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HOW A MULTI-USE FACILITY DOUBLES AS A CAMPUS STORM SHELTER

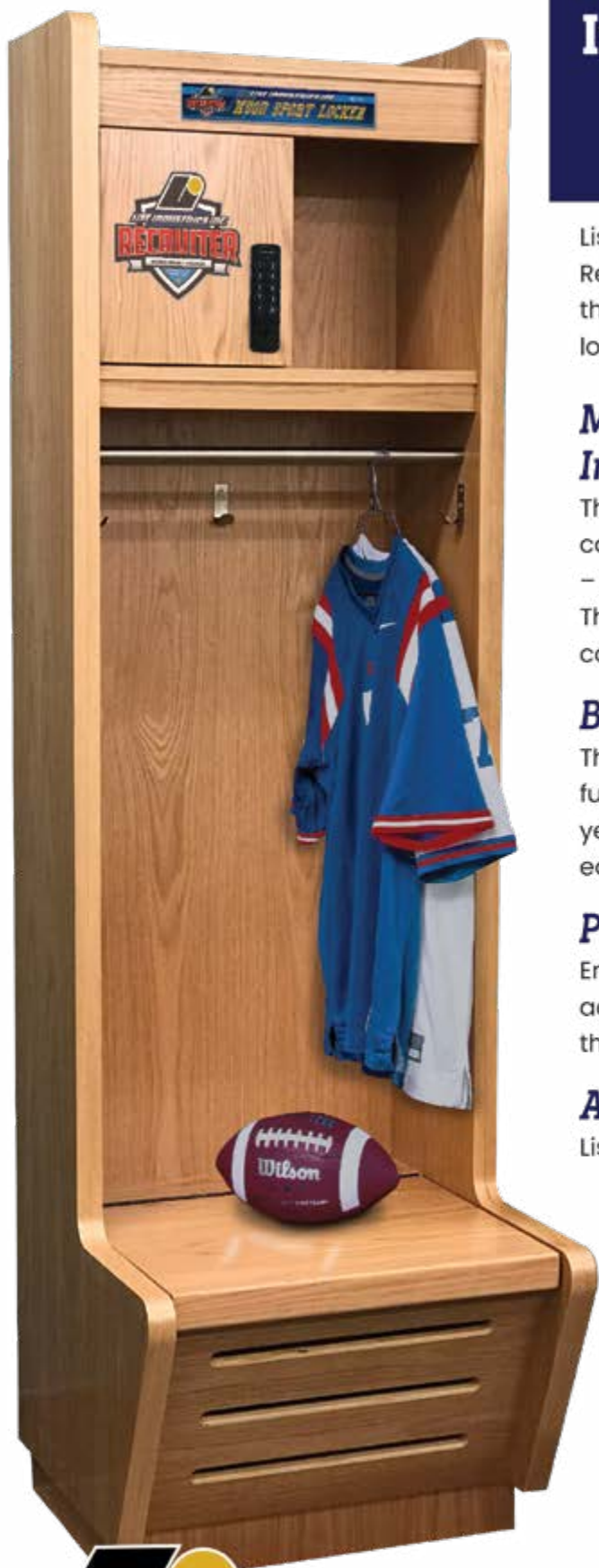
BY IMETCO



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Universities continually look for ways to make campus facilities more versatile, efficient, and valuable to the communities they serve. Athletic centers, recreation facilities, performing arts spaces and other large gathering areas are expected to support a wide range of academic, social, and community activities. Increasingly, institutions are also considering how these everyday facilities can provide protection when severe weather threatens the campus and surrounding area.

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A multi-use facility designed to serve as a community safe room offers an effective response to both needs. During normal operations, the building may host practices, events, meetings, performances or student activities. During a tornado or other extreme wind event, designated areas can provide a protected refuge for students, faculty, staff, and potentially members of the surrounding community.

This dual purpose makes the facility a valuable campus asset, but it also raises the performance expectations for every part of the structure. A building intended to protect occupants during extreme conditions cannot be approached as a conventional construction project with a collection of independently selected components. Its walls, roof, openings, connections and structural elements must function together as a complete protective envelope.

For facility managers, that makes early coordination and assembly-level accountability particularly important.

A Growing Need for Campus Resilience

The threat of severe weather has always influenced building design, but the frequency and financial impact of major weather events have

made resilience a more prominent consideration in institutional planning. According to the National Oceanic and Atmospheric Administration, the United States experienced an average of 23 billion-dollar weather and climate disasters annually from 2020 through 2024, compared with an annual average of nine events between 1980 and 2024. Severe storms accounted for more than half of the billion-dollar events recorded during that broader period.

Universities must consider more than the potential cost of physical damage. Severe weather can interrupt instruction, displace students, disrupt essential services and affect an institution's ability to support its surrounding community. Because many campuses function much like small cities, preparedness must address both immediate life safety and the ability to resume operations after an event.

A strategically located community safe room can become an important part of that preparedness plan. When incorporated into a facility the university already needs, it can also provide a more practical return on capital investment than a dedicated shelter that remains unused during normal conditions.

The result is a building that contributes to campus life throughout the year while remaining

prepared for the moments when its protective role matters most.

More Than a Strong Roof

The roof is one of the largest exposed surfaces on any building and a critical part of the storm shelter envelope. During an extreme wind event, it may be subjected to significant uplift pressures, rapidly changing loads and windborne debris. Damage to one portion of the roof can expose other layers, compromise the interior environment or interrupt the continuous load path that transfers forces through the structure.

For that reason, a safe-room roof should be considered as a complete assembly rather than a series of interchangeable materials.

A typical integrated assembly may include a structural metal deck, insulation that supports both thermal efficiency and acoustic performance, an air barrier, a high-density gypsum cover board, and a finished metal roofing system. Each layer performs a specific function, but the overall value comes from the way those layers are designed and coordinated to work together.

The structural deck provides the foundation for the roof assembly and helps transfer loads into the supporting structure. Insulation supports energy efficiency and occupant comfort while helping control sound transmission and reverberation within large multi-use spaces. The air barrier supports continuity of the building enclosure and helps control uncontrolled airflow and moisture movement. A high-density cover board provides a stable substrate and can contribute to impact, fire and moisture performance, depending on the selected assembly. The finished roofing system provides long-term weather protection while contributing to the facility's architectural character.

The connections between these layers are equally important. Fastener type, spacing, attachment patterns, panel configuration, substrate compatibility and perimeter conditions can all affect performance. Substituting a seemingly comparable component or changing its attachment in the field may alter the behavior of the tested assembly.

This is why specifications for critical facilities must look beyond individual product data. A strong component does not automatically create a strong assembly.

Tested for Extreme Conditions

FEMA guidance and the ICC 500 standard establish a demanding framework for the design

and construction of storm shelters. ICC 500 provides minimum requirements for shelters intended to protect occupants from tornadoes, hurricanes and other high-wind events. FEMA P-361 provides additional guidance for the planning, design, construction and operation of safe rooms.

Testing of storm shelter envelope components can include windborne debris impact as well as static and cyclic pressure testing. Impact testing evaluates whether components and assemblies can resist representative debris propelled at high speed. Pressure testing evaluates how those assemblies respond to forces created by extreme winds, including repeated loading that can place stress on panels, fasteners, seams and connections.

These evaluations are far more demanding than ordinary weather-resistance testing. They are intended to assess whether the protective envelope will remain intact under conditions that can cause widespread damage to conventionally designed buildings.

Testing the full roof configuration also reduces uncertainty. It provides evidence of how the deck, insulation, cover board, roofing and attachment system perform together. This is especially important because the performance of one layer can depend heavily on the layers above and below it.

The specified assembly should therefore be treated as a coordinated system throughout design, procurement and installation. Field substitutions should be carefully reviewed by the appropriate design professionals and system provider before they are accepted.

The Value of a Single-Source Approach

Complex roof assemblies often involve materials from several manufacturers, separate technical representatives and warranties that begin and end at different layers. On a conventional project, those divisions can already complicate coordination. On a life-safety facility, they may introduce avoidable uncertainty.

Working with a single-source supplier for the complete roof assembly can simplify both design and long-term ownership. Rather than asking the architect, contractor or university to reconcile the requirements of multiple manufacturers, one provider can help coordinate the components from the structural deck through the finished roof.

This approach can offer several advantages:

- Greater compatibility among assembly components
- Clearer attachment and installation requirements
- More efficient technical review during design
- Fewer gaps between individual warranty provisions
- A more direct path for resolving questions during construction
- Centralized accountability if a performance issue develops

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A single-source warranty can be particularly valuable for facility managers. Traditional material warranties may cover individual products without addressing how those products interact. When responsibilities are divided, identifying the cause of an issue can become time-consuming, especially when moisture or air movement crosses several layers of the assembly.

Broader warranty coverage from one source can reduce that ambiguity. The exact terms, exclusions and responsibilities should always be reviewed, but a coordinated warranty provides a clearer framework for inspection, service and resolution. For an institution responsible for operating the facility over several decades, that clarity can be nearly as important as the initial material selection.

Performance Beyond the Storm

Although protection during severe weather is the defining requirement, a multi-use safe-room facility must perform well every day. That means the roof assembly must also support energy

efficiency, acoustics, moisture management, durability and occupant comfort.

Properly specified insulation helps control heat flow, reduce demands on mechanical systems and improve acoustics in gymnasiums, assembly halls and other large spaces where hard surfaces can contribute to excessive reverberation. Air-barrier continuity can help limit drafts, condensation risk and uncontrolled moisture movement. A durable metal roofing system can provide long service life, resistance to routine weather exposure and relatively straightforward maintenance.

These everyday benefits strengthen the business case for investing in a high-performance assembly. The university is not paying only for protection during an event that may or may not occur. It is investing in a roof that contributes to building performance during every class, practice, event and community gathering held beneath it.

Material durability also supports long-term campus planning. A roof designed for an

extended service life can reduce the frequency of replacement, limit disruption to occupied facilities and help control life-cycle costs. Routine inspections and preventive maintenance remain essential, but a well-coordinated assembly gives facility teams a stronger foundation for long-term stewardship.

Planning for Confidence

A successful community safe room begins with early collaboration among the university, architect, structural engineer, enclosure consultant, contractor and assembly provider. Occupancy, capacity, location, emergency access and operational planning must be considered alongside structural and enclosure requirements.

For the roof, early coordination allows the team to identify tested assemblies, confirm attachment requirements and address transitions and penetrations before construction begins. It also gives facility managers an opportunity to evaluate warranty coverage, inspection requirements and long-term maintenance responsibilities.

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No building can eliminate every risk associated with severe weather. Thoughtful planning can, however, give universities a more dependable place to protect people while strengthening the performance of a facility used every day.

By combining a versatile campus space with a tested, integrated roof assembly and clearly defined single-source responsibility, institutions can create facilities that deliver lasting value under normal conditions and greater confidence when conditions are anything but normal.



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ABOUT THE AUTHOR: Since 1994, **IMETCO** has provided innovative metal roofing, wall, and building envelope systems. Through expert engineering, custom fabrication, and dedicated installation support, IMETCO helps architects and contractors bring design ideas to life with quality craftsmanship and comprehensive technical project guidance.

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