Tech Brief

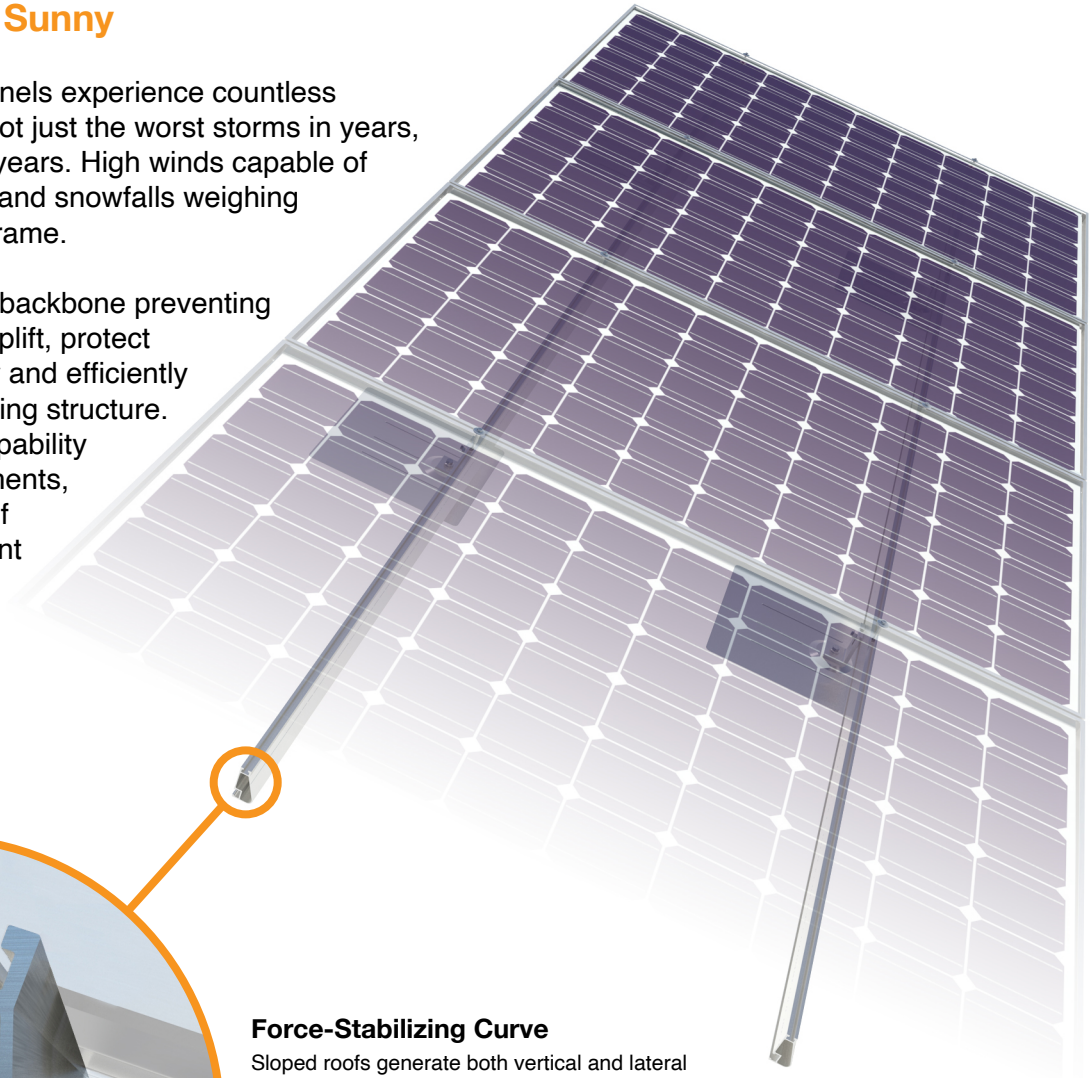
IRONRIDGE

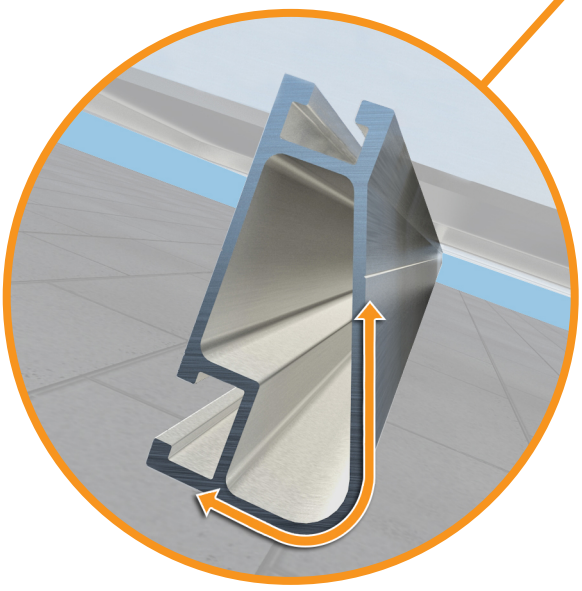
XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.





Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

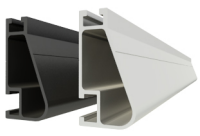
Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



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

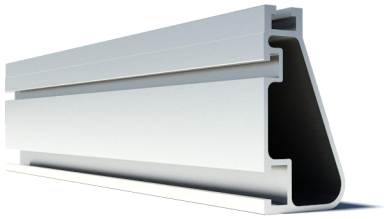
XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black 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 10 feet.

- 10' 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 up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

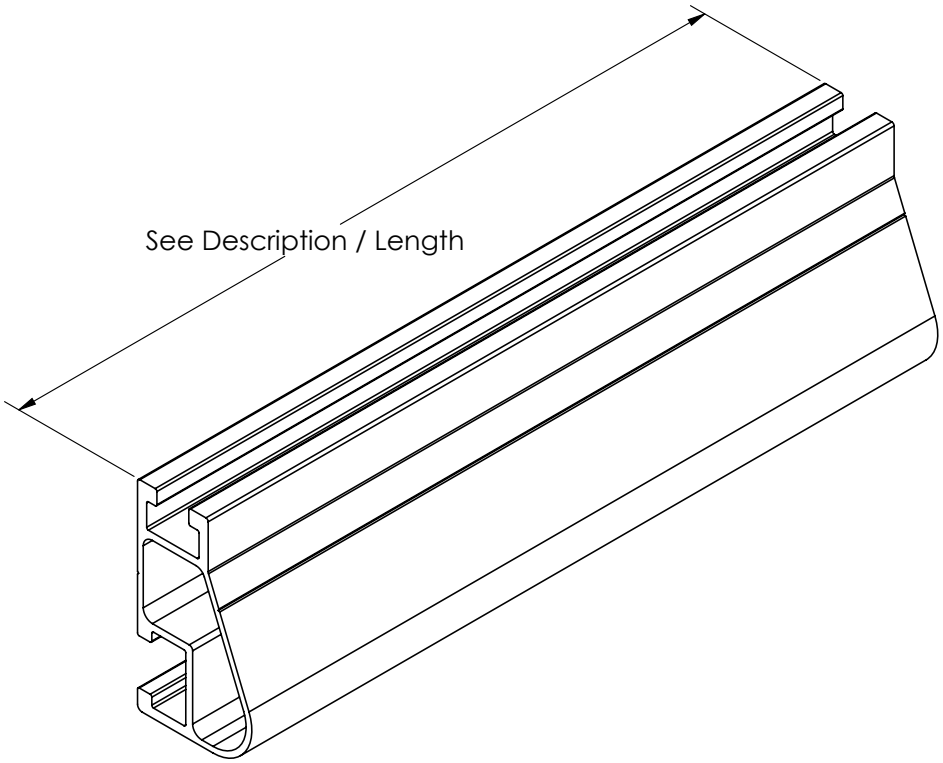
The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

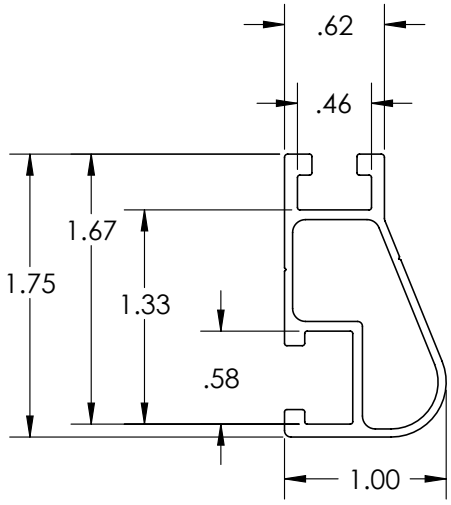
Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

IRONRIDGE

XR10 Rail



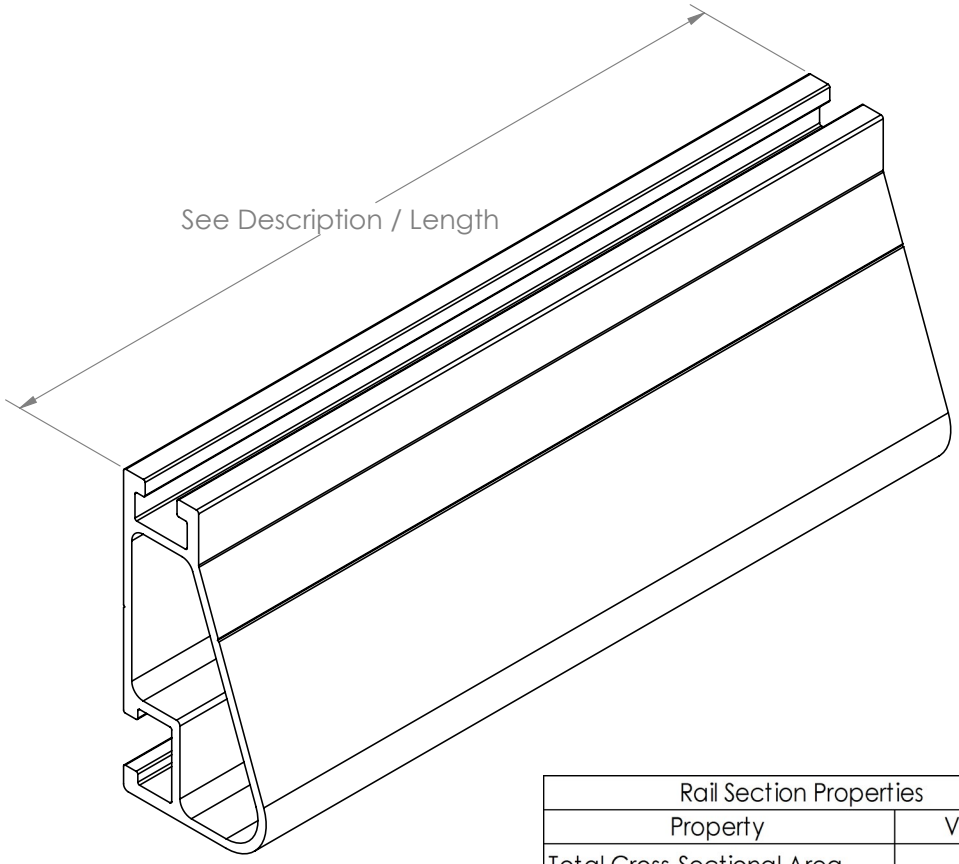


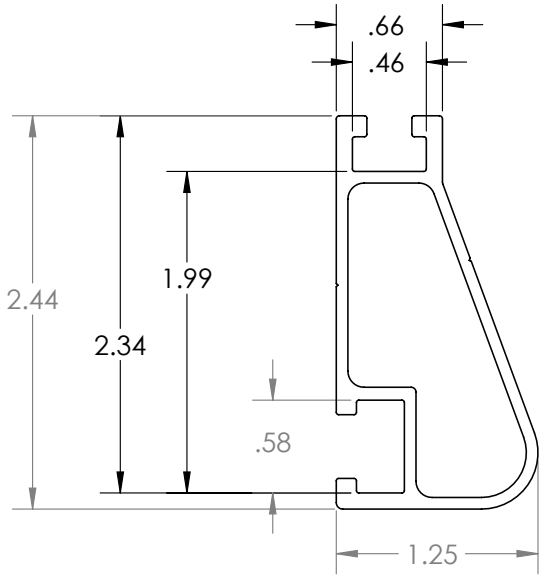
Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.363 in^2
Section Modulus (X-axis)	0.136 in^3
Moment of Inertia (X-axis)	0.124 in^4
Moment of Inertia (Y-axis)	0.032 in^4
Torsional Constant	0.076 in^3
Polar Moment of Inertia	0.033 in^4

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-10-132A	XR-10-132B	XR10, Rail 132" (11 Feet)	6000-Series Aluminum	4.67 lbs.
XR-10-168A	XR-10-168B	XR10, Rail 168" (14 Feet)		5.95 lbs.
XR-10-204A	XR-10-204B	XR10, Rail 204" (17 Feet)		7.22 lbs.

IRONRIDGE

XR100 Rail





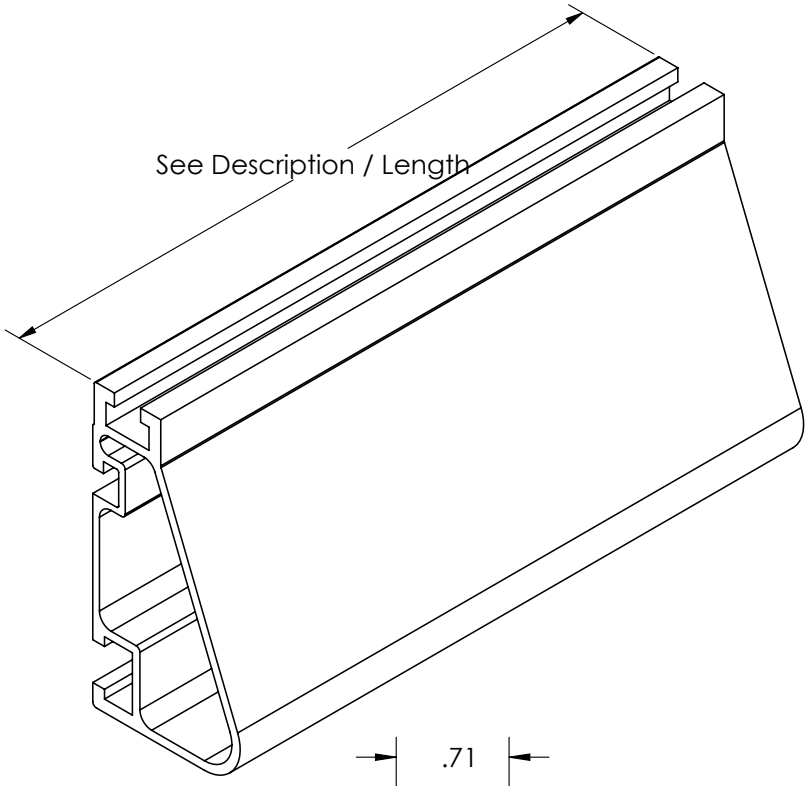
Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.582 in^2
Section Modulus (X-axis)	0.297 in^3
Moment of Inertia (X-axis)	0.390 in^4
Moment of Inertia (Y-axis)	0.085 in^4
Torsional Constant	0.214 in^3
Polar Moment of Inertia	0.126 in^4

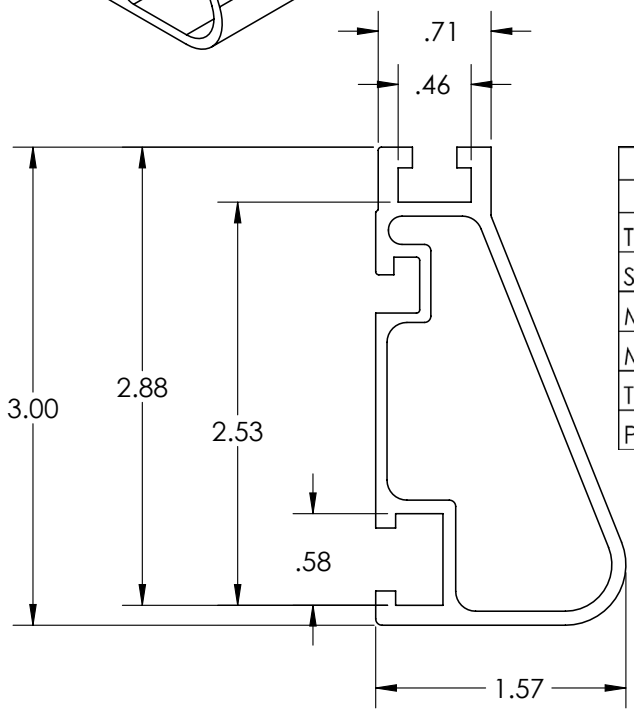
APPROVED MATERIALS:
6005-T6, 6005A-T61, 6105-T5, 6N01-T6
(34,000 PSI YIELD STRENGTH MINIMUM)

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-100-132A	XR-100-132B	XR100, Rail 132" (11 Feet)	6000-Series Aluminum	7.50 lbs.
XR-100-168A	XR-100-168B	XR100, Rail 168" (14 Feet)		9.55 lbs.
XR-100-204A	XR-100-204B	XR100, Rail 204" (17 Feet)		11.60 lbs.

IRONRIDGE

XR1000 Rail





Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.807 in^2
Section Modulus (X-axis)	0.530 in^3
Moment of Inertia (X-axis)	0.843 in^4
Moment of Inertia (Y-axis)	0.182 in^4
Torsional Constant	0.436 in^3
Polar Moment of Inertia	0.330 in^4

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-1000-132A	XR-1000-132B	XR1000, Rail 132" (11 Feet)	6000-Series Aluminum	10.97 lbs.
XR-1000-168A	XR-1000-168B	XR1000, Rail 168" (14 Feet)		13.96 lbs.
XR-1000-204A	XR-1000-204B	XR1000, Rail 204" (17 Feet)		16.95 lbs.

v1.0

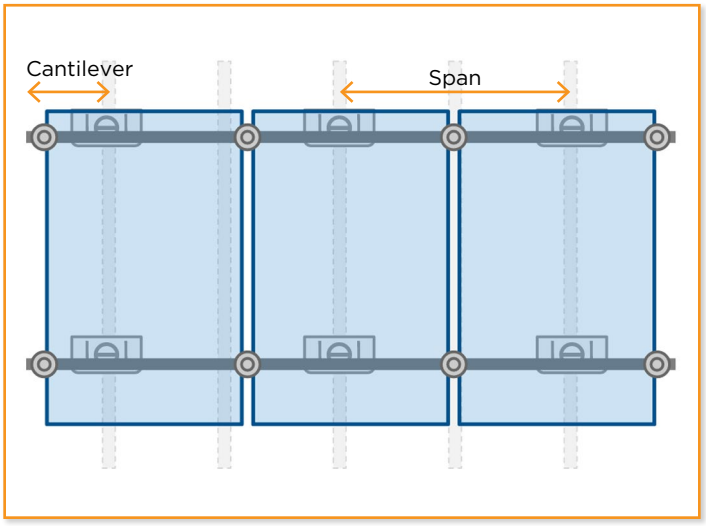
IRONRIDGE

TECHTIP

THE ADVANTAGE OF STRENGTH:
MAXIMIZING CANTILEVERS

A racking system with longer cantilevers and spans will reduce install times, roof penetrations, material and labor costs. IronRidge maximizes cantilever and spans.

Cantilever & Span



Cantilever is the distance from the edge of the array to the nearest attachment point. Cantilever is a function of span, which is the distance between attachments.

In a rail system, cantilever is measured from the end of the rail to the centerline of the mounting hardware attached to the rail. In a rail-less system, cantilever is typically measured from the outer edge of the array to the mounting component attached to the module.

Span is measured as the distance between the centerlines of the roof attachment hardware, like a lag bolt.

Determining Max Spans and Cantilever

Max allowable spans for specific site locations can be found in the span tables within the structural certification letters for the system being installed. IronRidge has these letters available on our website, or our free Design Assistant tool can auto-calculate both span and cantilever and deliver them to you in a project report.

Most rail brands must limit their cantilever to 1/3rd of the span rounded to either 33% or 34%. The efficient and strong design of XR delivers a max cantilever of 40% of the allowable span. This difference can have a very real impact when a system is designed and installed to optimize the cantilever.

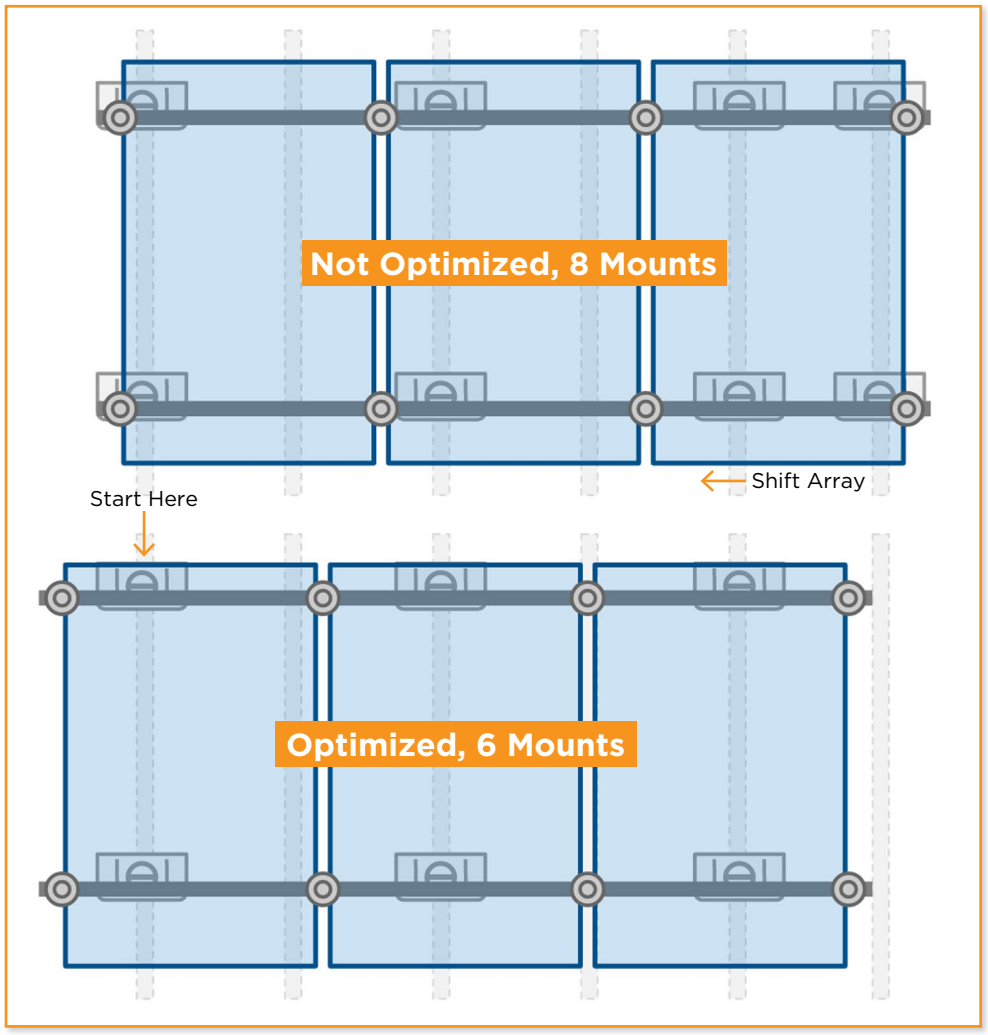
Optimizing Cantilever

A cantilever that is longer than the max allowable reduces structural integrity of the system which could lead to damage over the array's lifetime or during severe weather events. Cantilevers that are shorter than necessary will use extra mounts. To optimize your cantilever, you must stay within the max allowable length, while not creating the need for extra mounts.

The best way to optimize the cantilever is to start with your first rafter and mount. From there, measure out the exact distance of the max cantilever and mark it as the edge of your array, then continue with your layout. If desired, after marking all mount locations, shift the array over to evenly split the cantilever.

As a final check, look at your layout and ask, "Without exceeding the max cantilever, can I shift this array and eliminate a mount?" If the answer is "yes," do it. If the answer is "no" congratulations, your cantilever is optimized!

In some situations, you may need to stagger mounts, but you can still optimize your cantilever on one rail in each pair.



Case Study: IronRidge XR Offers Superior Spans and Cantilevers

The strength of XR100 Rail allows for a 61 inch max span. Cantilever is 40% of the span, or 24.4 inches. For the same array, competitor A's max span is 60 inches but their cantilever is limited to 34% of max span which is 20.4 inches. In this case, rafters are a typical 24 inches apart, so the spans are limited to 48 inches on both systems, but because XR's cantilever is 4 inches longer, you can eliminate an entire column of mounts!

Reduce Costs with IronRidge XR

By maximizing the cantilever across 7 real world arrays and on average, IronRidge required 6 fewer mounts per install. That is 6 fewer roof penetrations, mounts to purchase and attachments to install. When comparing the total cost of racking, the Bill of Materials (BOM) for an XR system was 13% less! It is clear that using a stronger product with longer spans and cantilevers like XR100 and designing your array to optimize your cantilevers will deliver savings in time and materials!