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THE SOFTER SIDE OF CONCRETE



SPECIAL SECTION

The Tuscaloosa area is no stranger to severe weather, and with the help of the Alabama Concrete Industries Association, the city is marching in the direction of building safer, sturdier, and more environmentally friendly homes for its residents.

Lorraine Davis' home, dedicated in November 2021, is the first Habitat for Humanity home in Tuscaloosa built entirely out of concrete. The home's structure was constructed using carbon injected concrete block that were later filled with low carbon ready mix. The block was produced by diverting CO2 emissions from a coal-fired power plant at the National Carbon Capture Center into the "curing" chamber - the final stage of block production.



When the emissions were “fed” into the new, lower carbon concrete mix, the result was concrete blocks containing substantially less embodied carbon. The CO₂ will remain trapped in that concrete for millennia.

The ready mix placed in the cavities of the block was manufactured using portland limestone cement (PLC) and fly ash, a byproduct of coal combustion. Using PLC in lieu of traditional Portland Cement reduces the CO₂ of the cement by up to 10%. The specially designed ready mix and block will significantly reduce the home's carbon emissions, known as its carbon footprint.

The sustainably designed home's concrete block will also withstand natural disasters and is expected to provide permanent, affordable housing to its new owner. The benefits of building with concrete block are unmatched. Not only are they energy efficient and storm resistant, but also more resistive to fires, termites and mold and mildew that are common problems facing homeowners in the state. Homes built using concrete exterior walls are also very air tight, limiting the amount of unconditioned exterior air that can leak into the interior. Limiting air leakage or infiltration from the outside is one of the

biggest keys to energy efficiency. Construction of the home comes at a time when climate resilience and sustainability are becoming increasingly relevant in Alabama and across the country. The innovative structure is expected to offer Davis an additional sense of security and protection in an area that continually faces natural disasters while providing unparalleled energy efficiency.

Marc Tyson, president of Ready Mix USA, a CEMEX company, said he was “thrilled” to help contribute to the concrete construction.

“Concrete homes provide added protection during natural disasters, especially in this area where storms are frequent, and we’re proud to be part of this project that can serve as an example of strength and sustainability for other homes in the region,” Tyson said.

Tyler Davis, of Bama Concrete stated, “Our company was honored to have donated materials for Ms. Davis’ home. In many parts of the country, concrete and concrete block homes are the norm for home construction due to their numerous benefits. We are proud to have been a part of bringing this time proven construction technique to the Tuscaloosa area.”



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Like all Tuscaloosa Habitat homes, Davis' house has a safe room built to the Federal Emergency Management Agency standards, which will withstand winds of 250 mph. Although Habitat normally lines its safe room walls with steel, the walls of the Davis family's safe room was built using solid filled concrete block like the exterior walls of the home.

And beginning Jan. 1, 2022, Alabamians who install a storm shelter may be eligible for a tax credit of up to \$3,000. Under a new law championed by Rep. Joe Lovvorn, R-Auburn and Sen. Tom Whatley, R-Auburn, eligible taxpayers can receive reimbursement for the cost of construction, acquisition or installation of a FEMA-approved storm shelter at their primary residence in the state. The shelter must be capable of withstanding an EF-5 tornado.



The Greener Side of Concrete

Everywhere you look, you see concrete. Other than water, it's the most-used material on the planet, representing about 50% of all manmade materials (by mass). It's a versatile, economical construction material that is the basis for just about everything we build such as foundations, buildings and roads. Modern society would likely not be possible if it weren't for the availability of concrete. And right here in Alabama, we live in one of the top ten cement producing states.

But because so much concrete is placed per year (more than five million yards in Alabama alone is predicted for 2022), how do you modify concrete mix design to make it more environmentally friendly.

Portland-limestone cement (PLCs) offers an easy way for concrete producers to accomplish this, much like fly ash and slag cement have done for decades. Portland limestone cement is manufactured using the same materials as ordinary portland cement but includes up to 15% ground limestone compared to the 5% in ordinary portland cement. Changing the percentage of ground limestone results in up to a 10% reduction in the carbon footprint of the materials. Assuming 5,000,000 cubic yards were produced in Alabama in 2021, if PLC was used in every yard, 90,492 metric tons of CO₂ would be immediately removed. The EPA estimates the average passenger car generates 4.6 metric tons of CO₂ per year. Use of PLC would generate the same CO₂ savings as removing 19,672 cars from Alabama roads for a year.

The concrete industry is also beginning to inject captured carbon into concrete during production.

CarbonCure, winner of the Carbon XPrize in 2020, is bringing the new technology to ready mix producers across the county. The technology injects a precise dosage of captured carbon dioxide into concrete during mixing, where it mineralizes. This improves the concrete's compressive strength, enabling mix optimization and significant carbon footprint reductions. By sequestering the recycled CO₂ within the concrete, the carbon footprint is reduced by approximately 25 pounds of CO₂ per cubic yard (sequestered + avoided CO₂).

However, the cement and concrete industry believe more needs to be done. To this end, last October the Global Cement and Concrete Association pledged to make the industry net zero by 2050. The road map includes an interim pledge to reduce CO₂ emissions from concrete by 25% by 2030. These actions will reduce CO₂ emissions by almost five billion tons. The state's cement companies, which include Argos, Cemex, Lehigh, Holcim, and National Cement are members of the GCCA pledge.

About the Alabama Concrete Industries Association

The Alabama Concrete Industries Association was founded in 1963 to provide a unified voice for companies in the concrete industry. Whether it be promotion of concrete products, addressing regulations and legislation, or coming together to tackle common challenges of the industry, the ACIA is working to protect and promote the concrete industry.