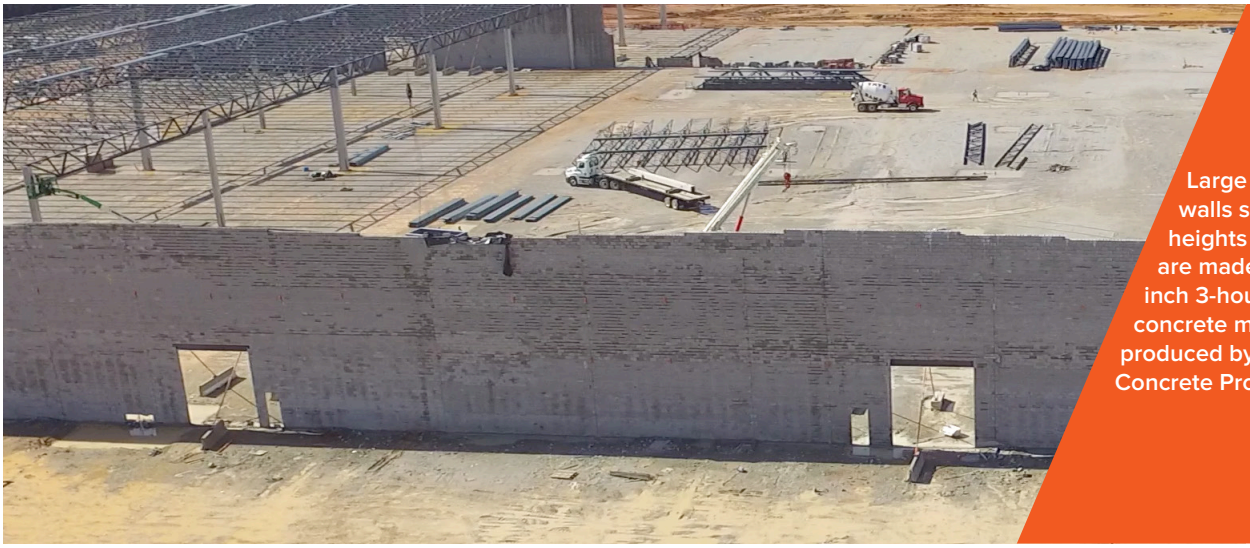

Large partition walls soaring to heights of 44-feet are made up of 10-inch 3-hour fire rated concrete masonry units produced by Tupelo Concrete Products.

LIGHTWEIGHT AGGREGATE EASILY PROVIDES 3-HOUR FIRE RATING FOR CMU

A massive automotive support building being built in Alabama features concrete masonry walls soaring some 44-feet. Those large partition walls will play a vital role in the structure's fire containment design. To obtain the 3-hour fire-rating required for the project, block producer Tupelo Concrete Products turned to experts at Arcosa Lightweight for help in developing the mix design for the concrete masonry units.

Tommy Bigham, Area Sales for Tupelo Concrete Products, says the CMU being used in this project had a number of unique requirements. "It was going to be bit of an odd product, being a 10-inch UL-rated block," says Bigham.

"We worked with Arcosa Lightweight to get our mix design right, to sell the builders on the fact that we didn't have to go through UL certification, that we could give them exactly the product they wanted, provide a good outcome and meet their construction schedule."

Jeff Speck, Arcosa Lightweight's General Manager of Marketing & Technical Sales, says the company has a number of staff experts to aid customers in determining the best and most economical way to incorporate lightweight aggregate into their specific application. "To determine the fire resistance of these 10-inch units, calculation procedures in ACI 216.1-14, Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies, were used. The procedures are based on volumes of existing fire test data ," says Speck.

"One of the ways that fire resistance is sometimes specified, is to require a UL (Underwriters Laboratory) Certification of the units, which is fine, except that you're just paying UL to certify what is easily determined using standards that are acceptable to the building code."

Determining Mix Design

"Arcosa was very good in adjusting exactly what we were doing here," says Bigham. "We were able to give the engineers with the project the peace of mind that we were going to provide something that they were going to want on the job."

The resulting 10-inch CMU classify as lightweight units with an oven dry density of about 103 pounds per cubic foot. "The combination of the equivalent thickness, the facial thickness and the proportions of the aggregates in the concrete from which the block are made, all combine to determine what the fire resistance rating of that unit will be," notes Speck.

"After Arcosa Lightweight got with us on our mix design, we produced a block that's somewhere around 42 pounds," says Bigham. "We went through all the submittal process of having those tested for absorption, for

TOMMY BIGHAM OF TUPELO CONCRETE PRODUCTS says the cost benefits of concrete masonry are hard to beat. “From a standpoint of insulated properties, strength, compressive strength, and the cost to get the wall up, we think there was a real benefit to concrete masonry being used on this job. For more than 20 years, Tupelo Concrete Products has served as the region’s leading architectural masonry supplier. They can be reached at (662) 842-7811 or by email at help@div2-4.com.

strength, and all the different variables that the engineer wanted to see.”

Transportation Benefits

One of the additional benefits of lightweight concrete masonry is reduced transportation cost. That was a critical factor in delivery of the block.

“This particular project is about 100 miles from their Mississippi plant,” says Speck. “Lightweight block allows them to put more units on a truck, reducing the number of truck loads required to deliver all the block for the project. That can result in significant savings to the owner..”

Bigham says to further maximize each load of block, a special computer program was utilized to determine the optimum way to stack block on the pallets. “The guys in our plant worked really hard to come up with a cubing pattern on the computer that would give us maximum amount of units we like to see in a cube,” he says.

“We got about 100 to 150 more units per truck than we thought we would. But over the life of the job, when you talk about 250 deliveries to the job site, there’s a lot of money at the end of that rainbow when you add up even a 100 more block per truck getting out the door.”

Experts On Call

In the end, the delivered units met all specifications, kept the project on schedule and provided transportation savings to the building owner.

“If it hadn’t been for Arcosa Lightweight, really working with us and getting our mix design right, increasing our lightweight a little bit and getting that cement content right where it needed to be for the strength to maintain the lightweight in the block, we don’t think that we’d be as successful as we are with it,” says Bigham.

“We try to do more than just sell lightweight aggregate,” says Speck. “We’re happy to help with things like calculating the fire resistance rating of a concrete assembly, whether it’s masonry or structural concrete, and also to help document that fire resistance to the architect engineer or code authority.”