

CASE STUDY

# ROOFING & SOLAR

**MBMA**  
METAL BUILDING MANUFACTURERS ASSOCIATION  
Research | Leadership | Education

Living Hope Church • Middletown, Pennsylvania



Anastasia Mosquito Control District • St. Augustine, Florida



Miller Sunset Pavilion • Winona Lake, Indiana



## EXCELLENCE IN ROOFING SYSTEMS & SOLAR PANELS

One of the most important technological advances in building construction is the standing seam metal roof. This system is used on virtually all metal buildings and many traditional structures due to its long lifespan, aesthetic appeal and ability to withstand extreme weather such as high winds, heavy snow, hailstorms and wildfires.

Each metal roof provides a weathertight seal and accommodates expansion and contraction. As a result, the standing seam metal roof fulfills a building owner's need for durable, long-term protection against virtually any type of weather. Billions of square feet of standing seam metal roofing is installed annually, underscoring the system's popularity and performance. Used for both new roofs and re-roofing, studies confirm that standing seam metal roofs are among the most cost-effective roofing systems available.

Metal roofing has an exceptional track record in new construction, where it is used in about two-thirds of low-rise commercial and industrial buildings.

The roof system is lightweight (about 1-1/2 lbs. per square foot) and has characteristics only available from a metal roof solution:

- With interlocking seams, a standing seam roof can cover a building with minimal penetration by structural fasteners.
- Weathertight seams are raised above a roof's drainage plane and serve as a water barrier.
- Special sealants are factory-applied inside the seams during roll forming of the roof panels for increased protection from seepage.
- Automatic field seaming machines produce weathertight connections between the metal roof panels.

In addition, metal roofing provides pathways for drainage of rain and snow, and solves ponded water problems as well as leaks and related challenges sometimes associated with flat roof systems. The

Stony Creek Brewery • Branford, Connecticut



panels also provide a respected retrofit option for built-up and single-ply roof systems. Since the metal panels may be installed directly over an existing roof, this option eliminates costly and time-consuming tear-offs and product disposal.

Metal roof panels resist corrosion with the help of a zinc, aluminum or aluminum-zinc alloy metallic coating applied to the base steel. Additional protection is available from attractive specially pigmented fluoropolymer paints that aesthetically harmonize the roof with conventional brick, concrete and wood sidewall materials, as well as enhance other design elements used on the building exterior.

## THE SOLAR SOLUTION

Metal roofing provides a logical substrate for crystalline/silicon solar arrays. Racks are easily installed on a standing seam metal roof, and the fasteners are hidden underneath the roof panels and lock directly onto the standing seams. The clips are especially beneficial because they do not require any penetration of the roof itself. Penetrations can lead to water seepage and reduce a roof's lifecycle. Metal roofs also accommodate laminates that can adhere directly to them.

They also provide an installation advantage. Solar cells are easily broken and have delicate wiring, so they need solid support such as that provided by an aluminum and glass encasement. On most asphalt shingle roofs, a racking system is anchored to the roof by drilling into its surface. Any roof penetration




is, in the long run, a potential leak; and wind action on the panel can pull on the fasteners. This may widen the roof holes over time. Mounting to a standing seam metal roof is a better option. Panel mounts can be clamped directly to the standing seams of the roof panels, eliminating any penetrations as well as the need for a racking system.

Life expectancy is another reason why metal roofs are best suited for solar arrays. The expected service life of a metal roof—recently shown to be 60 years or more—is a better match for the service life of solar panels. The warranted life of today's solar panels is 20-25 years and many of them prove to

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remain functional well after that. Few commercial roofs—other than metal—will last as long as the solar panels. So, all solar panels must be removed and reinstalled each time a roof is replaced, adding time and cost and potentially causing damage to the system.





## CASE STUDIES IN ROOFING EXCELLENCE

Port Miami Terminal F • Miami, Florida

### PORTMIAMI TERMINAL F

Carnival Cruise Line introduced a new larger cruise ship, requiring the addition of a new building as part of a complex of buildings located at Terminal F. A roof retrofit was needed to expand the facility. The new roof served as a visual bridge so that three buildings appear to be one. James Partridge, a project manager with general contractor Lemartec Corporation, says that the owner wanted to make it so that, “when you’re embarking from the cruise ship, you look down and you see this really cool roof. It just isn’t a roof to keep the building weather tight. It is also something esthetically pleasing.”

Out-of-the-box solutions allowed the design and construction team to create a very tall roof slope build up, ranging from one foot to close to 20 feet.

## DUNDEE TOWNSHIP FIRE STATION

In the southeast corner of Michigan, Dundee Township is home to just under 4,000 people. Though small, the community funded a fire station that was not only cost-effective but provides a strong architectural statement. The clearspan, open interior 8,250-sq.-ft. equipment bay provides for vehicle storage and includes a 1,280-sq.-ft. mezzanine. An additional 5,400 sq. ft. allows for offices, a conference room, a kitchen and pantry, and housing for firefighters. The design offers an attractive roof height elevation change, dormers and cupola—all capped with a bright red metal roof to match the life-saving rescue equipment housed inside.



Dundee Township • Dundee, Michigan



Walmart • North Conway, New Hampshire

## WALMART

An average annual snowfall of 80 inches created problems at the Walmart in North Conway, New Hampshire. Dangerous snow slides occurred, requiring closure on areas around the front entrance to assure the safety of patrons and employees. Walmart's Construction Management group, in coordination with BRR Architecture of Bentonville, Arkansas, and general contractor, Bast Hatfield of Clifton Park, New York contacted metal roof contracting specialist Jottan-Jorel of Evans City, Pennsylvania. Jottan-Jorel completed installation of a high-quality snow retention system onto the existing metal roof in a matter of days that is guaranteed to perform for the life of the roof.

## IMMACULATE CONCEPTION CATHOLIC CHURCH

Vega, Texas is a small farming community in the panhandle of Texas, with its nearest big city, Amarillo, 40 miles away. The Catholic community in this town of less than 1,000 people needed a new church—one the parishioners' budget could handle. The solution was a metal building system with an attractive brick exterior, topped with a standing seam metal roof. The roof, rated to 140-mile per hour winds, was a logical solution to withstand west Texas' harsh climate.



Immaculate Conception Catholic Church • Vega, Texas

## HAMSTRA HEATING & COOLING, INC.

Heating and cooling need not be boring. This statement is underscored in the beauty of this Tucson, Arizona structure. Separated into office and display areas, as well as warehousing, the building features a faux rust finish installed vertically on girts, with end walls installed horizontally on inset studs. The canopy is a metal standing seam roof, also with a faux rust finish. The structure is connected to a rainwater harvesting system that incorporates a tank and storage tower.



Hamstra Heating & Cooling, Inc. • Tucson, Arizona

## GLOBAL ARCHERY

Global Archery is headquartered in a 1980s-era metal building in Ashley, Indiana. With over 40 years of useful service, this building's metal roof was in need of replacement. The solution was to place a new metal surface over the existing one. The re-roofing of more than 20,000 sq. ft. was accomplished using structural factory-notched sub-purlins and a 24-gauge, 180-degree roof panel system. The 4.5-inch height of the vintage roof allowed for 6 inches of unfaced fiberglass insulation to be installed between the old roof and the underside of the new one, adding energy efficiency to the facility. The metal-over-metal roofing provides a solution to serve for decades to come.



Global Archery • Ashley, Indiana





## CASE STUDIES IN SOLAR: THE NEW NORMAL

Calcaire House • Boulder, Colorado

### CALCAIRE HOUSE

The Calcaire House is a 15,000-sq-ft single-family residential structure consisting of five interconnected buildings. Floor-to-ceiling glass links the interior space to the exterior landscape, offering spectacular views of the Boulder Flatirons. A combination of exposed timber, stone and steel structural design elements, and exposed custom roof trusses, complement the gabled standing seam metal roof.

The Solar Revolution, a Boulder solar provider, was charged with installing more than 60 kilowatts of solar dispersed over multiple rooftops. Boulder Roofing installed approximately 12,000 sq ft of 14-in., 24-gauge panels.

#### The Challenge

The City of Boulder has strict energy codes in place and requires all new construction to meet a certain level of efficiency. The requirements are based on the square footage of the home and are more stringent on larger homes—the larger the home, the more efficient it needs to be.

The goal is to have a net-zero home, not taking energy from the grid, and the only way for a larger home to achieve this is with solar. A modest home or small addition might only require about 2 kilowatts. A large home might require 20-30 kilowatts.

The most optimal rooftops for solar are also the most visually prominent, and the homeowner was concerned about aesthetics. These concerns were alleviated after seeing a small-scale mock-up of the discreet mounting hardware combined with an all-black solar module.

In addition, the location is considered a high-wind area and required a study to account for wind speeds as the solar installers could only rely on the roof itself and its attachment to the wood sheathing when attaching solar panels.

Another difficulty was finding a viable path to route the energy created by the solar panels back to the point of connection with the home's distribution system. The Solar Revolution worked with the builder and the architect, and analyzed photos and design plans to find ways to conceal the conduits. They ultimately found a viable path that was aesthetically pleasing, code compliant and cost-effective.



PERE



Harvest Hill Golf Course • Orchard Park, New York

### HARVEST HILL GOLF COURSE

Harvest Hill Golf Course in Orchard Park, New York is a world-class, 18-hole facility. It was expanded to include a new clubhouse, two cart houses and a tournament pavilion. Upon completion, the Harvest Hill staff contracted Frey Electric to install a solar harvesting system for the cart house structures with the goal of partially offsetting energy costs. Because the steep slope allows snow to shed quickly from the PV modules mounted on a metal roof system, the energy output is higher than the originally projected values and is anticipated to provide 20% of Harvest Hill's annual power requirements.







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