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September 2013

## BUILDING BETTER SCHOOLS

Richardsville Elementary Earns Top Marks  
for Safety, Sustainability and Cost Savings

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Inside: **Beauty of Basements**

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## a letter to the editor



Photovoltaic panels at work on the roof of the Richardsville School.  
Photography Joshua White.

The ICF schools here do not cost any more to build than traditional schools, about \$225 per square foot. This is attainable technology with funds available for all people and all communities. The Kentucky Board of Education now requires new schools to be constructed using NUDURA's Insulated Concrete Forms, unless the designers can provide a reason why they choose not to use it. The biggest bonus might be these schools also are disaster resilient. The insulated concrete forms can withstand tornadoes well in excess of the minimum design criteria required in Kentucky.

**Wrote Jill Lewis Smith,  
President of Civic Consultants  
Inc., Louisville, Kentucky**

## From my perspective



It's an unusual back-to-school issue this year. The tragedy in Moore, Okla., on May 20 influenced the topics. As a child in elementary school in Oklahoma City, I often heard the emergency sirens sounding as little feet rushed to huddle in hallways much like those at Plaza Towers Elementary School. It is not a good childhood memory to recall and I shiver to think of those young ones who lost their lives. I only hope that parents will demand safer and better schools to protect our families and our future. We know that the methods it takes are available.

Thank you to architect, Kenny Stanfield, and his team for supplying a wealth of information for the cover story on "Building Better Schools". This feature covers the first net-zero energy school in the U.S and the topics of school safety and sustainability. The landmark Richardsville School project was called to my attention by Jennifer Boyce at NUDURA, who was preparing additional information for their website. Naturally, when I was planning the issue, I talked with the CEO of NUDURA who had recently visited Oklahoma. He commented:

*"The industry has proven that it is possible to build energy efficient schools, on time and on budget when compared to traditional methods," said Murray Snider, President and CEO of NUDURA. "We also know that with a little bit of extra thought we can design the reinforced concrete walls to create a safe environment as well. So why would anyone consider anything less when rebuilding schools in areas where extreme weather conditions occur again and again?"*

In the Concrete Monthly Supplement read about how Joplin Schools are building dual-purpose safe rooms in 14 of their buildings to put safety first for students, teachers, staff and even the community. The below grade feature written by Barry Herbert this month also touches on safe rooms and other benefits of basements worth knowing about. That's the "Beauty of Basements."

As the industry looks forward to the 6th Annual ICPSC event coming up in Georgia on September 12-15, this issue is the perfect time to share some information about the new polishing standards introduced this year by CPAA. I talked with Brad Burns about what that means. Some of the great examples are in school buildings because the advantages of concrete polishing for reducing maintenance costs, improving indoor air quality and minimizing slip-fall hazards have been well-documented in LEED™ for Schools.

Enjoy the bright days of summer!

A handwritten signature in cursive script that reads "Sherry Boyd".

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Managing Editor  
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# BUILDING BETTER SCHOOLS

## RICHARDSVILLE ELEMENTARY EARNS TOP MARKS FOR SAFETY, SUSTAINABILITY AND COST SAVINGS

Text by SHERRY BOYD  
Photography by CHRIS PHEBUS

**B**UILDING THE FIRST NET-ZERO ENERGY (NZE) SCHOOL IN THE NATION AT A COST COMPARABLE WITH TRADITIONAL CONSTRUCTION REQUIRED INNOVATIVE DESIGN SOLUTIONS TO MINIMIZE ENERGY DEMANDS AND RADICALLY REDUCE BOTH CONSTRUCTION AND OPERATING COSTS FOR THE 72,285-SQUARE-FOOT RICHARDSVILLE ELEMENTARY SCHOOL. THE NEW SCHOOL SUCCEEDED SO WELL, IT WENT BEYOND THE GOAL OF GENERATING AS MUCH CLEAN ENERGY AS IT CONSUMES. BY THE END OF 2012, THE DISTRICT RECEIVED A CHECK FOR THE ELECTRICITY IT GENERATED – A NET-POSITIVE RESULT.

“Warren County Public School district was very forward thinking in their goal of reducing energy costs to free up more budget dollars for education and teacher salaries,” says the lead architect, Kenny Stanfield, AIA, LEED AP, of Sherman Carter Barnhart Architects.

Sherman Carter Barnhart Architects in collaboration with CMTA Engineering Consultants were able to reduce first costs for the building through several means. The compact floor plan minimized the amount of perimeter wall and reduced the HVAC load. The high bay areas for the media

center and a dual-purpose gymnasium/cafeteria were centrally positioned, eliminating attic space and relocating heat pumps to mechanical closets. Insulated Concrete form (ICF) construction allowed a shorter construction schedule. These cost savings and others allowed expenditures to be shifted to a geothermal system for heating, cooling and water heating with a much lower energy use.

Actual building energy consumption for Richardsville Elementary School is measured as an annual energy use intensity (EUI) 18.2 kBtUs per square foot and the energy



#### PROJECT TEAM

**Architect:** Kenny Stanfield, AIA, LEED AP, Sherman Carter Barnhart Architects, Lexington, Ky.

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**Mechanical Engineer:** Mark Seibert, PE,

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**Electrical Engineer and Lighting Design:** Brian Baumgartle, PE, IC, LEED AP, Inc., Prospect, Ky.

**Energy Modeler:** Kosuke Kato, PE, LEED AP, CMTA, Inc., Prospect, Ky.

**Structural Engineer:** Sherman Carter Barnhart Architects, Lexington, Ky.

**NUDURA Distributor:** Holdfast Technologies

**ICF Manufacturer:** NUDURA

generation has exceeded consumption by 26.5% since January of 2012 when the full solar energy system became operational. The renewable energy system consists of a 208 kW thin-film photovoltaic (PV) array located on the roof in February 2011, which was augmented by 140 kW crystalline PV panels that sit atop a shade structure built in the parking area. It was designed to have a 20-year life cycle. (By comparison, the average school in Kentucky consumes EUI 73 kBtus per square foot annually.)

However, the success of the renewable energy system is only a part of the story. Richardsville Elementary is built of steel reinforced monolithic concrete walls using 6-inch and 8-inch NUDURA insulated concrete forms (ICF) with an R-value of 28 - resulting in less energy use for heating and cooling. The metal roof has a 6-inch layer of polyisocyanurate insulation providing an R-34.9 rated roof. Interior walls are also ICF, providing sound attenuation of particular importance in hallways, the gymnasium and media center.

By the time the Warren County Public Schools District was ready to build the new Richardsville School to replace its aging predecessor built in 1946, the school district was

already committed to ICF construction. Safety became a consideration since the area had historically experienced high winds and severe storms. The Warren County Public School district had made the pivotal decision to switch from traditional masonry to ICF construction and hollow core concrete plank floors. In 2005-2006, the district built Alvaton Elementary, using insulated concrete forms from NUDURA, which contain 50% recycled materials, reduced construction waste and provide sound attenuation. With each successive project, the district wanted to improve upon the sustainability and energy efficiency that they could already see.

“Since our firm has been working in partnership with the school district as their architect for over 20 years, we had the advantage of looking closely at each school after it was built to understand where the greatest energy use areas are,” said Stanfield. “Looking at data the local TVA subsidiary gathered, we discovered that the kitchen used 22% of the energy demand. This allowed us to focus on improvements.”

In collaboration with the school district, the team looked more closely at improvements in the kitchen. In addition





NUDURA Radius Forms are custom cut at Nudura's plant facility to meet the design specifications, then preassembled for easier and faster installation.





Energy demand is reduced by the daylighting from clerestory windows in the dual-purpose gymnasium and cafeteria. Courtesy Sherman Carter Barnhart Architects.

to using Energy Star-rated kitchen equipment, combi-ovens were installed in lieu of fryers and skillets. The combi-ovens use steam instead of grease, also eliminating the Class 1 hood requirements necessary to capture grease vapors.

Reducing energy use further, windows are placed to maximize use of daylight and reduce lighting costs and light shelves are used to minimize glare. Tubular skylights, also called “light tubes”, are strategically situated. The supplementary artificial lighting is controlled by sensor systems. Motion sensors also adjust ventilation relating to room occupancy. All of this contributes to reducing energy use.

Richardsville Elementary became the first all wireless school in the Warren County Public School district. First cost savings were realized by eliminating the power/data wiring infrastructure for classroom computers and removing 1,000 square feet from the floor plan that would have been allocated to the computer center. The server rooms would have consumed significant energy, and the new computer carts give teachers more mobility in using computers anywhere throughout the school.

One of the unexpected benefits is involvement by both students and teachers in learning more about our environment. Richardsville Elementary school has hallway displays about Solar Power Generation, Water Conservation and Recycling that are making sustainability topics a part of every day conversations for first graders and their parents.

Throughout the school, environmentally friendly finishes were specified. Polished concrete floors, a popular choice

for high-traffic areas, were specified for the majority of classrooms, hallways and workspace, another first in the school district. The low-maintenance polished concrete choice provided another surprising benefit; maintenance was reduced significantly enough to eliminate a member of the custodial staff. The gymnasium floor was constructed of hardwoods recycled from the old building along with renewable bamboo.

Sherman Carter Barnhart Architects is convinced of the advantages of ICF construction for many areas beyond energy efficiency and reduced operational costs. ICF performs well for long-term durability, sound attenuation, reduced waste and materials use and providing a streamlined construction schedule even during winter months.

“We were told ‘you can’t do it.’ We were able to dispel the myths,” says Stanfield. “Using green design does not have to create an added cost. We can look at the advantages and data from many successful projects. The five most energy efficient schools operating in Kentucky, including the Net-Zero Richardsville School, are all ICF schools designed by our team. That should take away any fear of the unknown. There is a track record to provide showing you can achieve all those goals.” According to the architect, “With ICF there is not just one advantage, there are multiple advantages. Based on our experience, it would be hard to see a better alternative. The schools built this way are designed and constructed to withstand severe weather conditions. During storms, parents know their children are safer in an ICF school than at home.” 