

CONCRETE MASONRY UNITS

The World's Safest Building Material

WHITE PAPER

by the Southeast Concrete Masonry Association

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Concrete masonry units' surging popularity

Architects and builders increasingly are turning to concrete masonry units to meet their clients' needs. Whether the final building will be for residential, commercial or industrial use, if it is designed with concrete masonry units, it will be a safe, resilient, low-maintenance structure with low-upkeep costs that will last for many decades.

Concrete masonry units – or CMUs – provide unsurpassed longevity and durability. Timber is susceptible to rot, mold and pests. Metal rusts and corrodes. But CMUs are designed with strength and resilience in mind.

Concrete masonry buildings offer premiere safety unavailable with other materials. They can withstand weather, natural disasters and human threats.

When working with concrete masonry units, architects and builders can incorporate any architectural style to meet a client's vision. The CMUs provide the structure on which the style and flair hang.

CMUs are the safest, most-enduring building material in the world. They are found in residential,



commercial and industrial buildings. They afford designers tremendous flexibility and ensure that the final product will last.

Longevity and Durability

When tourists visit Rome, the Colosseum and the Pantheon are must see sites. They are nearly 2,000 years old.

The reason the Colosseum and the Pantheon still stand after all these years is that they are made from concrete. The ancient Romans knew that concrete buildings endure. The Romans also built with wood, but those structures didn't survive centuries let alone millennia.

Concrete masonry units descended from the same concrete that the Romans used. The technology has improved over 2,000 years, but the idea is the same: Build with CMUs for safe structures that can stand up to almost anything for decades.



Modern concrete masonry units, like their ancient predecessors, are made from a mix of water, aggregate and cement molded into a solid block as hard as stone and just as resilient. They are designed to exceed required compressive strength.

No other building material is as durable as concrete masonry units. Because they do not rust, rot or burn, concrete masonry buildings can easily last up to 100 years without compromising structural integrity. They also protect investments in sustainability and environmental standards during construction.

Rot and warp resistant

Concrete masonry units come in over 185 shapes and sizes. If an architect can imagine it, a CMU can be shaped into it.

The rigidity is a large part of what makes concrete masonry buildings so long lasting. The blocks will remain fixed in place, resistant to external forces and unchanging. They do not rot or warp.

The same cannot be said for wood and metal buildings. Over time, even pressure-treated wood products will begin to rot. Water intrusion can accelerate this problem. If it is not caught quickly, that can lead to a dangerous structural deficiency that will be expensive to rebuild. Likewise, metal that goes through multiple heating and cooling cycles can warp, causing similar challenges and deficiencies.

Even mild rotting or warping can be detrimental to a building's functionality. They can create gaps in a structure that allows intrusion of water or pests. Gaps also allow air exchange with the outside, increasing heating and cooling costs and diminishing environmental gains of a well-designed building.

Concrete masonry units will not experience those same problems and the associated costs and aggravation. CMUs last up to 200 years once properly set in place, and they will maintain a high return on sustainability investment.

Mold resistant

When moisture encroaches on a wood-frame building, it creates an environment in which mold can thrive. Unseen behind drywall, mold particles and spores create a breathing hazard for anyone in the building. Over time, it also eats away at wood and other soft building materials, leading to rot and structural deficiencies.

Concrete masonry units resist water seepage. Mold growth is not sustainable in a properly constructed concrete masonry building. That resistance saves money on health and safety upkeep. In fact, concrete masonry exposed to moisture will be only get stronger when it dries out because water is an integral part of the material.



Rust and corrosion resistant

Mold isn't the only threat when moisture enters a building. A structure that relies on metal frames and sheathing is vulnerable to rust and corrosion. We often see sharp looking new metal structures turn burnt-orange with rust after only a season or two in the rain. That deterioration is exacerbated in environments with high salinity such as near seashores or in communities that use salt to combat ice during the winter.

As building components rust and corrode, gaps are exposed to the elements which could increase costs. Worse, its structural integrity weakens. Expensive repairs are the norm, and many metal buildings with extensive rust damage must be replaced entirely.

Concrete masonry buildings are not vulnerable to rust and corrosion.

Pest and termite resistant

Insects are natural enemies to many buildings. Termites, carpenter bees and other pests can slip into a wooden structure



and cause extensive damage before they are discovered. The risk only grows as wood begins to rot and weaken over the years.

Repairing timber rot and exterminating pests are expensive, unavoidable costs of owning wood-based buildings. By avoiding those problems, owners of concrete masonry buildings save money on repairs and extermination services. You might have to kill a spider occasionally, like in any building, but you'll never worry that pests are quietly eating away wood framing.



Disaster Resilience

Concrete masonry structures stand up to the worst weather. Heavy rain, sleet, snow,

hail and wind do not harm concrete masonry buildings, ensuring the safety of the structure and, more importantly, the people inside.

CMUs are especially valuable in areas subject to extreme weather events and natural disasters. Concrete masonry's strength helps it withstand major hurricanes, tornados, floods and blizzards with little or no structural damage. CMUs can provide peace of mind that a building and its inhabitants will be safe.

Communities across the country that face intense weather events are adopting programs and building codes that demand durable construction and sustainable development. The strength and longevity of concrete masonry building meets or exceeds those requirements.

CMU's durability is good for the climate, too. Because concrete masonry buildings require fewer repairs over time, they require production of fewer carbon-intensive repair materials and generate less waste for landfills.

It is much more common for a concrete masonry building to be demolished because it has become functionally obsolete than because it has deteriorated. Yet even if a building is no longer needed for its original purpose, a concrete masonry building shell typically can be repurposed for other structural uses.

Wind resistant

CMUs withstand high winds and wind-borne debris hurled at walls. Weaker walls are severely damaged by this debris.

Wind events are becoming an increasing threat as average atmospheric temperatures warm. [CBS News](#) found that 'Tornado Alley,' the area of the United States most susceptible to tornados, is moving eastward into states that historically had seen few such wind events. Recent years have also seen an increase in derecho storms that bring damaging winds.

Each severe wind event can cause billions of dollars in damage, most of it coming from destruction of buildings that are not able to withstand high winds.



Wind-borne debris during high-wind events such as hurricanes and tornadoes do not penetrate concrete masonry walls. Single-family homes face the greatest danger of destruction during a tornado. In regions of the country where tornados can wreak havoc on single-family homes, concrete masonry designs can provide a durable, wind-resistant structure.

At wind speeds as low as 50-70 mph, wind-borne debris can penetrate a wood or metal wall. Reinforced [concrete masonry walls can withstand debris in winds of 109 mph or more.](#)

During a high-wind event, the inside of a concrete masonry building, away from windows, is one of the safest places to take shelter.

Storm surge resistant

According to the [National Oceanic and Atmospheric Administration](#) (NOAA), the average year, over the past three decades, has seen 14 named storms, 7 hurricanes and 3 major hurricanes. Those storms tend to make landfall in the Southeast United States,



causing tremendous damage. They also are growing more intense and numerous as the Atlantic Ocean and Gulf of Mexico experience sea level rise and warming.

Hurricanes often produce a storm surge in coastal areas. The rushing water carrying debris can be incredibly destructive. Many waterfront communities prone to hurricanes therefore have adopted storm surge resiliency standards that well-designed concrete masonry buildings can easily meet.

Fire

Concrete masonry withstands intense heat and fire, making it an ideal building material in areas prone to wildfires. If a fire breaks out, it will pass a concrete masonry building. A fire-resistant concrete masonry building also

will not spread the fire as a timber building would. It is a structural firebreak for large fires. Uncontrollable fires can lead to firestorms spreading to multiple buildings and even blocks of buildings. Water supply, available resources and access may be limited during a disaster emergency.

Wildfires have grown in intensity and size in recent years. The federal [Government Accountability Office](#) counted 59,000 wildfires in 2020 that burned more than 10 million acres.

In the unfortunate event that a fire starts inside a concrete masonry building, noncombustible walls will contain the blaze, protecting other parts and the people and items within them. For example, CMU walls compartmentalize multi-family structure so that each living unit

is protected from the spread of fire through adjoining walls and floors.

Providing adequate fire containment with minimum two-hour fire-resistant concrete masonry walls between living units and between living units and public spaces will typically contain fires to the unit of origin. This reduced fire spread not only limits the amount of post-fire repair and reconstruction but also reduces the amount of pollution resulting from burning contents within the building.

Research sponsored by fire safety construction advisory councils in 3 states found that building with concrete masonry units is cost-comparable to other materials, usually no more than the contingency budget of a project. But the gains were tremendous. The [report concluded](#):

"Materials like concrete masonry ... have many other advantages beyond their inherent fire performance including resistance to mold growth, resistance to damage from vandalism, and minimal damage caused by water and fire in the event of a fire in the building. In many cases, with this type of construction the damage outside of the fire compartment is minimal. This provides for reduced cleanup costs and quicker reoccupation of the structure."

IV Maximum comfort



Concrete masonry buildings provide a high level of comfort and safety. They excel at temperature regulation and acoustic containment. They also offer unparalleled personal safety.

Temperature

The thermal mass of [concrete masonry units provide inherent insulation](#) for a building. In some warmer climates, that is enough to meet local standards and give occupants a comfortable indoor experience. Where additional insulation is needed, CMUs offer options beyond other construction forms. Not only can concrete masonry buildings incorporate the usual insulation behind drywall or above ceilings, but it also can include insulated cavities that do not take up additional space.

Because of the baseline insulation provided by CMUs, a building requires less other insulation to achieve comfort levels compared to other construction materials. That saves money and requires less long-term upkeep and replacement.



Acoustics

Unwanted noise is disruptive in any environment. Constraining conversations, noise from machinery or loud neighbors is a challenge in designing any workplace, school or residential building. Unlike wood and metal structures, concrete masonry provides [two levels of noise control](#).

First, CMUs simply block acoustic waves. Sound easily passes through timber-framed drywall, but when it hits concrete masonry, it stops.

Second, CMUs absorb acoustic energy. Stopping soundwaves is not enough. They reflect off many materials, like metal, creating

an amplified echo chamber. But concrete masonry blocks and takes in the energy, reducing reverberation tremendously.

The result is sound containment in each room separated by concrete masonry walls. That means classrooms are not disturbed by the lessons in the next room over. Residents of apartments and guests in hotels are not disturbed by the television or other noise coming from next door. And all buildings – homes, offices stores – are insulated from exterior noise such as passing traffic.



Building safer schools

Parents entrust their children to schools for hours every day. It is incumbent on school leaders – whether public or private – to protect their precious charges. Safety begins with the built environment of the school, and concrete masonry buildings create the safest environments possible. In fact, the majority of schools in America today are built with concrete masonry.

Disaster resistance

Natural disasters are indiscriminate in the harm they cause. Ideally, there is plenty of forewarning that a major storm system, hurricane or blizzard is coming. Schools can close, and communities can evacuate.

Sometimes, however, disasters strike without warning. Concrete masonry is a natural storm shelter.

A tornado can touch down unexpectedly almost any time, but the National Oceanic and Atmospheric Administration notes that they are most likely to strike late afternoon to evening when students might still be in class or participating in extracurricular activities.

Fire is another threat that can happen at any time. A major fire can start in or near a school when no one expects it.

Parents will rest easier if they know that their



children are protected within a concrete masonry school that is resistant to wind damage and fire. Where high winds can blow over a wood-framed building or shred it with wind-borne debris, concrete masonry will repel the danger. A fire inside a school will likely be contained to a small area if concrete masonry walls surround it, and an external fire will not likely spread into a fire-resistant concrete masonry building. Students, teachers and school staff will remain safe inside.

Ballistic resistance

Since 2018, the [Center for Homeland Defense and Security](#) at the Naval Postgraduate School has tracked 711 school shootings in the United States with 165 fatalities and hundreds of injuries.

It is a terrible reality of modern life that architects must plan for the worst, including violent gunfire incidents. No one wants to think that a shooter might visit a school or workplace, but if one does, concrete masonry can help protect precious lives.

Compared with other building materials,



[CMUs have high ballistic resistance.](#) That means that bullets fired in one room are unlikely to pass through a concrete masonry wall to harm people in the next room over. Even projectiles fired from high-powered rifles will stop when they hit concrete masonry. Drywall mounted on wood framing does not offer the same protection.

Well-designed concrete masonry structures also allow for maximum access control to school facilities, preventing potentially violent individuals not associated with the school from ever coming inside.

VI Building better commercial buildings and residential homes

Economics

Researchers recently conducted a [31-city, 10-month study](#) comparing the costs of concrete masonry to other popular building materials throughout the Southeast. The research uncovered that masonry and precast costs were similar to – and often cheaper than – other popular building materials.

For example, in Charlotte, NC, the cost per square foot of a concrete masonry building in 2021 was \$198, compared with \$210 for wood

framing and \$209 for light steel framing. A savings of \$11 or \$12 per square foot adds up quickly in a residential or commercial building. As timber costs have escalated in the past year, the savings are even greater.

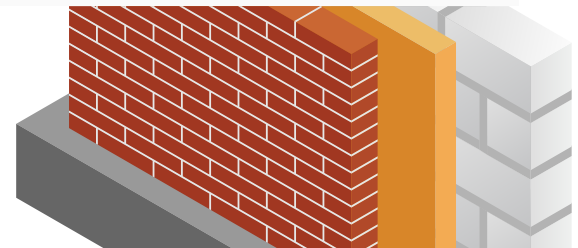
In addition to being competitively priced to other building materials, concrete masonry sets itself further apart from the competition with energy efficiency, minimal maintenance, sustainability and green building properties. Concrete pays for itself over the course of its lifetime, offering savings that other materials simply cannot match.

Energy savings benefit not just building owners but also tenants who pay utility bills. When looking for tenants to lease an apartment or a business space, utility savings are an excellent selling point.

Energy efficiency

Due to concrete masonry units' thermal mass, a building constructed with concrete block holds heat longer in cool weather, and cool air inside for longer periods, even in the dead of summer. With airtight walls, concrete block also reduces wall leaks, which prevents energy loss and could lower your heating and cooling bills by 50 percent.

Concrete masonry walls provide [very effective thermal storage](#) – remaining warm or cool long after the heat or air-conditioning has shut off. This reduction in heating and



cooling loads moderates indoor temperature swings and shifts heating and cooling loads to off-peak hours. Due to the thermal mass, the IECC permits concrete masonry walls to have less insulation than frame wall systems to meet the energy requirements.

In addition to the thermal mass benefits, concrete masonry can provide continuous insulation with an R-Value of 14 or 20 (in this typical cavity wall) depending on the type of rigid insulation used. This wall system exceeds current energy code in all eight areas.

Green building

Aside from the tremendous energy savings on heating and cooling that reduce greenhouse gas emissions, concrete masonry buildings also allow a high degree of green savings during construction.

Concrete masonry is friendlier to the environment. Limestone, the most abundant mineral on earth, is the predominant raw material for the cement in concrete. Concrete can also be made with a variety of waste by-



products from power plants, steel mills, and other manufacturing facilities.

Those looking for minimum environmental impact when building also will be pleased by the low-waste production when using concrete masonry units. Resources are not wasted with concrete like they are with other building materials. Concrete block is produced in the quantities needed for each project and can be recycled. Wood cuttings, on the other hand, always generate waste.

The environmental benefits make CMUs a particularly attractive option for buildings that seek to earn [LEED status](#).

Stop fires from spreading

Because concrete masonry units are fire-

resistant, internal fires are far less likely to spread between rooms. That contains the damage and reduces losses. CMU is a natural fire barrier which protects lives

Equally important, concrete masonry buildings resist fire storms. A rapidly spreading wildfire will consume wooden structures but not CMUs. As conflagrations have [increased in intensity and size](#) in recent years, fire protection has become an essential component of building design. Both commercial and residential occupants of concrete masonry buildings will appreciate the heightened safety in the event of a conflagration.

VII Conclusion

Concrete masonry units are the building material of choice for those who want maximum durability, longevity, safety and comfort at a reasonable price.

Architects have embraced CMUs for their versatility and ability to meet the building requirements in all environments. Recent premiere projects like the [Woodbury School of Architecture](#) in Burbank, CA, and the [Swift Agency](#) in Portland, OR, have showcased the potential of concrete masonry. Both are exciting modern projects that deliver comfort and safety thanks to their concrete masonry core. They are dynamic environments in which to work and learn that will serve students and workers for decades to come.

[Researchers studying the costs and benefits](#) of different building materials have concluded that concrete masonry:

Increases

- Life Safety
- Energy Efficiency
- Structural Integrity
- Flexibility
- Comfort

Decreases

- Energy Costs
- Maintenance Costs
- Mold Exposure
- Construction Schedules
- Sound Transmissions

Whether public projects such as schools and municipal buildings or private development for office or residences, concrete masonry will satisfy the people paying the bills while ensuring that the people who live, work and play inside are safe and secure.



About the SCMA

The [Southeast Concrete Masonry Association](#) is a non-profit trade organization that advocates for the concrete masonry industry. The SCMA promotes the quality use of concrete masonry units and serves as a promotional and educational research center for CMU construction.

The SCMA touts the economic advantages and many uses of concrete masonry units and assists with designs and meeting code requirements for residential and commercial concrete masonry construction. The SCMA is involved in a broad range of research, technical data, educational activities, promotional events, local government relations and industry communication activities.

Since its inception in 1946, the SCMA has been the region's largest advocate for the use of concrete masonry units. We're comprised of 70+ producing manufacturing facilities in North Carolina, South Carolina, Georgia, Tennessee and Virginia. We're supported by 315+ member locations who supply aggregates, cement, mortar mix, equipment, admixtures, materials and services to our industry.

Together, we can build safer, healthier and thriving communities with block

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