



Commercial Case Study

Green Saves Green, and Achieves Gold, at Spring ISD's Gloria Marshall Elementary School in Texas

When the Spring Independent School District (ISD) began planning for the construction of its newest elementary building, of primary focus was sticking to a proven, budget-conscious design. However, school administrators quickly discovered that smart architectural planning, coupled with the right combination of contractors and materials, could mean the construction of a school on budget and on trend with the latest in sustainable building methods.

Working with architectural firm SHW Group, Spring ISD's administration was successful in designing what would become one of the leading green educational facilities in all of Texas. Contributing to this achievement, the two-story, 105,000 square foot Gloria Marshall Elementary School, which was built by Purcell Construction and completed in September 2010, features numerous sustainable building elements that promote both conservation and energy efficiency.

Successfully securing a LEED® (Leadership in Energy and Environmental Design) Gold certification from the U.S. Green Building Council (USGBC), the school has also been designed to earn an ENERGY STAR rating from the U.S. Environmental Protection Agency (EPA), and was bestowed a Houston AIA Honor Award in 2011.

An on-site wind turbine and 10 kilowatts of roof-mounted photovoltaic cells provide Gloria Marshall Elementary School with independent renewable energy sourcing capabilities, while passive solar features and a reflective white roof contribute to heat management. Also, daylighting and a smart controls sensor system enable the school to harvest 75 percent natural light for illumination needs. An above-ground cistern collects rainwater in a way that can be observed by students, and supplies it to an outdoor eco-pond. A 20,000-gallon underground tank that is also fed by the roof drainage system supplies water for the school's bathrooms, and further water conservation is achieved via an irrigation-free landscaping design. A science garden, river table, recycled-content materials and other sustainable construction materials additionally contribute to the school's notability as both a truly green structure and a hands-on learning environment for students.

“Gloria Marshall Elementary School is an amazing facility in many ways,” said Jeff Windsor, Spring ISD director of construction and energy. “We are not only saving the district money – close to 50 percent when compared with our older building prototypes – but have created a dynamic building that will be used daily as an instrument of learning.”



According to Windsor, many systems in the school serve a dually functional and educational purpose. “For example, the roof-mounted photovoltaic cells are not only a learning tool, they are a trial to determine if we will replicate their use on a much larger scale to supply most of the electricity for our next school. This also applies to the onsite wind turbine. Also, a touch-screen display, located in the school’s foyer, monitors the real-time activity of the mechanical and electrical systems of the building and is being tested for future use throughout the district.”

Rounding out Gloria Marshall’s host of renewable and energy efficient components, the school also features a high-performance HVAC system that incorporates geothermal technology, which is expected to facilitate at least a 25 percent energy savings beyond that specified by code. The 275-ton system – the first of its kind to be used for heating and cooling in a Houston school – includes a network of 180 300-ft. deep vertical wells and



geothermal heat pump technology from ClimateMaster. It is comprised of 64 Tranquility® 20 Single-Stage (TS) and Tranquility® 30 Two-Stage (TT) units, as well as two Tranquility® Modular Water to Water (TMW) units, all of which include the new environmentally friendly EarthPure® HFC-410A refrigerant technology.

“As our first project with the SHW Group, Spring ISD and in the Houston area overall, this needed to be a home run for CMTA,” said Mark Seibert, principal at CMTA Consulting Engineers, Inc., the project MEP firm. “This was also the first time a school would be built with a geothermal system in the Houston area, and we wanted to make sure we had a manufacturer on board who would be a partner on the project – not just an equipment supplier.”

According to Seibert, the ClimateMaster units used enabled CMTA to design a system that would deliver the required 25 percent energy savings for the project, while also helping to earn all available energy points for LEED® certification at the Gold level.

“ClimateMaster was with us on this job every step of the way,” said Seibert. “This has been an example of how the trust and professionalism in a true partnership with your equipment supplier can make great things happen.” Seibert additionally shares that the high-efficiency ClimateMaster units notably contribute to Gloria Marshall’s current use of half the energy of the district’s existing school buildings.

“We were looking at a groundbreaking situation with the first geothermal job at a school in Houston, and to be honest, people were a little nervous about it at first,” said Michael Glasner, president of Southern Mechanical and the project’s mechanical contractor.

Gloria Marshall Elementary School Spring, TX



According to Glasner, while his team navigated a few learning curves as to the best way to install this type of system, his first experience with geothermal ground-source heat pump technology was favorable.

“By the end of the job we had a solid understanding of how best to integrate geothermal into a school, and why, overall, this is a great system for saving on energy costs,” Glasner said. “In fact, we’ve now completed a second geothermal job at Sheldon Elementary No. 5 School, and I expect we’ll be seeing more in the future.”

“In all our geothermal job experience, we’d never seen a project quite like this one,” said Russell Buras, president at LoopTech, the project’s geothermal drilling contractor and ground loop installer. Buras and LoopTech oversaw drilling of the well field, which was created in part under Gloria Marshall’s parking lot and in part under a field on the school grounds. The company used enhanced thermal grout in all the wells and additionally installed the ground loop field for the geothermal system. LoopTech also aggregated HDPE piping from the field into an outdoor vault, from which the supply and return mains circulate water to and from the HVAC system’s HDPE piping inside the building via a distributed pumping configuration. In addition, Purge Rite provided system flushing services to ensure optimal water flow prior to the system going online.

“From an overall project perspective, everything went smoothly,” Buras said. “We also have a lot of pride in it as a company, including our work in helping to create the student learning experience with the exposed geothermal heat pumps inside the school. Since completing the job we’ve used it several times as a showcase for our potential customers – people have even flown in from out of state to see it. In addition to many accolades for the impressive nature of this project overall, I’m expecting Gloria Marshall will see

tremendous savings on their energy bills.”

When students began classes at Gloria Marshall Elementary School in August of 2011, they were welcomed into a beautiful, environmentally friendly facility that offers unique opportunities for learning about their world and how it works.

“Everywhere you look there are teaching tools incorporated into the campus. In fact, the building itself is a teaching tool,” said Kathy Morrison, Gloria Marshall principal. “Using discovery learning, our students are involved in engaging projects that incorporate core subjects and have been designed with the learner in mind.”



As one example, Morrison shares that students have access to outdoor classrooms next to an eco-pond where plans are being developed for using underwater cameras and other equipment to study the ecosystem, compare living and non-living things, investigate the life cycle of plants and animals and collect data on the impact of environmental factors.

Additional learning features include: an indoor tree house made from reclaimed wood; a helix-shaped indoor slide; a series of windows designed to enable students to track the sun’s movement throughout the year; and outdoor gardens designed for a host of interdisciplinary learning activities.

“Gloria Marshall is an exciting place to teach and learn. We are all enjoying the opportunities that this unique facility provides for both students and staff,” Morrison said.



Gloria Marshall Elementary School
Spring, TX

Architect:
Jody Henry - SHW Group

Mechanical Contractor:
Southern Mechanical

LEED® Gold Certified

Equipment:
64 Tranquility® 20 (TS) Units & Tranquility® 30 (TT) Units
2 Tranquility® Modular Water-to-Water (TMW) Units

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