

New School Building “Hardened” Against the Wind

A few years back, in Oakfield, Wisconsin, fund-raising T-shirts were printed with the motto: “There’s no place like Oakfield,” rewording Dorothy’s feelings about her tornado experience in *The Wizard of Oz*. The T-shirts were designed after a tornado roared through the small community in July of 1996, demolishing nearly half the town.



Photo by Don Lloyd

The Middle School was one of the 180 structures destroyed or damaged by the tornado. Community residents could also now say, “There’s no middle school like the new Oakfield Middle School.” With “hardened” interior walls and the roof bolted to wall

supports, the school building is now constructed to endure twice the wind force than most other Wisconsin schools. It was designed to withstand 150-mph winds, as compared to the 88-mph wind load required by Wisconsin building code for public buildings.



“From the destruction of that July day, the community of Oakfield built a school to be proud of, and one that provides a greater sense of security for those who

experienced the devastation of the tornado,” said Joe Heinzelman, Superintendent of Oakfield School District.

Trail of Destruction

Just minutes after sirens signaled its coming, the tornado slammed through the middle of Oakfield, destroying 44 homes, two churches and the Middle School. It also razed a majority of the village’s mature oak trees, 1800 of them, for which the village was named back in 1847. Authorities estimated Oakfield suffered \$50 million in damages.



When a disaster is federally declared, as it was after the Oakfield tornado, mitigation funds are activated through the Hazard Mitigation Grant Program (HMGP). These funds

are available to communities for prevention of future disaster damage. In consultation with staff at Wisconsin Emergency Management (WEM), the Oakfield school administration learned that HMGP funds could be used to build a more wind-resistant structure.

“Strengthening the school building was very important to our community,” said Heinzelman. “Just to assure people that we have a building that could withstand destructive winds like we experienced and it could become a community shelter in a similar circumstance. It could also become the command center in case other buildings were destroyed. We learned how important that was with the last storm.”

Rebuilding a Stronger School



The construction technique of “hardening” the walls of the new Middle School included the placement of reinforcing steel in the masonry walls to provide for the additional wind load requirements. The roof structure was changed from steel to a masonry pre-cast concrete roof, and the roof was welded to plates embedded into the walls, placed at double the normal rate, to tie the roof into the structure more securely.

The cost of the improvements to the building totaled \$207,260. FEMA contributed \$151,662 through HMGP, the state WEM provided \$25,277, and the local match was \$25,277.

With the funding in place and the building designs completed, an aggressive construction schedule was begun to ensure that no student would miss out on the middle school experience. By January of 1998, after attending class in temporary classrooms for 18 months, students had a school building they could call their own.

Fortunately, the walls and roof of the Oakfield Middle School have not been put to a wind test. Along with the village getting a new middle school, homes and the two churches were rebuilt where the tornado had created a swath of destruction. And sales of those fund-raising T-shirts helped raise enough money to plant more than a thousand oak trees so the community could still live up to its name.



For more information on mitigation in the state of Wisconsin, please contact Roxanne Gray, State Hazard Mitigation Officer, by phone at (608) 242-3211 or email at grayr@dma.state.wi.us. For more information about the Wisconsin Division of Emergency Management, see www.state.wi.us/agencies/dma

For more information on the Oakfield Middle School building project, contact Joe Heinzelman, (920) 583-3146.

To learn more about tornadoes, check out www.tornadoproject.com. You'll find everything you ever wanted to know about tornadoes.

To learn about building a Safe Room inside your house, check out the FEMA web page featuring "Taking Shelter from the Storm" at www.fema.gov/mit/tsfs02/htm.

To learn more about wind-resistant construction, check out www.wind.ttu.edu, the Texas Tech Wind Research Center website providing information on the latest research.

Captions:

Oak-Picture 1: The tornado that hit Oakfield on July 18, 1996, photographed by Don Lloyd of Lomira, WI

Oak-Picture 2: Groundbreaking for the Oakfield Middle School took place April, 1997 and the students attended classes for the first time in the new school on Jan. 5.1998. At the cost of \$207,260 the structural integrity of the school was strengthened to withstand 150mph winds.

Oak-Picture 3: The school district had just spent \$40,000 on a new gymnasium floor and the tornado pleated it like an accordion, buckling it to three feet high in some spots. A blown out back wall left one side of the building completely open and hundreds of cans of corn were imbedded in walls, floors and ceiling, scattered from a canning company located a couple blocks away. The building was more than 50% damaged.

Oak-Picture 4: "It gave me a very sick feeling in the pit of my stomach to walk around the building I had spent so many years involved in," said Paul Dix, principal of the Middle School at the time, currently principal of the Oakfield High School. "But with only six weeks until the start of school, we quickly changed our focus to getting temporary classrooms for the kids and opening school on time."

Timing was critical for the Oakfield school administration in getting the new school designed and built. Commitment from WEM officials and state legislators helped in gaining grant approval to meet the deadline of a bond issue vote on the building construction. Once approved, an aggressive construction schedule began.

Oak-Picture 5: The open ceiling of the gym showing the masonry supports for the roof is the only visible indication of the structural techniques used in strengthening the middle school building.

Oak-Picture 6:

"The old middle school had been a special place for Oakfield students," said Paul Dix, former principal of the Middle School. Meeting the scheduled completion date for construction of the new middle school made it possible that no student would miss out on the middle school experience. In this picture, students sang at the Open House Celebration held in February of 1998, just after the students started classes in the new school.