IRVINGTON ELEMENTARY, BRECKINRIDGE COUNTY SCHOOLS, KY
INSULATED CONCRETE FORMS BUILDING SYSTEM

the coming storm

by Kenny Stanfield, AIA, LEED AP, PRINCIPAL
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When it comes to severe weather in the southeast, we anticipate with trepidation the seasonal storms and with them the threat of tornadoes. Unpredictable and potentially devastating, direct strikes from tornadoes can demolish even the seemingly strongest of buildings, including our schools. Recent tornado storms in Alabama, North Carolina, Missouri, and Kentucky devastated towns and buildings, taking countless lives and injuring many more in their paths. These storms demonstrated firsthand how vulnerable a seemingly strong concrete block and brick school can be in the path of a tornado.

After January 1, 2019, KBC will require all new schools to incorporate a tornado storm shelter within the facility.

Periodically, the Department of Housing, Building, and Construction (HBC) revises and updates regulations in the Kentucky Building Code (KBC), and due to the increasing risk of severe storms, HBC has revised the building code to require all new schools, public or private with a capacity of 50 or morethe c constructed after January 1, 2019, to incorporate a tornado storm shelter within the facility.

These requirements can be summed up as follows:

1. The shelter may be incorporated into a single or multiple enclosure(s) within the building, or consist of an additional free-standing structure on the school site.
2. The shelter must be reinforced to withstand a direct tornado hit, including flying debris, and be separated from the rest of the building with a 2-hour firewall rated assembly.
3. The shelter must have its own restrooms, emergency generator to power independent lighting and ventilation, plumbing and water storage tanks.
4. The size of the shelter shall be determined by including 5 square feet for each person according to the "calculated" occupant load, which is considerably more than the students, staff and faculty typically determined by the KDE program requirements. For comparison, a 750-student school would need a dedicated tornado shelter approximately the same size as an elementary school gymnasium.

All new school construction in Kentucky submitted for HBC approval after January 1, 2019 will be required to be equipped with a tornado shelter meeting all the criteria just discussed. There are no exceptions to new buildings; however, renovations and additions are excluded. The cost implications for the design will be significant, and directly impact a district's construction budget. For a 750-student school facility, these requirements could easily add $1 to 1.5 million dollars to your projects overall cost.

As we evaluate the design criteria to comply with these requirements, it has become clear that traditional school building structures, such as load bearing masonry or steel frame will need to be heavily modified at a substantial cost, to resist the impact of a direct tornado strike.

One building system that we have extensive experience with, that can achieve these requirements with little to no modifications is insulated concrete forms (ICF). About a decade ago, Sherman Carter Barnhart pioneered the use of insulated concrete forms (ICF) in Kentucky school design and construction. Its thermal mass and superior insulation consisting of an 8" (typical) thick solid concrete wall poured around reinforcing steel provides unmatched strength in resisting high winds as well as reducing energy.

If you would like more information about these newly adopted regulations and how Sherman Carter Barnhart is meeting the design challenges that will ultimately impact your projects, please contact Kenny Stanfield at kstanfield@scbarchitects.com/859.224.1351. We will be happy to share our knowledge of these "coming storm" changes to the Kentucky Building Code and our insulated concrete forms solutions.

^ **ALVATON ELEMENTARY**(2006) KENTUCKY'S FIRST PUBLIC SCHOOL DESIGNED WITH INSULATED CONCRETE FORMS.

^ **RICHARDSVILLE ELEMENTARY**(2008) NATION'S FIRST NET ZERO ENERGY PUBLIC SCHOOL UTILIZING INSULATED CONCRETE FORMS.

^ **SOUTH WARREN MIDDLE & HIGH SCHOOL** (2010) THE LARGEST SINGLE STRUCTURE INSULATED CONCRETE FORMS BUILDING IN NORTH AMERICA & THE FIRST EDUCATIONAL PROJECT TO UTILIZE INSULATED CONCRETE FORMS CONSTRUCTION FOR BOTH INTERIOR & EXTERIOR BEARING WALLS.

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KENNY STANFIELD, AIA, LEED AP, IS A PRINCIPAL OF SHERMAN CARTER BARNHART'S EDUCATION STUDIO. MR. STANFIELD LEADS THE FIRM'S INNOVATIVE, DEVELOPMENT AND APPLICATION OF SUSTAINABLE DESIGN STRATEGIES IN SCHOOLS. NATIONALLY RECOGNIZED AS A LEADER OF HIGH PERFORMANCE, ENERGY EFFICIENT DESIGNS, HE IS CREDITED WITH THE PLANNING AND DESIGN OF THE FIRST NET ZERO ENERGY PUBLIC SCHOOL, AS WELL AS THE LARGEST SINGLE STRUCTURE INSULATED CONCRETE FORMS BUILDING IN THE UNITED STATES.