

# How Metal Roofing Pays for Itself

By Harry Comfort

It has been estimated by The Metal Initiative, a coalition of manufacturers, individuals and associations that have come together to provide information on the features and benefits of metal in construction, that metal's growth in the commercial building market is accelerating, with more than 70 percent of federal government building projects specifying metal roofs and walls. Federal government procurement is often the bellwether for changes to come across the private and public sector, and many expect this trend to permeate the wider commercial construction market for the simple reason that over time, metal building solutions pay for themselves.



*The Greater Brunswick Charter School chose standing seam metal to replace an original shingle roof that had exposed the underlying structure to water penetration due to its inability to accommodate a challenging architectural design that called for the dramatic reverse curves shown here.*

Long-term life-cycle evaluations have long been the norm in federal procurement, which is why metals are the construction materials of preference. This article will explore the major benefits of metal that are driving today's trend of choosing metal roofs and walls for the new construction and reroofing of private and public sector commercial facilities.

## Functional and Aesthetic Versatility

What can metal do that traditional commercial roofing materials, such as single ply, modified bitumen, and BUR cannot?

The major differentiating functional capabilities of metal roof and wall solutions include:

- Lightweight
- Strength/performance
- Speed and ease of installation
- Minimal maintenance requirements
- Facilitates insulation upgrades

From an aesthetic perspective, the major differentiating capabilities of metal building solutions include:

- The ability to achieve tight curves and complex angles
- Extensive versatility in color and texture, including the ability to simulate, complement, and integrate with other building materials

## Lightweight

Since metal's performance life is most comparable to that of a modified built-up roofing system, it's important to note that a typical metal roof is conservatively half the weight of BUR, while

exceeding its strength on a pound-to-pound basis. That means at least some of the initial cost of metal is immediately paid back during new construction since metal roofs require fewer support materials. When it comes to reroofing, the lighter weight of metal makes retrofitting an option in many scenarios, making it possible to avoid costly tear-offs of roofs that have already met the building code maximums. This too can result in significant cost savings, even more so where the existing system includes asbestos or some other hazard whose removal can add prohibitive costs.



*This Franklin Township roof used roof huggers attached through an existing standing seam roof to install a new standing seam roof, eliminating costly tear-off while making it possible to upgrade the facility's energy efficiency with added insulation.*

## **Strength/Performance**

With the wide spectrum of load requirements, geographical conditions, and building functions that exist across North America, wind uplift resistance is the first of many prerequisites for the lasting performance of metal roofs and walls. Relying on minimum wind uplift resistance testing standards may be reasonable for a warehouse in Iowa, but would be a high risk for a healthcare facility in the middle of hurricane alley. Fortunately, today's metal systems can and should be subjected to a full arsenal of wind uplift resistance testing, including ASTM E1592, UL 580, and TAS 125. Panels that meet or exceed these testing protocols, when properly designed and attached according to the manufacturer's specifications, can be counted on to provide exceptional performance in the critical area of wind resistance.

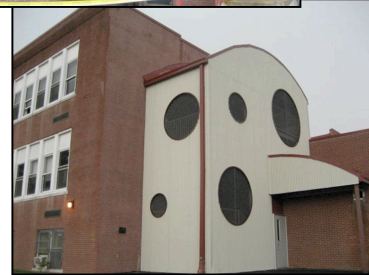
But wind uplift resistance is only one of the many forces of nature that roofs are expected to withstand during the course of their service lives. Metal roof testing protocols also exist for verifying that metal panel systems are able to resist air and water infiltration. Specifically, it is reasonable to expect a metal roof system to have met or exceeded testing in these additional areas of performance:

- Water Penetration (ASTM E1646, ASTM E2140, TAS 114 Appendix G)
- Air Infiltration and Leakage (ASTM E1680)
- Wind Driven Rain (TAS 100, AAMA 501.1)

## **Speed and Ease of Installation**

Because metals are capable of achieving far more challenging and complex architectural designs than other roof systems, they have mistakenly earned a reputation for being more complex to install. Certainly complex details require the highest level of craftsmanship, and nothing but metal can achieve some of the more dramatic and demanding architectural visions. However, when comparing apples to apples, installing metal on a typical commercial roof is no more time consuming or demanding than installing many other materials, and can be faster and easier, especially in those applications where tear-off can be eliminated. In addition, standing seam metal roof installations are less affected by weather-related conditions than other systems, which can result in more predictable scheduling.

Perhaps most importantly, keep in mind that it is a fallacy to think all metal systems are alike. The fasteners used to secure/attach metal roof and wall systems may be through-fastened or concealed. Roof and wall panel designs may be symmetrical or asymmetrical. Clips may be two-piece or integrated as a single-piece and may use a continuous clip or snap-on design. Sealants may be isolated or exposed. All these factors will affect the facility of installation and long-term performance of the system. Requesting a comparative evaluation of different types of metal solutions, and their details, is the best way to make sure that the ease of installation of the metal system chosen is appropriate to the complexity of the design.



### **Facilitation of Maintenance and Repair**

With metal roofs, which tend to shed dirt, routine gutter maintenance and an occasional power washing are typically the only maintenance required. In addition, the modularity of integrated metal roof and wall systems makes tracing leaks and replacing portions of wet insulation easier than with many alternative systems.

*(Before and after photos of standing seam renovation) This Watchung Elementary School in New Jersey took advantage of its roof renovation project to upgrade its time-worn fire stairs using standing seam metal. The metal's aesthetic versatility provided a facility facelift without violating the integrity of the brick building's original design.*

Aside from these preventive maintenance and repair advantages, metals can frequently make it possible to solve tough waterproofing problems for less expense. For example, if water is leaking through the walls of a brick or block building, it can be very costly to cut out and repoint the mortar joints and apply a water repellent. Even after doing so, you are likely to have to reapply the water repellent to the vertical surface at least once every seven to ten years. The fluted split face masonry that was so popular in the 1980s and 1990s is particularly susceptible to these kinds of problems and is quite difficult to waterproof using only an exterior surface coating. For a more permanent and less costly solution, once the source of the leak has been identified and repaired, you can overlay the masonry wall with a metal panel system, significantly reducing future maintenance and repairs, while upgrading the building's aesthetics.

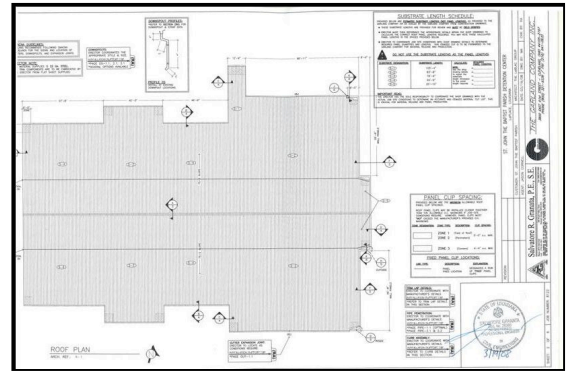
### **Facilitates Insulation Upgrades**

With no end in sight to the volatility of energy costs, it is beneficial to realize that metal systems make insulation upgrades a relatively direct and easy process. Specifically, adding continuous insulation to the exterior of a building during a retrofit can significantly reduce costs related to cooling the building's interior.

### **Angles and Curves**

No alternative roofing or wall material compares to metal, for the long-term, when it comes to complex angles and tight curves. Although fluid-applied coating systems can be used in these areas, they typically require specialized craftsmen to properly install, as well as costly coating

reapplication in the future. When you take a roof structure with multiple planes adjoining each other you have a lot of angles, each of which requires its own unique detailing to ensure watertight performance at the junction points. Materials such as masonry, for walls, or BUR, for roofs, do not lend themselves to such design complexity. Metal is the ideal solution for such applications, enabling installers to craft watertight details where different roof slopes adjoin.



The dramatic curves associated with so much contemporary design are another aesthetic challenge that can only be resolved through the use of metal. Advancements in metal roof and wall design have liberated the imaginations of architects to explore seemingly impossible curves that fan out, reverse themselves, overlap, and extend to create the most dramatic architectural statements.

*Custom details are especially critical to the long-term waterproofing integrity of metal roof and wall solutions.*

For high profile projects that require community support and participation, such designs, made possible only with metal systems, can make the difference between funding failure and success, while encouraging subsequent community enthusiasm for, and use of, the resulting facility.



*Factory-caliber rolling equipment, transported via tractor trailer to the work site and manned by the roofing manufacturer's own workers, enables architects to confidently use super-long spans and challenging curves in their designs, confident of factory-quality performance.*

## Versatility in Color and Texture

The vast number of colors, textures, and alignment options (i.e., vertical, horizontal, angular) that are possible using metal roof and wall panels make it possible to aesthetically match or complement the materials used on historic buildings or neighboring facilities, frequently at a fraction of the cost of replicating the original construction materials.

In addition, the flexibility of today's metal panel designs provides architects with a whole new spectrum of aesthetic shapes that not only provide drama and curb appeal, but can also extend the functionality of the facilities themselves through the creative structuring of sites that are unusually compact or irregular.

As an added benefit, the high reflectivity of certain colors can greatly reduce heat absorption, resulting in a reduction of air-conditioning related energy requirements in warmer climates.



## 100 Percent Recyclability

The cradle-to-grave environmental impact of metal roof and wall solutions is minimal since 100 percent of metal panels are recyclable when metal systems reach the end of their service life. The new International Green Construction Code that was launched in March 2012 mandates that at least 55 percent of building materials must be salvaged, recycled-content, recyclable, bio-based, or indigenous — which is expected to earn metal solutions an even greater market share in the years ahead.



## Extended Life-Cycle Performance

The new code has also raised the bar on building longevity. The new longevity requirement for sustainable buildings was raised to 60 years, and includes a mandate for a service plan capable of justifying the longevity of various building materials and components. High performance metal systems can reasonably be expected to resist degradation for half a century. Even more importantly, some metal roof and wall systems come with a 30-year commitment of watertight performance. This benefit alone ensures building owners of a better life-cycle dollar-and-cents return on investment than is possible with the majority of alternative low-slope waterproofing solution for commercial buildings on the market today.

## Conclusion

The growing use of metal to ensure the waterproofing integrity of commercial buildings is justified by its many benefits. High-performance metal roof and wall solutions — when properly designed and installed — offer property owners, who expect to retain ownership for 30 years or more, the best value over time, while offering architects an infinite array of aesthetic and functional possibilities.

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