



CRAIG FRITHSEN  
ENGINEERING

PROFESSIONAL ENGINEERING & DRAFTING SERVICES

PO BOX 772759 | STEAMBOAT SPRINGS, CO 80477

PHONE 970-846-7980 | craigfrithsen@gmail.com

**REVIEWED  
FOR  
CODE  
COMPLIANCE**

**10/07/2022**

September 21, 2022

Brightside Solar, Inc.  
PO Box 773115  
Steamboat Springs, CO 80477

Reference: Vista Verde Lodge, 58000 Cowboy Way, Clark, CO

Subject: Structural Review of Proposed Solar Array

Dear Mr. Piva,

Please note that I have reviewed your proposal to place a 108 panel solar array on the east and west facing sides of the 5:12 pitched roof at the Vista Verde Lodge. The lodge roof structure consists of 12x16 timber trusses spaced at 10' on center with 8x12 timber purlins spaced at 4' on center, 2x6 tongue and groove decking, and 11 1/4" core thickness SIPs. The roof structure changes to manufactured trusses spaced at 16" on center for the northernmost 8' of the roof. The roof system appears to be performing well with no visible signs of distress or failure. The appropriate ground snow load for this site is 136 psf which corresponds to a 95 psf roof snow load. The roof structure is adequate to support the additional 2.9 psf the proposed solar arrays will add to the roofs. Note that the west facing array will be located above a lower gable roof, and has the potential to shed snow onto this roof and add additional snow load. CFE recommends this condition be monitored and addressed via snow removal as required to prevent potential overloading of this roof.

The proposed array consists of two subarrays with 72 panels on the west side and 36 panels on the east side of the roof. Each sub array has four rows of panels, and each row will be supported by three IronRidge XR1000 rails which will be connected to the roof with Sunmodo Nano-mount brackets spaced at 4'-0" on center. The brackets will be staggered 24" from rail to rail to maintain the current loading pattern. IronRidge documentation factored for the 136 psf ground snow load indicates the XR1000 rails are able to support the snow load and span up to 4'-5" between supports using a two rail system, and the proposed system will use a three rail system. A 115 mph wind speed is appropriate for this site. The IronRidge analysis adjusted for the 136 psf gsl and the three rail system give maximum reactions of 242 lbs uplift and 190 lbs lateral at each connector. Each Nano-mount connector has an allowable uplift capacity of 250 lbs and an allowable lateral capacity of 190 lbs with a factor of safety of 2.

In summary the roof structure is sufficient to support the new solar array. Also the proposed solar array is adequately sized to support the appropriate snow load, and adequately connected to resist the appropriate wind forces. Thank you for your attention to these items and if you have any additional questions or concerns please do not hesitate to contact me.

Sincerely,

Craig Frithsen, PE





CRAIG FRITHSEN  
ENGINEERING

PROFESSIONAL ENGINEERING & DRAFTING SERVICES

PO BOX 772759 | STEAMBOAT SPRINGS, CO 80477  
PHONE 970-846-7980 | craigfrithsen@gmail.com

**REVIEWED  
FOR  
CODE  
COMPLIANCE**  
10/07/2022

September 21, 2022

Brightside Solar, Inc.  
PO Box 773115  
Steamboat Springs, CO 80477

Reference: Vista Verde Arena, 58000 Cowboy Way, Clark, CO

Subject: Structural Review of Proposed Solar Array

Dear Mr. Piva,

Please note that I have reviewed your proposal to place a 119 panel solar array on the south facing side of the 4:12 pitched roof of the Vista Verde Arena. The arena is a typical manufactured steel building with arched steel superstructure members spaced at 20' on center and 4"x10" 12 gauge Z girt purlins spanning between the superstructure members. The Z girts are spaced at 3' on center and the standing seam metal roof is directly applied to the Z girts. The roof system appears to be performing well with no visible signs of distress or failure. The appropriate ground snow load for this site is 136 psf which corresponds to a 95 psf roof snow load. My analysis of the Z girts indicates they are capable of supporting the full snow load, and at least a 10 psf dead load. The roof structure is adequate to support the additional 2.8 psf the proposed solar arrays will add to the roof.

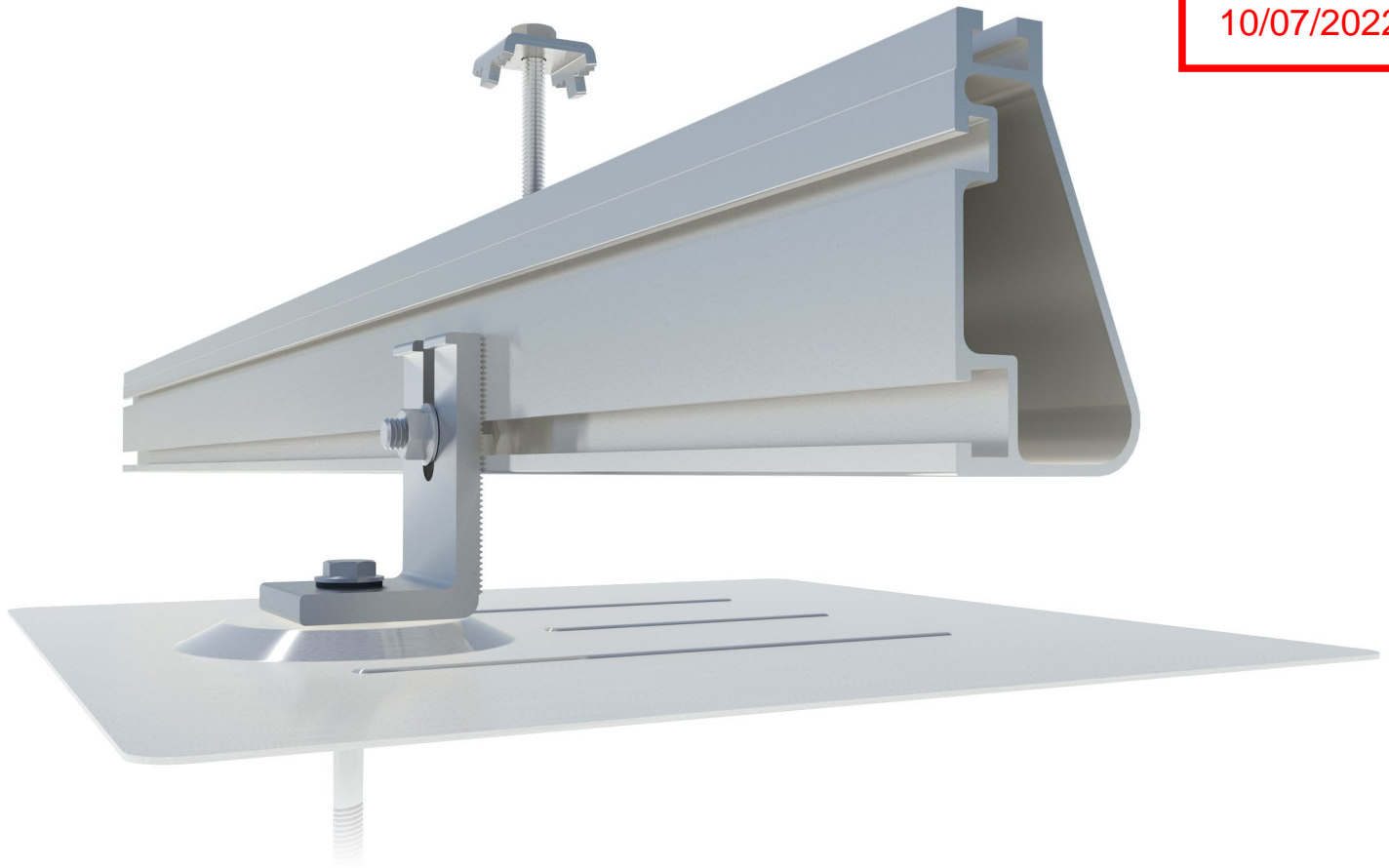
The proposed 119 panel array consists of seven rows of 17 panels in portrait orientation. Each row of panels will be supported by three IronRidge XR1000 rails which will be located over every Z girt (3' on center) with additional rails added to the layout to provide 3 rails for each row of panels. The rails will be connected to the roof with S-5-V Solar Clamps spaced at 4'-0" on center. The clamps will be staggered 24" from rail to rail to maintain the current loading pattern. IronRidge documentation factored for the 136 psf ground snow load indicates the XR1000 rails are able to support the snow load and span up to 4'-4" between supports using a two rail system, and the proposed system will use a three rail system. A 115 mph wind speed is appropriate for this site. The IronRidge analysis adjusted for the 136 psf gsl and the three rail system give maximum reactions of 242 lbs uplift and 170 lbs lateral at each connector. Each S-5-V Solar clamp has an allowable uplift capacity of 819 lbs and an allowable lateral capacity of 1091 lbs with a factor of safety of 2.

In summary the roof structure is sufficient to support the new solar array. Also the proposed solar array is adequately sized to support the appropriate snow load, and adequately connected to resist the appropriate wind forces. Thank you for your attention to these items and if you have any additional questions or concerns please do not hesitate to contact me.

Sincerely,

Craig Frithsen, PE





### Built for solar's toughest roofs.

IronRidge builds the strongest roof mounting system in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 20-year warranty.



#### Strength Tested

All components evaluated for superior structural performance.



#### PE Certified

Pre-stamped engineering letters available in most states.



#### Class A Fire Rating

Certified to maintain the fire resistance rating of the existing roof.



#### Design Software

Online tool generates a complete bill of materials in minutes.



#### Integrated Grounding

UL 2703 system eliminates separate module grounding components.



#### 20 Year Warranty

Twice the protection offered by competitors.

**REVIEWED  
FOR  
CODE  
COMPLIANCE**  
10/07/2022

## XR Rails

### XR10 Rail



A low-profile mounting rail for regions with light snow.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish

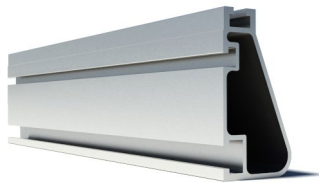
### XR100 Rail



The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear & black anod. finish

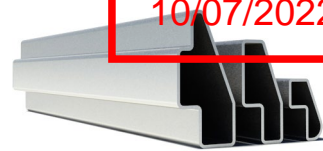
### XR1000 Rail



A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

### Internal Splices

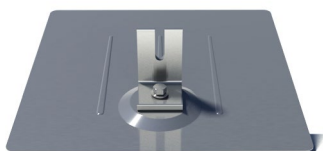


All rails use internal splices for seamless connections.

- 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

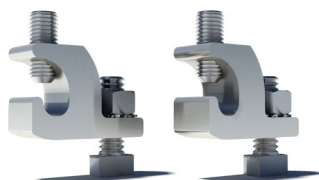
### Grounding Mid Clamps



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

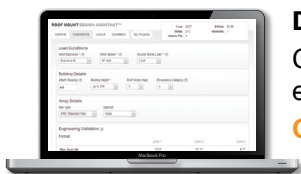
### Accessories



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](http://Go to IronRidge.com/rm)



### NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems.

[Go to IronRidge.com/training](http://Go to IronRidge.com/training)





REVIEWED  
FOR  
CODE  
COMPLIANCE  
10/07/2022

# SOLAR'S FASTEST ATTACHMENT

NanoMount®

Rafter or Deck Mount



Damaging roof shingles used to be one of a solar installers' worst challenges.

Now, the easy, affordable solution is NanoMount®, SunModo's patented solar mounting innovation.

The mount eliminates the need for lifting shingles and dramatically reduces the installation time.

## The NanoMount® Advantage

- ✓ The fastest roof attachment in solar.
- ✓ Versatile mounting options including direct-to-decking.
- ✓ Eliminates the need to lift shingles and prevents damage to shingles.
- ✓ High-Velocity Hurricane Zone Approved - Passed TAS 100 (a) Wind-Driven Rain Test.
- ✓ All materials are compatible with asphalt shingles and single-ply roof membranes.

Key Features of NanoMount®

SUNMODO

REVIEWED  
FOR  
CODE  
COMPLIANCE  
10/07/2022

5 levels of protection against water penetration



Technical Data

Application	Residential roof coverings, commercial single-ply roof membranes
Material	High grade aluminum, 304 stainless steel hardware
Finish	Black powder coating
Roof Attachment	Rafter and decking
Structural integrity	IBC and IRC Compliant
Warranty	25 years



**The right way to attach almost anything to metal roofs!**

# S-5!®

## The Right Way!®

### S-5-V Clamp

The S-5-V clamp is a versatile clamp that fits vertical-folded seam profiles manufactured in North America—including most structural and architectural profiles.

Its simple design and generous dimensioning are what make the S-5-V clamp so versatile for use with the S-5!® snow retention products, such as ColorGard®, as well as with other heavy-duty applications.

Installation is as simple as setting the patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the stainless steel bolt provided with the product. Go to [www.S-5.com/tools](http://www.S-5.com/tools) for information and tools available for properly attaching and tensioning S-5! clamps.

### S-5-V Mini Clamp

The S-5-V Mini is a bit shorter than the S-5-V and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!\*

\*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.



**The S-5-V clamp is a versatile clamp, fitting most of the vertical standing seam profiles in North America.**

**REVIEWED  
FOR  
CODE  
COMPLIANCE**  
10/07/2022

**S-5-V and S-5-V Mini**

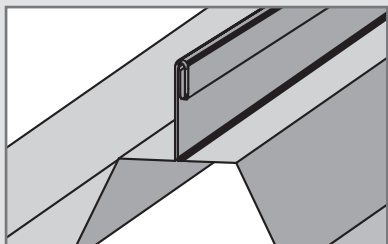
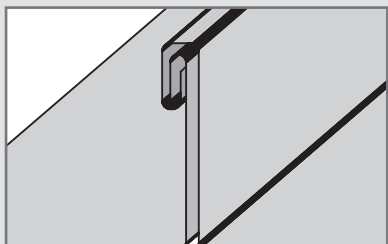


**888-825-3432 | [www.S-5.com](http://www.S-5.com) |**

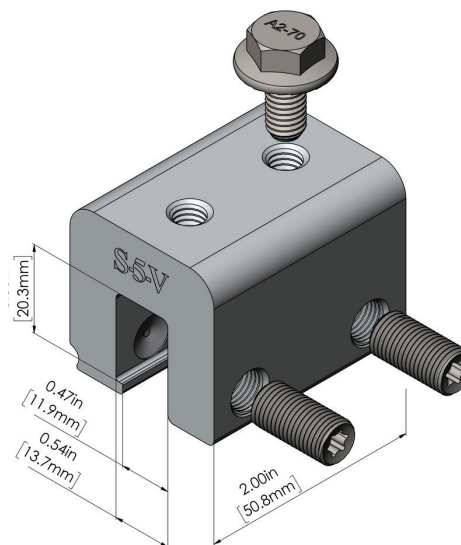
The **S-5-V and S-5-V Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-V is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit [www.S-5.com](http://www.S-5.com) for more information including CAD details, metallurgical compatibilities, and specifications.

The S-5-V clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at [www.S-5.com](http://www.S-5.com) can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

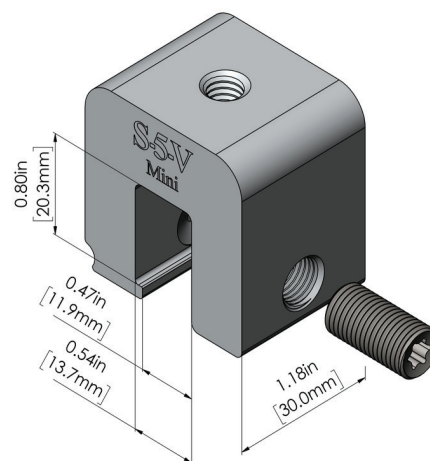
## Example Profiles



## S-5-V Clamp



## S-5-V Mini Clamp



### S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at [www.S-5.com](http://www.S-5.com) for complete information on patents and trademarks. Consult the S-5! website at [www.S-5.com](http://www.S-5.com) for published data regarding installation instructions and holding strength.

Copyright 2021, Metal Roof Innovations, Ltd. S-5! products are patent protected. S-5! aggressively protects its patents, trademarks, and copyrights. Version 081721.

Distributed by