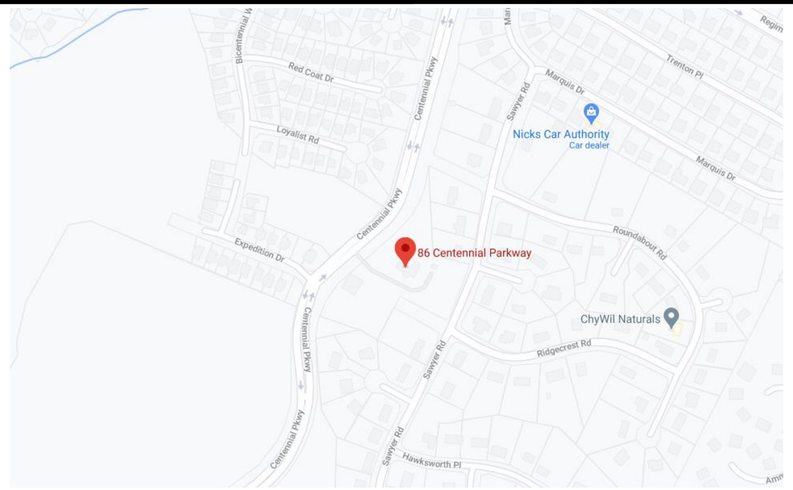
MAP VIEW



AERIAL VIEW

PLAN VIEW

TABLE OF CONTENT

CODE SUMMARY

BUILDING	ELECTRICAL	STATE	FIRE
2018 IBC	2017 NEC	NORTH CAROLINA	NFPA 2015 EDITION 1

PROJECT/PERMITTING NOTES

PROJECT: INSTALLATION OF GRID-TIED PHOTOVOLTAIC SYSTEM

SEAL:

REVISION/NOTES:

PROJECT: Dawkins, Andre
86 Centennial Parkway
Cameron, NC 283226
Cover Page

GOSOLAR POWER™
933 Clint Moore Road
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CVC56962

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DRAWN BY: B.G.
DATE: 09/16/2020
PAGE:

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SYSTEM DESCRIPTION:

- GRID-TIED PHOTOVOLTAIC SYSTEM
- (29) ENPHASE IQ 7A MICRO-INVERTER
- (29) JINKO 400W MODULE (JKM400M-72HL)

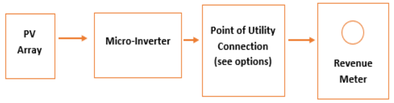
SYSTEM:

- (29) PHOTOVOLTAIC MODULES ARE CONNECTED INTO (29) MICRO-INVERTER
- (29) INVERTER CONNECT INTO (2) CIRCUIT OF (10 & 9) MODULES WHICH FEED (3) 2P-240V 20A CIRCUIT BREAKERS
- TOTAL PHOTOVOLTAIC SYSTEM STC RATED DC ENERGY POWER PRODUCTION OF 11,600 WATTS
- INVERTER HAS MAXIMUM POWER POINT TRACKING (MPPT)
- INVERTER MEETS REQUIREMENTS OF 3-P POWER
- INVERTER MEET IEEE 1547
- INVERTER MEETS U11741
- ALL ELECTRICAL EQUIPTMENT INSTALLED ARE UL LISTED

SYSTEM AUTOMATIC OPERATION:

- GRID POWER IS PRESENT, PHOTOVOLTAIC SYSTEM FEEDS THE LOAD AT DAY TIME.
- GRID POWER IS LOST, PHOTOVOLTAIC SYSTEM AUTOMATICALLY DISCONNECTS FROM THE GRID.
- PHOTOVOLTAIC SYSTEM WILL AUTOMATICALLY RESUME FEEDING POWER TO THE GRID. WHEN THE PROPER GRID VOLTAGE AND FREQUENCY IS RESTORED (IEEE STANDARDS) AND THERE IS ENOUGH SUNLIGHT.

ITEM	MANUFACTER	MODEL	LISTING/COMPLIANCE
PV/MODULES	JINKO	400W	UL
INVERTER	ENPHASE	IQ 7A	UL
ALL DISCONNECTS	ENPHASE	DC & AC	UL IEEE 1547
ALL OVERCURRENT PROTECTION	ENPHASE	DC & AC	UL
FSEC CERTICICATION #	JINKO ENPHASE	400W IQ 7A	RV-16-0106A



The NEC gives you the choice of four methods for ensuring electrical continuity at service equipment, service raceways, and service conductor enclosures [250.92(B]:

1. ***Bonding jumpers.*** **Bond metal parts to the service neutral conductor. This requires a main bonding jumper [250.24(B) and 250.28]. because the service neutral conductor provides the effective ground- fault current path to the power supply [250.24(C)], you don't have to install an equipment grounding conductor within PVC conduit containing service-entrance conductors [250.142(A)(1) and 352.60 Ex 2].**
2. ***Threaded fittings.*** **Terminate metal raceways to metal enclosures by threaded hubs on enclosures (if made wrench tight).**
3. ***Threadless fittings.*** **Terminate metal raceways to metal enclosures by threadless fittings (if made tight)**
4. ***Other listed devices.*** **These include bonding-type locknuts, bushings, wedges, or bushings with bonding jumpers.**

PV PEAK POWER	11.6 kWp
TOTAL NUMBER OF PV MODULES	29
NUMBER OF INVERTERS	29
MAX. DC POWER	400 W
MAX. AC POWER	7,656 W
GRID VOLTAGE	240 V
DC-AC RATIO	98%

PV-ARRAY	INPUT A/ PV-ARRAY 1
NUMBER OF INVERTER	29
NUMBER OF PV MODULES	29
PEAK POWER (INPUT)	400 Wp
MPP PV VOLTAGE	41.7 V
OC PV VOLTAGE	49.8 V
MIN. DC VOLTAGE (GRID VOLTAGE 240V)	22.0 V
MAX. PV VOLTAGE	55.136568 V
MAX. INPUT DC VOLTAGE (INVERTER)	349 V
MAX. CURRENT	10.48 A

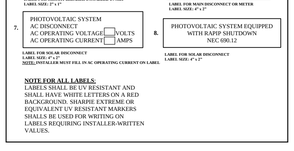
AMBIENT TEMPERATURE	
RECORD LOW TEMPERATURE	8.6 DEG F
AVERAGE HIGH TEMPERATURE	93.2 DEG F
RECORD HIGH TEMPERATURE	96.8 DEG F
SYSTEM OVERVIEW PART PROJECT 1	GRID VOLTAGE: 1 ~ 240 V
29 x JINKO 400 W	PV ARRAY 1
29 x -240 VAC (INVERTER EFFICIENCY 95%)	INVERTERS
MOUNTING TYPE	ROOF

PV/Inverter Compatible

- PV array and type of inverter are compatible. The nominal power ratio (max. DC power of the inverter divided by the peak power) is within the recommended range (80-120%)

Design temperature 96.8 deg F, adder 60 deg F (310.15(B)(2)(A)
Total 151 deg F. Multiplier at 151 deg F is 0.58(310.16 correction factors).
#10 THWN-2 rated 40 amps, times 0.58 = 23.2 amps. 6 conductors in single conduit.
Adjustment factor is 80%. (23.2) * (.8) = 18.56 amps

NOTES:
(29) MICRO-INVERTER TOTAL AMPS: 42.0A
TOTAL 2-P 240V 20A BREAKERS: 3
ELECTRICAL BREAKER RATING: 150A
ELECTRICAL PANEL RATING: 200A
MAX. CURRRENT OUTPUT (125%) : 52.56A
BUSBAR AMPACITY (120%): 240A



Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US	IQ7PLUS-72-2-US
Commonly used module pairings[1]	235 W - 350 W +	235 W - 440 W +
Module compatibility	60-cell PV modules only	60-cell and 72-cell PV modules
Maximum input DC voltage	48 V	60 V
Peak power tracking voltage	27 V - 37 V	27 V - 45 V
Operating range	16 V - 48 V	16 V - 60 V
Min/Max start voltage	22 V / 48 V	22 V / 60 V
Max DC short circuit current (module Isc)	15 A	15 A
Overvoltage class DC port	II	II
DC port backfeed current	0 A	0 A
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	

OUTPUT DATA (AC)	IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %

MECHANICAL DATA	
Ambient temperature range	-40°C to +65°C
Relative humidity range	4% to 100% (condensing)
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)
Weight	1.08 kg (2.38 lbs)
Cooling	Natural convection - No fans
Approved for wet locations	Yes
Pollution degree	PD3
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure
Environmental category / UV exposure rating	NEMA Type 6 / outdoor

FEATURES	
Communication	Power Line Communication (PLC)
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

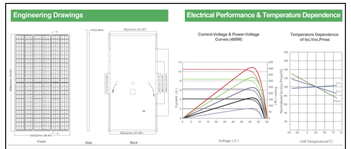
Enphase IQ Envoy

MODEL NUMBERS	
Enphase IQ Envoy™ ENV-IQ-AM1-240	Enphase IQ Envoy communications gateway with integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional consumption monitoring (+/- 2.5%). Includes one 200A continuous rated production CT
ACCESSORIES (order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G / 12-year data plan) CELLMODEM-01 (3G / 5-year data plan) CELLMODEM-M1 (4G based LTE-M / 5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring CT CT-200-SPLIT	Split-core current transformers enable whole home metering.
POWER REQUIREMENTS	
Power requirements	120/240 VAC split-phase. Max 20 A overcurrent protection required.
CAPACITY	
Number of microinverters polled	Up to 600
MECHANICAL DATA	
Dimensions (WxHxD)	21.3 x 12.6 x 4.5 cm (8.4" x 5" x 1.8")
Weight	17.6 oz (498 g)
Ambient temperature range	-40° to 65° C (-40° to 149° F) - -40° to 46° C (-40° to 115° F) if installed in an enclosure.
Environmental rating	IP30. For installation indoors or in an NRTL-certified, NEMA type 3R enclosure.
Altitude	To 2000 meters (6,560 feet)
Production CT	- Ia limited to 200A of continuous current / 250A OCPD – 72kW AC - Internal aperture measures 19.36mm to support 250MCM THWN conductors (max)
Consumption CT	- For electrical services to 250A with parallel runs up to 500A - Internal aperture measures 0.84" x 0.96" (21.33mm x 24.38mm) to support 3/0 THWN conductor - CT wire insulation rating of 600V
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	802.3, Cat5E (or Cat 6) UTP Ethernet cable, not included
Mobile	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G), not included
COMPLIANCE	
Compliance	UL 916 CAN/CSA C22.2 No. 61010-1 47 CFR, Part 15, Class B, ICES 003 IEC/EN 61010-1:2010, EN50065-1, EN61000-4-5, EN61000-6-1, EN61000-6-2 Metering: ANSI C12.20 accuracy class 0.5

LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE



Packaging Configuration

Two pallets = One stack
26pcs/pallet, 52pcs/stack, 572pcs/40'HQ Container

Mechanical Characteristics

Cell Type	Mono PERC Diamond Cell (158.75 x 158.75 mm)
No.of Half-cells	144 (6×24)
Dimensions	2008×1002×40mm (79.06×39.45×1.57 inch)
Weight	22.5 kg (49.6 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High-Transmission, Low-Iron Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	12 AWG, (+) 1400mm/55.12 in), (-) 1400mm/55.12 in or Customized Length
Fire Type	Type 1

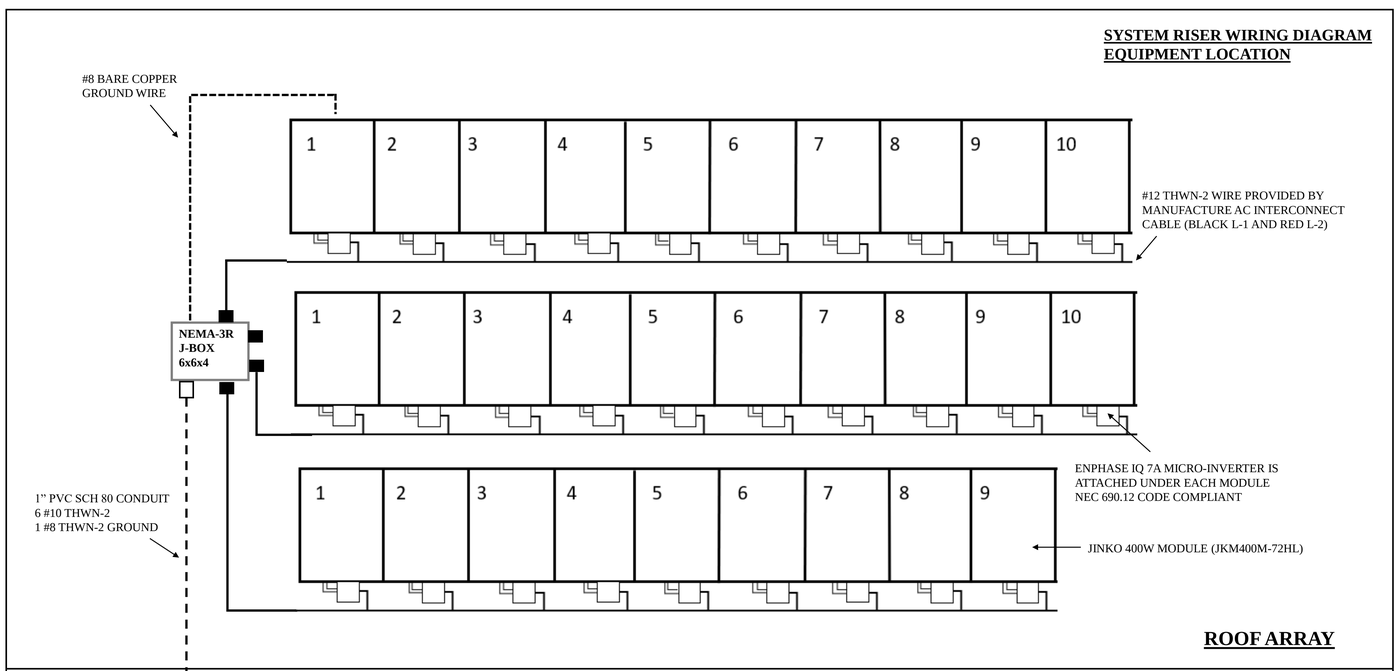
SPECIFICATIONS

Module Type	JKM360M-72HL-V		JKM365M-72HL-V		JKM400M-72HL-V		JKM405M-72HL-V		JKM410M-72HL-V	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	360Wp	264Wp	365Wp	268Wp	400Wp	307Wp	405Wp	311Wp	410Wp	315Wp
Maximum Power Voltage (Vmp)	41.1V	38.1V	41.4V	39.0V	41.7V	38.8V	42.0V	39.9V	42.3V	40.0V
Maximum Power Current (Imp)	8.49A	7.34A	8.55A	7.60A	9.80A	7.96A	9.66A	7.72A	9.69A	7.76A
Open-circuit Voltage (Voc)	49.3V	46.5V	49.5V	46.7V	49.8V	46.9V	50.1V	47.2V	50.4V	48.9V
Short-circuit Current (Isc)	10.12A	8.02A	10.23A	8.08A	10.36A	8.16A	10.48A	8.22A	10.60A	8.26A
Module Efficiency STC (%)	19.38%		19.67%		19.68%		20.13%		20.36%	
Operating Temperature (°C)	-40°C~+85°C									
Maximum System Voltage	1500VDC(UL)/1000VDC(IEC)									
Maximum Series Fuse Rating	20A									
Power Tolerance	0~+3%									
Temperature Coefficients of Pmax	-0.36%/°C									
Temperature Coefficients of Voc	-0.28%/°C									
Temperature Coefficients of Isc	0.048%/°C									
Nominal Operating Cell Temperature (NOCT)	45±2°C									

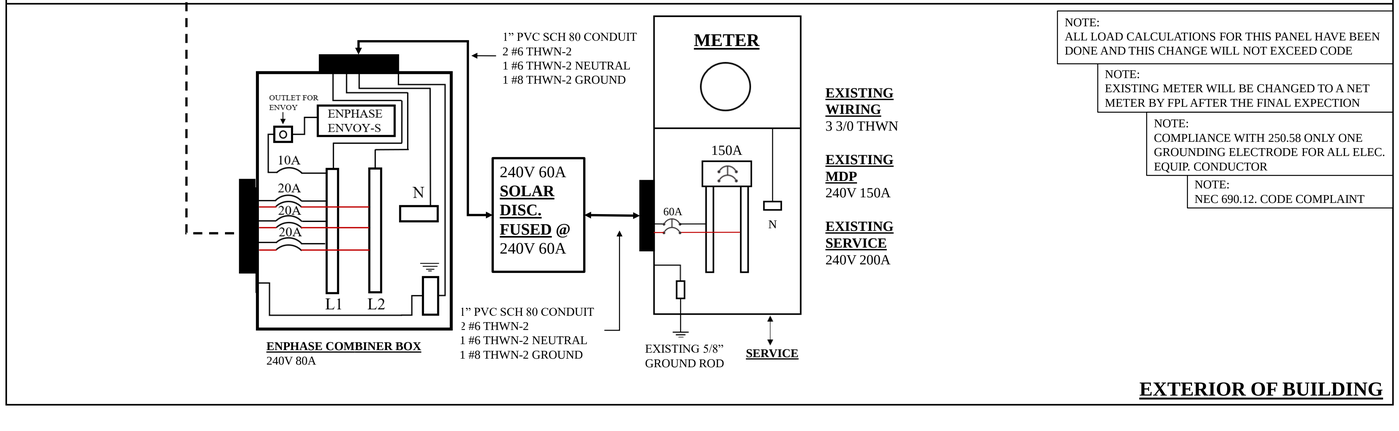
STC: Irradiance 1000W/m² | Cell Temperature 25°C | AM=1.5

NOCT: Irradiance 800W/m² | Ambient Temperature 20°C | AM=1.5 | Wind Speed 1m/s

* Power measurement tolerance: ± 3%



ROOF ARRAY



ENPHASE COMBINER BOX
240V 80A

EXTERIOR OF BUILDING

SYSTEM RISER WIRING DIAGRAM EQUIPMENT LOCATION

NOTE:
ALL LOAD CALCULATIONS FOR THIS PANEL HAVE BEEN DONE AND THIS CHANGE WILL NOT EXCEED CODE

NOTE:
EXISTING METER WILL BE CHANGED TO A NET METER BY FPL AFTER THE FINAL EXPECTION

NOTE:
COMPLIANCE WITH 250.58 ONLY ONE GROUNDING ELECTRODE FOR ALL ELEC. EQUIP. CONDUCTOR

NOTE:
NEC 690.12. CODE COMPLAINT

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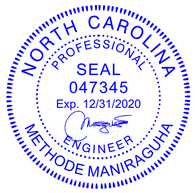

REVISION/NOTES:

PROJECT: Dawkins, Andre
86 Centennial Parkway
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Datasheet

XR Rails

XR10 Rail

A low-profile mounting rail for regions with light snow.
- 6' spanning capability
- Moderate load capability
- Clear & black anod. finish

XR100 Rail

The ultimate residential solar mounting rail.
- 8' spanning capability
- Heavy load capability
- Clear & black anod. finish

XR1000 Rail

A heavyweight mounting rail for commercial projects.
- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Internal Splices

All rails use internal splices for seamless connections.
- Self-tapping screws
- Varying versions for rails
- Grounding Straps offered

Attachments

FlashFoot

Anchor, flash, and mount with all-in-one attachments.
- Ships with all hardware
- IBC & IRC compliant
- Certified with XR Rails

Slotted L-Feet

Drop-in design for rapid rail attachment.
- High-friction serrated face
- Heavy-duty profile shape
- Clear & black anod. finish

Standoffs

Raise flush or tilted systems to various heights.
- Works with vent flashing
- Ships pre-assembled
- 4" and 7" Lengths

Tilt Legs

Tilt assembly to desired angle, up to 45 degrees.
- Attaches directly to rail
- Ships with all hardware
- Fixed and adjustable

Clamps & Grounding

End Clamps

Slide in clamps and secure modules at ends of rails.
- Mill finish & black anod.
- Sizes from 1.22" to 2.3"
- Optional Under Clamps

Grounding Mid Clamps

Attach and ground modules in the middle of the rail.
- Parallel bonding T-bolt
- Reusable up to 10 times
- Mill & black stainless

T-Bolt Grounding Lugs

Ground system using the rail's top slot.
- Easy top-slot mounting
- Eliminates pre-drilling
- Swivels in any direction

Accessories

Provide a finished and organized look for rails.
- Snap-in Wire Clips
- Perfected End Caps
- UV-protected polymer

Free Resources

Design Assistant
Go from rough layout to fully engineered system. For free.
Go to IronRidge.com/rm

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training

Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.
- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.
- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.
- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

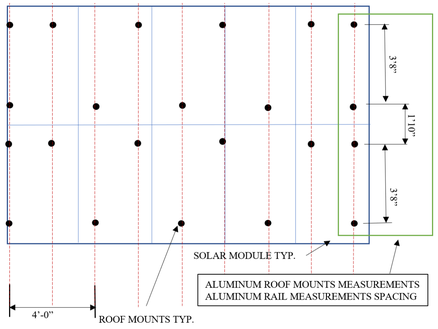
The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

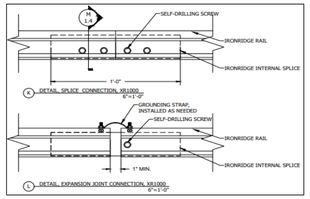
Allowable Spans

The following table was prepared by IronRidge to translate common site conditions into wind uplift pressures and span values (engineering assumptions below). Alternatively, the prescriptive roof pressures defined in RAS 127 tables 1 & 2 can be used.

Parameters				Approved Span (in)							
Roof Zone	Exposure Category	Wind Speed (MPH)	Uplift* (PSF)	16	24	32	36	48	60	64	72
1	B & C	150	-28	XR10					XR100		
		160	-32								
		170	-36								
		175	-39								
		180	-41								
	D	150	-34								
		160	-38								
		170	-43								
		175	-46								
		180	-48								
2	B	150	-20								
		160	-23								
		170	-26								
	C	150	-48								
		160	-54						N/A		
		170	-61								
		175	-65								
		180	-69								
	D	150	-57	XR100 (or XR10 3-Rail)							
		160	-64								
		170	-73								
		175	-77								
		180	-82								

*Uplift calculated by Florida P.E. Engineering Assumptions: Risk Category I, Roof Slope 2:12-12:12, Max Building Height 30', Module Size 19.5 Square Feet





ROOF AREA

EXISTING SHINGLE ROOF
TOTAL ROOF AREA: 3,574 sq.-ft
TOTAL PHOTOVOLTAIC AREA: 774 sq.-ft
PERIMETER WIDTH: 4.3'
PRESSURE ZONE: 1 & 2
MEAN ROOF HEIGHT: 14'
ROOF SLOPE: 12:12
TRUSS SIZE: 2 x 4
TOTAL MODULES: 29
MIN. ROOF MOUNTS: 66
TOTAL POINT OF CONNECTIONS PER MODULE: 4
ALUMINUM RAILS: 2

SM SOLAR MOUNT

CODE COMPLIANCE NOTES

INSTALLATION GUIDE | C PAGE

SYSTEM LEVEL FIRE CLASSIFICATION

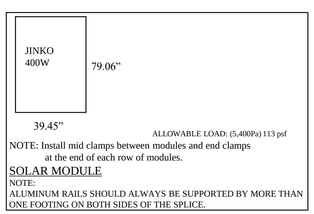
The system fire class rating requires installation in the manner specified in the SOLARMOUNT Installation Guide. SOLARMOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. SOLARMOUNT has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the SOLARMOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes > 2 inches per foot, or 9.5 degrees). The system is to be mounted over fire resistant roof covering rated for the application. There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLARMOUNT. Module Types & System Level Fire Ratings are listed below:

Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required
Standard Rail	Type 1, Type 2, Type 3 & Type 10	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Light Rail	Type 1 & Type 2	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required

This racking system may be used to ground and/or mount a PV module complying with UL1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

UL2703 CERTIFICATION MARKING LABEL

Unirac SOLARMOUNT is listed to UL 2703. Certification marking is embossed on all mid clamps as shown. Labels with additional information will be provided . After the racking system is fully assembled, a single label should be applied to the SOLARMOUNT rail at the edge of the array. Note: The sticker label should be placed such that it is visible, but not outward facing.



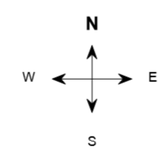
NOTE: Install mid clamps between modules and end clamps at the end of each row of modules.

SOLAR MODULE

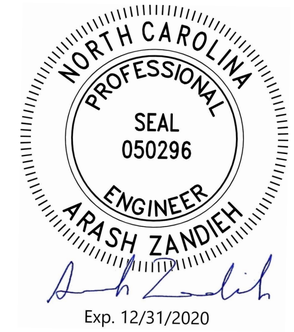
NOTE:
ALUMINUM RAILS SHOULD ALWAYS BE SUPPORTED BY MORE THAN ONE FOOTING ON BOTH SIDES OF THE SPLICE.

BONDING MIDCLAMP ASSEMBLY

1. Stainless steel Midclamp points, 2 per module, pierce module frame anodization to bond module to module through clamp.
2. Serrated flange nut bonds stainless steel clamp to stainless steel T-bolt
3. Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, clamp, and modules to grounded SM rail.



SEAL:



REVISION/NOTES:

PROJECT: Dawkins, Andre
86 Centennial Parkway
Cameron, NC 283226
Structural Diagram

GSOLAR POWER™
933 Clint Moore Road
Boca Raton, FL 33487
(800) 530-9597
CVC56962

SCALE: NTS
DRAWN BY: B.G.
DATE: 09/16/2020
PAGE:

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DESIGN WIND PRESSURE CALCULATIONS FOR SOLAR MODULES INSTALLED ON ROOFS

IBC EDITION	2018	**RISK CATEGORY**	II
MEAN ROOF HEIGHT (ft.)	14	**EXPOSURE CATEGORY**	C
LENGTH (ft.)	57	**ROOF SLOPE (SHINGLE)**	12:12
WIDTH (ft.)	49	**ROOF SLOPE (DEGREE)**	45.0°
EFFECTIVE WIND AREA (ft^2)	18.0	**ROOF TYPE**	GABLE
PARAPET HEIGHT (ft.)	0	**ULTIMATE WIND SPEED**	175 mph
MODULE LENGTH (in)	65	**NOMINAL WIND SPEED**	136 mph
MODULE WIDTH (in)	39.38	**KD**	0.85
		KZT	1.0
		KZ	0.85

DESIGN CALCULATIONS:
VELOCITY PRESSURE (q) = 0.00256(KZ)(KZT)(KD)(V^2)
VELOCITY PRESSURE (qh) = 33.9 psf EQUATION 26.8-1
INTERNAL PRESSURE COEFFICIENT (+/-) = 0.18

DESIGN PRESSURE EQUATION 30.9-1	DIRECTION – UP PSF	DIRECTION – DOWN PSF
ZONE 1	-39.2	35.8
ZONE 2	-60.0	35.8
ZONE 3	-81.0	35.8

GCp: FIGURE 30.4-2 B	DIRECTION – UP	DIRECTION - DOWN
ZONE 1	-1.0	0.9
ZONE 2	-1.6	0.9
ZONE 3	-2.2	0.9

ASCE 7-16 VELOCITY PRESSURE
qz10 = 0.00256 KZ KD V2
where:
qz10 = ASCE 7-16 velocity pressure evaluated at mean roof height (psf)
Kz = velocity pressure exposure coefficient
KZT = topographic factor
KD = wind directionality factor
V = basic wind speed (mph) from ASCE 7-16 maps referred to as ultimate wind speed maps in 2018 IBC.

As an example, for an array having an array of 158.04 sq.-ft., the total uplifting (resultant) force acting on the array would be -39.1 psf x 158.04 sq.-ft. = -6.179.364 lb. Knowing this resultant force, the design engineer can now determine the number of attached points and the size of the mounting hardware necessary to safely carry this load.

LIVE LOADS:
Live loads associated with photovoltaic systems are usually assumed to be distributed uniformly and are small, on the order of 4 psf or less.

NOTES:
These calculations are based on the C&C Wind Loads for Enclosed Buildings. Design wind pressures are calculated using ASCE 7-10 equation in 30.6-1. All notes in Figures 30.4-1, and 30.4-2 (A, B, AND C) have been incorporated. Mean roof height must be less than 60 feet.

Lag Screw Installation Guidelines

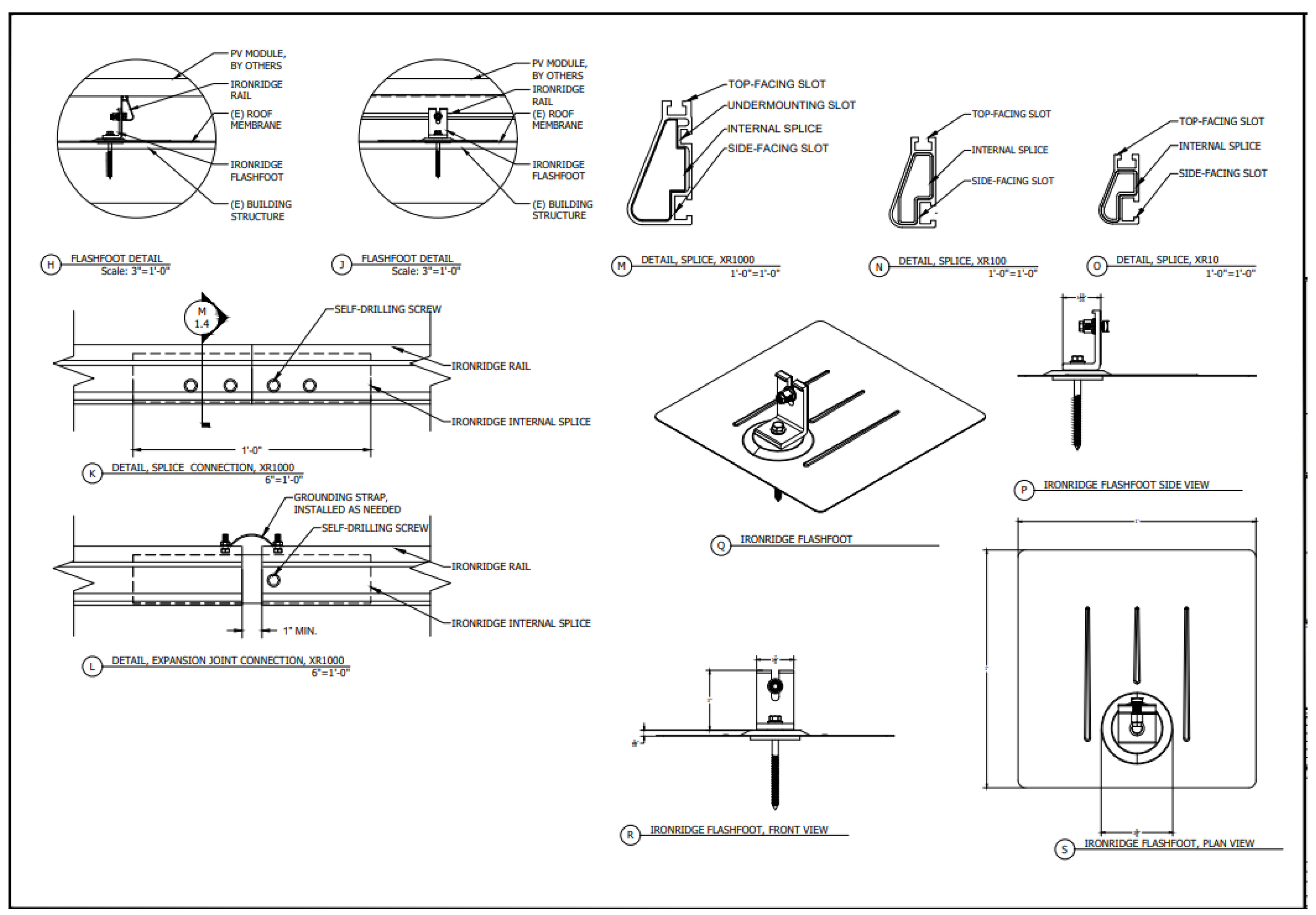
1. Determine location for the L-Bracket on roof by drilling through the center of truss from bottom with 5/32" drill bit.
2. Mark mounting holes for L-Bracket on underlayment. Mounting holes should be centered on the trusses.
3. Drill 15/64" pilot hole.
4. Apply sealant to bottom of L-Bracket.
5. Place L-Bracket over roof underlayment with holes in roof.
6. apply sealant to bottom of L-Bracket, apply sealant to lag screws, and fasten L-Bracket securely to trusses.
7. Apply additional sealant to top assembly to be sure all penetrations are sealed.

	STAINLESS STEEL Lag screw speci?cations: Speci?c gravity	5/16? shaft, * per inch thread depth
Douglas Fir, Larch	0.50	266
Douglas Fir, South	0.46	235
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	0.46	235
Hem, Fir, Redwood (close grain)	0.43	212
Hem, Fir (North)	0.46	235
Southern Pine	0.55	307
Spruce, Pine, Fir	0.42	205
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	0.50	266

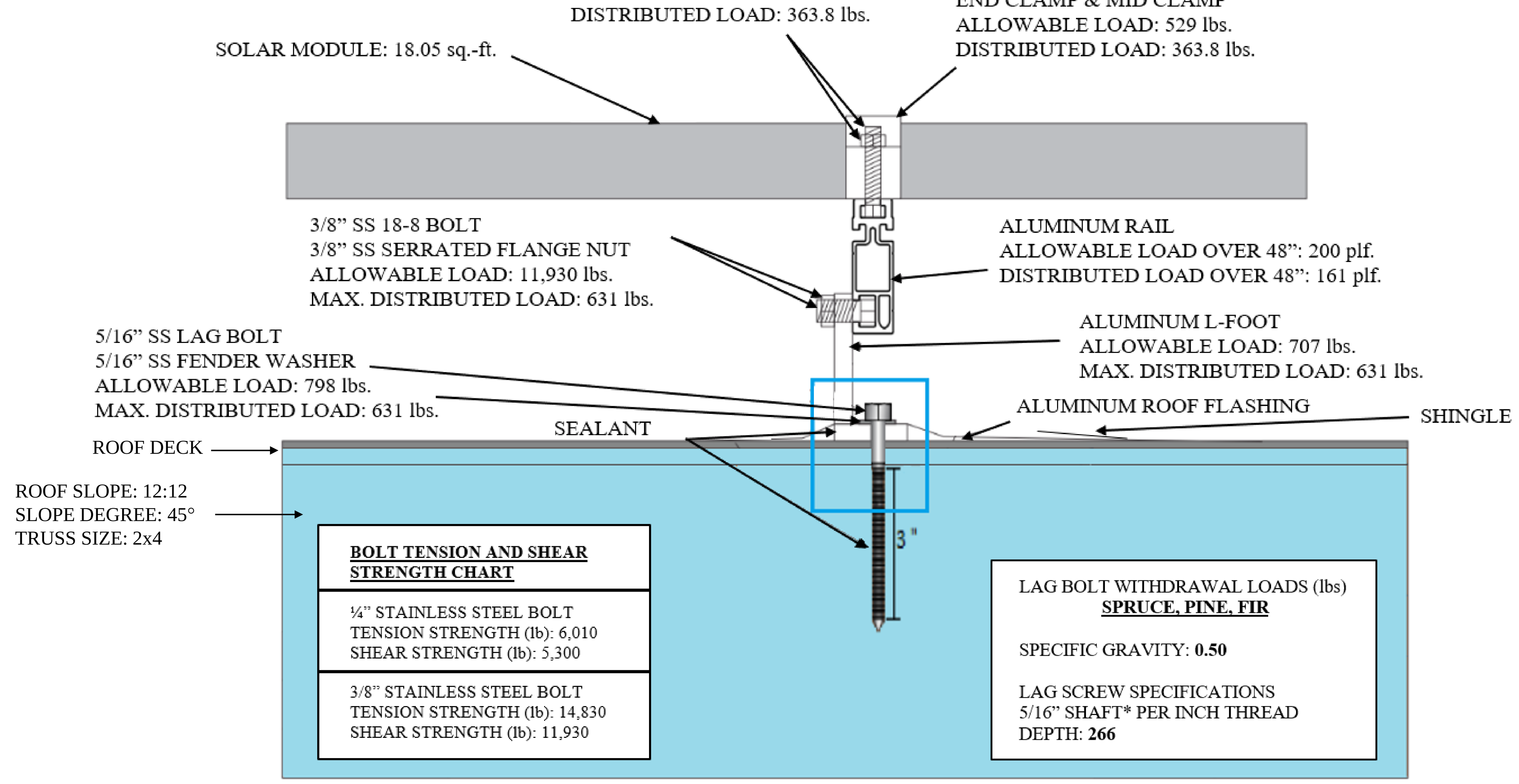
Thread depth

Sources: American Wood Council, NDS 2005, Table 11.2A, 11.3.2A.

Notes: (1) Thread must be embedded in the side grain of a Trusses or other structural member integral with the building structure.
(2) Lag bolts must be located in the middle third of the structural member.
(3) These values are not valid for wet service.
(4) This table does not include shear capacities. If necessary, contact a local engineer to specifiy lag bolt size with regard to shear forces.
(5) Install lag bolts with head and washer flush to surface (no gap). Do not over-torque.
(6) Withdrawal design values for lag screw connections shall be multiplied by applicable adjustment factors if necessary. See Table 10.3.1 in the American Wood Council NDS for Wood Construction.



ATTACHMENT DETAIL
2 RAILS PER MODULE



***Rails, L-Foot, Mid-clamps & End-clamps are extruded using one of the following aluminum alloys: 6005-T5, 6105-T5, 6061-T6 Sources: American Wood Council, NDS 2005, Table 11.2A, 11.3.2A**

Array Wind Load Calculations		Lag Bolt Pull Out Calculations		
Solar Panel	11	Spruce, Pine	Per Inch Thread Depth	266 lbs.
Total Area (sq.ft.)	198.55	SS Lag Bolt 5/16" x 4"	Min. Thread Depth	3"
Wind Load (psf.)	-60.0	Wood Strength x Thread Depth = Pull Out Strength		
Total Wind Loads (lbs.)	-11,913.0	266 lbs. x 3" = 789 lbs.		
Total Roof Mounts (#)	22	Allowable Pull Out Strength Required per Lag Bolt	798 lbs.	
Tension Force per Mount (lbs.)	-531.5725	Max. Pull Out Strength Required per Lag Bolt	-531.6 lbs.	
Tension force per LAG-BOLT (lbs.)	-531.6	Lag Bolt Pull Out Strength Safety Factor	1.5	

CHEM LINK POLYMER INNOVATION

DuraLink 50
Super Adhesion Sealant

Technical Data Sheet	Polyether Technology	CSI Section No. 07 92 13

CHEM LINK
Construction & Maintenance
Telephone: 800-826-1681
Fax: 269-679-4448
353 E. Lyons Street
Schoolcraft, MI 49087
www.chemlink.com

Last Revision: 10/21/19
Document No. DS1260

Product Description
DuraLink 50 is an extremely elastic moisture curing sealant designed for use in cementitious siding, metal architecture, curtain wall construction and joints subject to movement. **DuraLink 50's** adhesion to difficult surfaces permits its use on anodized metal and coatings such as Kynar 500® PVDF. **DuraLink 50** will not stain absorbent stone substrates like limestone or marble. **DuraLink 50's** unique polyether chemistry eliminates out-gassing on green concrete and protects against "sun tanning" or discoloration when exposed to ultraviolet light.

Applicable Performance Standards
- ASTM C920, Type S, Grade NS, Class 50, Uses NT, T_2, M, G, A & O
- Federal Specification TT-S-00230-C Type II, Class A
- Corps of Engineers CRD-C-541, Type II, Class A
- Canadian Standards Board CAN 19, 13-M82
- SWR Institute Validated (Sealant Waterproofing and Restoration)

Regulatory Compliance
- Conforms to OTC Rule for Sealants
- Meets requirements of California Regs: CARB, BAAQMD and SCAQMD
- This product does not contain cancer causing chemicals listed in California Proposition 65
- Conforms to USDA Requirements for Non-food Contact

Green Standards:
- LEED 2.2 for New Construction and Major Renovations: Low Emitting Materials (Section 4.1) 1 Point
- NAHB Model Green Home Building Guidelines: 5 Global Impact Points
- VOC Content: less than 22 grams / liter ASTM D2369 EPA Method 24 (tested at 240°F / 115°C)

Advantages
- Bonds to Kynar 500® PVDF coated metal
- Solvent free, 100% solids will not shrink
- Non-slump, applies vertically and overhead
- 40 minute skin over
- No outgassing on damp surfaces
- Available is a wide range of roofing & siding colors
- Color stability, will not suntan
- Paintable within 24 hours (See limitations)
- +/- 50% joint movement

Colors
Please refer to applied color board or chemlink.com for a full list of roofing and siding colors.
Special colors are available upon request.

Packaging
- **10.1 oz (300 ml) Euro / 4inch nozzle**
  12 cartridges/carton, 105 cartons/pallet
  24 cartridges/carton, 45 cartons/pallet
- **20 oz (600 ml)**
  12 sausages/carton, 40 cartons/pallet
- **2 and 5 gallon pails or 50 gallon drums**
  available by special order

American Architectural Manufacturers Association
NATIONAL ROOFING CONTRACTORS ASSOCIATION MEMBER
ISO 9001:2015

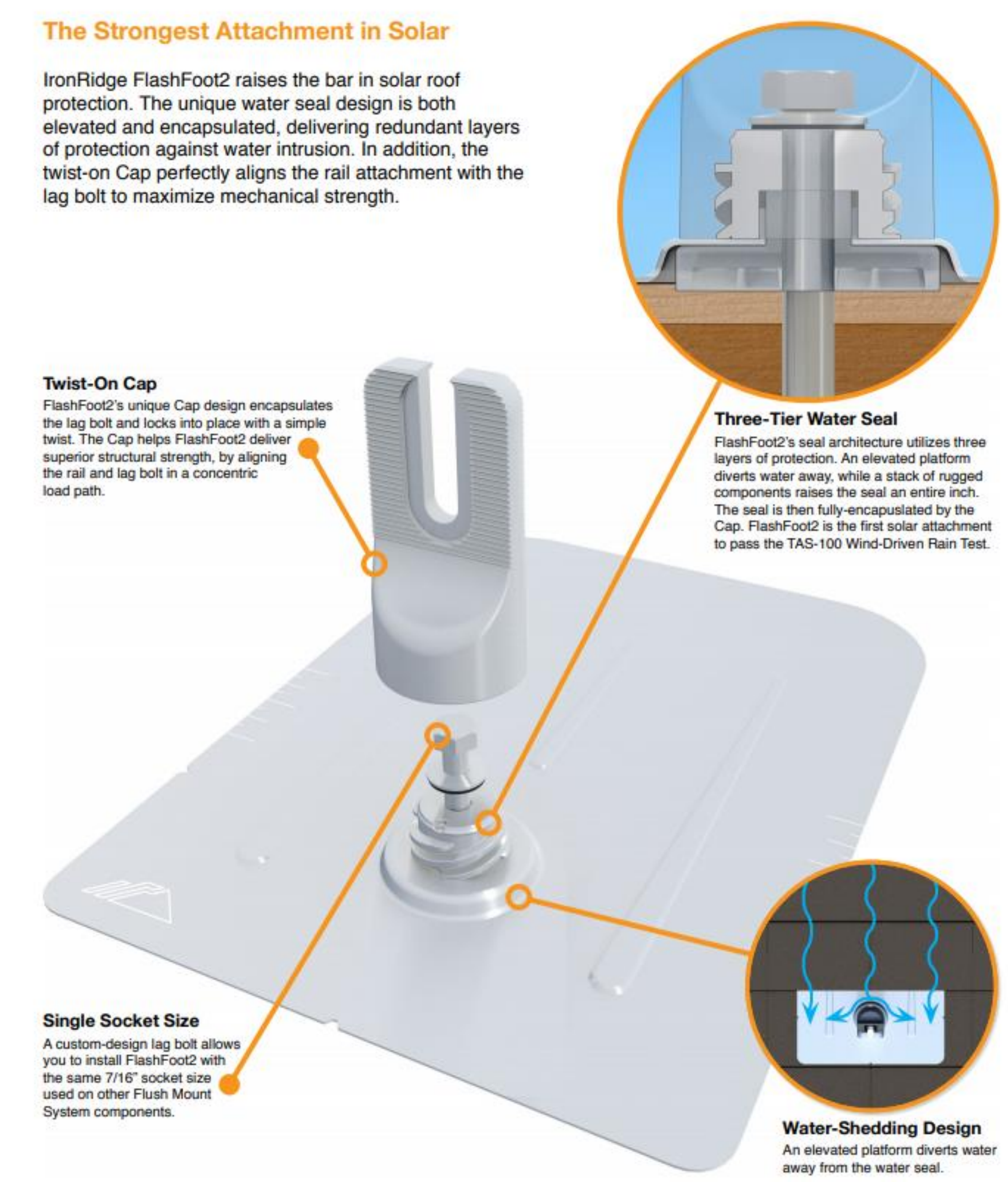
Tech Brief

IRONRIDGE

FlashFoot2

The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.



Twist-On Cap
FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.

Three-Tier Water Seal
FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapuslated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.

Single Socket Size
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.

Water-Shedding Design
An elevated platform diverts water away from the water seal.

SEAL:

REVISION/NOTES:

PROJECT: Dawkins, Andre
86 Centennial Parkway
Cameron, NC 283226
Structural Calculations

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