

BUILD SAFE AND COST-CONSCIOUS SCHOOLS

with Concrete Masonry Units

WHITE PAPER

by the Southeast Concrete Masonry Association

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| **Cut Energy Bills with Concrete Masonry Units**

Schools are the backbone of a community. More than just a place where children attend classes, they offer space for lifelong learning to people of all ages, a gathering place for the community and, in many communities, a shelter from an oncoming storm.

When planning for the construction of these schools, architects and builders are turning with confidence to concrete masonry units – or CMUs – for their unmatched versatility, durability and, perhaps most importantly, their ability to keep buildings safe for children and adults alike.

While mold and pests can attack timber and metal can be weakened by rust and corrosion, concrete masonry units are engineered for strength and longevity. These properties allow them to withstand weather, natural disasters and human threats, providing exceptional protection year-round.

Moreover, architects and builders find that CMUs can support any aesthetic and offer cost-efficient construction for municipalities and organizations looking for quality while spending public dollars wisely.



That's important because new education construction in the United States was expected to hit a high of \$111.1 million in 2023, up from \$97.8 million in 2018, according to figures compiled by Statista. Getting the construction right matters.



Block Cares – Children's Safety First

Mold & Pest Resistance

Unlike wood frame construction, concrete masonry units protect against mold and pests, both of which can pose significant health risks to adults and children alike.

Concrete as a material is naturally resistant to mold, a characteristic that is especially important when constructing schools in the humid climates found in the southeastern United States. Additionally, concrete masonry units can be manufactured with admixtures that further enhance their waterproofing and mold resistance.

CMUs, when properly constructed and sealed, create an interior barrier that's watertight, guarding against the elements that allow mold to grow and thrive. Weep holes on exterior walls allow moisture to escape the foundation, flowing away from the building and posing little threat of mold and mildew development.

If a mold issue does develop within the structure, CMUs are easy to clean with a mild detergent, water and other solutions — a process that's less costly than a large remediation project.

Wood frame construction is also susceptible to termite damage, which opens up opportunities for destructive insects, rodents and other pests to infiltrate the building.

Ballistic Resistance – Building Smarter Schools

Concrete masonry units are strong, solid and difficult to penetrate, which brings long-term benefits for schools.

Day to day, classroom walls made with CMUs offer a natural sound barrier that affords students quiet and privacy during the school day and an acoustical environment that supports learning and reflection.

Concrete masonry units have an excellent sound transmission class (STC) rating because they control noise in two ways: by blocking sound transmission from classroom to classroom through shared walls and by actually absorbing sound within a busy classroom, cafeteria or gymnasium. The denser the concrete masonry unit, the higher its STC rating.

On very bad days, these same walls provide ballistic resistance and robust defense against unauthorized attacks. That means if a gun is fired in one room, a bullet is more likely to lodge into the concrete wall instead of hurting anyone in the next room over.

It's a heartbreaking necessity for students today. According to the National Center for Education Statistics' annual crime and safety report, school shootings at U.S. elementary schools continue to climb, with 188 shootings with casualties reported during the 2021-22 school year.



Storm Resilience

When the community of Florence, Alabama, needed a new middle school, the school's architects chose concrete masonry construction for the 180,000-square-foot facility. CMUs provide the structure for a host of state-of-the-art technological features within the school, but the "crown jewel" of the building is "a gymnasium comprised of concrete masonry units that doubles as a FEMA-rated storm shelter accommodating three times the school population," according to the Concrete Masonry & Hardscapes Association.

Due to their substantial mass, buildings constructed with reinforced CMU demonstrate notable strength during natural disasters, including earthquakes, tornadoes, hurricanes, high winds, hail and heavy rainfall. CMU structures designed to be storm shelters can endure winds reaching 250 mph and projectiles traveling at 100 mph. CMU structures remain the default refuge during severe weather drills, with many gymnasiums designed as fortified community shelters.



Fire Containment

Concrete masonry construction is similarly resilient to fire damage because of its ability to withstand extreme temperatures and walls made of concrete masonry can help stop flames from spreading throughout a building, allowing children and teachers the opportunity to escape.

Fire safety requires that a wall not only halt the spread of fire from one area to another but also retain its structural integrity throughout the fire and fire-fighting operations. Concrete masonry is widely specified for fire walls and fire barriers because concrete masonry is noncombustible, provides durable fire resistance and is economical to construct. Concrete block can be rated to withstand fire for up to 4 hours, depending on size (equivalent thickness) and aggregate type.

Beyond protection from the flames, CMUs suffer significantly less water damage from firefighting efforts, meaning cleanup costs are less and buildings can be reopened faster.

||| Budget friendly for schools with tight budgets

Material Cost Efficiency

CMU costs compare favorably to that of other building materials, according to a 31-city study conducted in the southeastern U.S. In 2021 in Atlanta, for example, concrete masonry construction cost \$277.70 per square foot compared to \$241.20 for wood and \$240.03 for light steel.

In fact, research shows that CMU construction is generally no more than 4% more expensive than wood framing. Factor in the cost savings over the lifetime of a building from concrete's energy efficiency, low maintenance, sustainability and green building properties, and CMU construction becomes an exceptional choice for school construction.

Mitigated Maintenance Costs

Concrete block construction is durable and needs considerably less maintenance over time, which saves time and money over the long term. A simple maintenance plan of regular cleaning to remove dirt and stains and to patch any cracks resulting from routine settling of a building over time is generally all that's needed.

Lower Insurance Costs

Because CMU construction can withstand extreme weather and fire hazards, insurance costs are significantly lower compared with timber frame construction — 7 to 10 times lower, in many cases. This is due to a belief among insurance providers that timber buildings have a higher risk than concrete masonry buildings.

Energy Efficient

Perhaps the most significant savings of concrete block construction over time comes in energy costs. CMU construction offers premier energy efficiency because of its high



thermal mass, or its ability to absorb and hold heat. This trait allows CMUs to hold in cool air in the summer months and radiate warm air in the winter month, helping to keep the inside temperature steady while the outside temperature rises and falls.

With CMUs at a structure's core, a school's HVAC system works less, cutting energy bills and decreasing the property's overall carbon footprint.

IV ICF vs. CMU Construction

Insulated concrete form (ICF) walls are cast-in-place, reinforced concrete systems. Like concrete masonry unit construction, ICF wall systems strive to be energy-efficient, durable and impervious to moisture, mold, fire and extreme weather.

But ICF construction comes with some hidden costs and challenges when compared with concrete masonry units because the concrete must be poured and then cured on site.



pests, turbulent weather and unauthorized attacks while allowing builders to craft elegant and modern buildings that delight and inspire students.

A school is no place to compromise on quality, and that's why concrete masonry earns an A+ from architects and builders.



These include:

- The need for specialized labor, which can be hard to find and cost up to 40% more than a construction crew with expertise in building with concrete masonry units.
- Inferior materials. Concrete masonry units can be reinforced with rebar, but ICF walls often don't have the room to accommodate rebar. They additionally have weaknesses at the corners and at wall seams, which can lead to instability.
- The curing time for ICF walls has gotten faster, but if a construction crew moves along too quickly, the walls will be weaker, followed by stability issues over time.
- Remodeling is difficult for ICF construction. Even adding a window or a doorway to a

wall requires cutting through a thick layer of concrete and can be costly, time consuming and messy.

V Conclusion

There's a reason a majority of schools in America today are built with concrete masonry — it's the strongest building material available and creates the safest and most comfortable environment for children and their teachers.

CMU construction delivers on all fronts: it's affordable, durable, long-lasting, energy efficient and green. Its structure provides substantial protection against mold and





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