

FleeceBACK® TPO
Roofing Systems

CASE STUDY

Hail Resistance for Mineral Wells School District



HAIL RESISTANCE FOR MINERAL WELLS SCHOOL DISTRICT

JOB PROFILE

PROJECT LOCATION:
Mineral Wells, TX

CARLISLE APPLICATOR:
Crawford Roofing

ROOFING SYSTEM:
Carlisle 115-Mil FleeceBACK TPO

When students of the Mineral Wells School District packed up their bags on the afternoon of April 17th, 2008, they had little reason to suspect the evening's weather would be especially notable. By 6:00 PM, however, local weather reports had changed: severe thunderstorms were expected, with the potential for heavy rains and strong winds.

A few minutes after the severe thunderstorm watch came across the wire, all hail broke loose.

The storm from the north brought with it sustained winds of fifty miles per hour, with gusts up to sixty miles per hour. One storm tracker even reported seeing a tornado touch ground. But the most massive damage was caused by a barrage of softball-sized hail that caused tens of millions of dollars worth of damage across the county. Bleachers at the new Ram Stadium, which celebrated its opening less than a week prior, looked as though they were attacked by vandals armed with sledgehammers. Skylights shattered at the local Walmart, destroying the electronics section and causing panicked customers to dodge to safety as the weather literally poured in.

The Mineral Wells School District unfortunately fared the same fate. Each of its buildings, from elementary schools to administration offices, suffered irreparable roof damage. Built-up roofs



on the high school, junior high, and administration buildings were destroyed. Architect Paul Presson of Parkhill, Smith and Cooper's Architecture Division in Lubbock, Texas was contacted to create a professional specification. Because the district was not in a position to pass a bond issue for roof repairs, the available funds for re-roofing were limited to what the district received from their insurance claim.

"We were contacted in April of 2009," Presson said. "They had already bid the project with no drawings, no specifications, minimal written information, and no limitations on the system being bid." As a result there were 8 bidders with 7 different systems including 4-ply built-up, Hyload, modified bitumen, EPDM, TPO and PVC. Several bidders bid two different systems and several bidders only bid parts of the project. Presson said, "After analyzing the bid information, systems and existing conditions, we determined it would be better to start from scratch."

Since the project was previously bid, Presson contacted the original bidders and asked them to bid again. The bid for the re-roofing job was won by Crawford Roofing of Chickasha, OK. Crawford Roofing is a 4th generation company started in 1936 by the grandfather of Tim Crawford, the current company president. Crawford Roofing specializes in re-roofing jobs, traveling all over the country with their expertise. Hotels, assisted care facilities, and schools often contact Crawford for help with roofs that are severely damaged from a variety of causes, including severe storms like the one in Mineral Wells. While the Mineral Wells School District's roofs were all badly damaged, it was a job that he knew they would be able to handle.

Crawford estimated that a crew of nearly one hundred would be required to repair the five facilities that sustained hail damage. In total, more than half a million square feet of rooftop required replacement.

Because the roofing and insulation on each building were out of compliance with current energy code requirements, the school district's facilities manager, James Bradford, turned the disaster into an opportunity to create more energy-



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—Tim Crawford

efficient buildings. “We were aware that the existing roof systems did not have adequate insulation to meet current energy codes, and James wanted an Energy Star-rated membrane to aid compliance with energy reduction initiatives the school district has started,” said Presson. “He was a major part of letting us run with the project without pushing any one system.” The major factor for selection of a thermoplastic roof system was the ability to reduce the cooling load on the buildings with high-reflectance, high-emittance membranes. Although the district originally collected information and a bid from a contractor who used PVC products, Presson’s specifications recommended 2-inch hail coverage and a 90mph wind warranty.

“The specification was totally performance based, requiring compliance with ASCE 7 for wind uplift, IBC 2006 for impact resistance and a 20-year warranty for material, wind uplift resistance and impact resistance,” said Presson. “We used FM 4470 SH for impact resistance criteria and IBC 90 mph 3 second gust for the wind uplift requirement with no increased factor of safety.” Outside of these requirements, Crawford Roofing was free to choose whatever products they preferred to best achieve the desired result of a wind- and hail-proof roof.

Crawford realized that these specifications would require a special product with the ability to easily outperform the previous roofing materials. He remembered that Carlisle Representative Chad Leshar had recommended Carlisle’s FleeceBACK membrane and FAST™ Adhesive for previous projects, and was curious to see them in action. “Chad kept coming to us with these great new products,” Crawford said. “He kept telling us, you’ve got to try FleeceBACK and this foamable adhesive!”

Carlisle’s FleeceBACK TPO membrane consists of a layer of TPO laminated to non-woven polyester fleece backing. The fleece reinforcement adds toughness, durability and enhanced puncture resistance. The 115-mil thickness used on the project delivers 33% greater puncture resistance and 33% greater breaking strength than standard 60-mil TPO. Crawford believed it was the ideal choice for the district’s need due to its superior hail damage resistance—the membrane passes FM’s severe hail test and the National Bureau of



Standards ice ball test for hail up to three-inch diameter with the membrane cooled to 32°F. It also holds a UL-2218 Class 4 rating.

“I really liked Carlisle’s FleeceBACK,” said Crawford. “I went to the maintenance guys and really pushed the product, and they also really liked it. The other products considered just couldn’t meet the specifications for wind uplift, hail and warranty.”

Presson was equally enthusiastic about the use of FAST Adhesive, Carlisle’s low-rise, two-component insulating polyurethane adhesive because it mitigates thermal bridging. “The low-rise adhesive for the installation of both the membrane and insulation eliminates all of the thermal shorts created by mechanical fasteners, provides thermal separation of materials, provides some additional R-value, and eliminates the ever-present problem of fastener heads telescoping through the membrane,” said Presson. “We do a lot to eliminate thermal gaps in insulation, including installing the insulation in two staggered layers, or installing insulation in one layer and protection board with offsetting joints.”

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Beginning January 12, 2010, around 90 workers set to work tearing off each roof to the structural decks and laying insulation and membrane. Crawford's crews cleared all remaining debris off the substrates and began applying Carlisle's FAST Adhesive, at four inches on-center using a heated Predator spray rig. Unlike many roofing methods, the application of FAST Adhesive was not disruptive to the staff or students. "Some of the national contracts we've done have been hotels," said Crawford. "They pay tremendous amounts of money to ensure that we don't disrupt customers with noise or the asphalt smell. We'd go so far as to put vanilla extract in our asphalt so it wouldn't smell so bad. With FAST Adhesive, we were out of sight, out of mind. No toxic smells, no risk of the workers getting burned. It was much handier." By avoiding the noise and noxious fumes of replacing the original built-up roofs, students could continue attending school in peace and safety.

Six months later, the installation was complete. Reflective membranes—tan on the junior high and DSC facilities and white on all the other buildings—will help to reduce the district's energy consumption, saving them money in the long run. Additionally, they have a roof system that provides hail resistance and wind uplift warranties. "Because of the cost effectiveness of Carlisle's FleeceBACK TPO system, the project was accomplished within the available funding and in less time than originally anticipated," said Presson.

The durability of the new roofing systems ensure that the roofs of the Mineral Wells School District are protected from the elements. "We're confident that these roofs will stand up in any weather condition," said Crawford. "I've been in the roofing business all my life, and I've seen many, many products come and go. I know that this product will weather the storm."