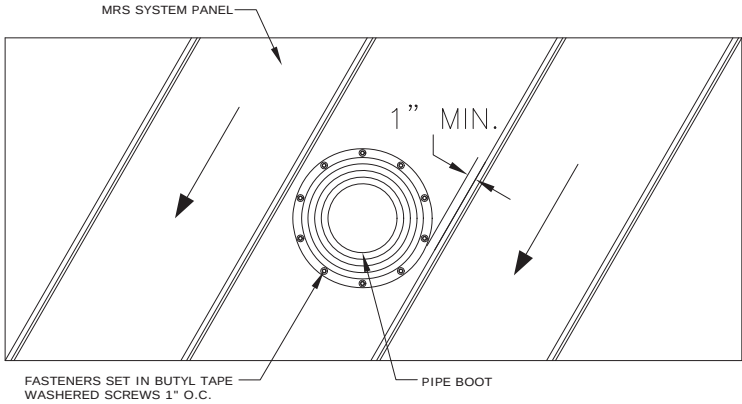
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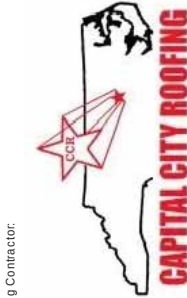
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1
6

Pipe/ PV Panel Penetration

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DETAILS 2

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06

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