# ROOFING "OLD RED"

**Built in 1892,** the Old Red Museum of Dallas County History and Culture is a symbol of Dallas heritage. Located at the crossroads of tourist traffic, the museum is adjacent to the John F. Kennedy Memorial and Dealey Plaza. Seeking to inspire and educate people about the rich cultural, economic, political and social history of Dallas, the museum showcases many cultures that formed the city.

The museum's first floor contains a special exhibits gallery. The second floor has interactive exhibits with touchscreen computers, an educational learning center and four minitheaters. Architectural highlights include a clock tower; four decorative terra-cotta wyverns (Latin for serpents) perched atop columns on four corners of the museum's exterior; a grand staircase; the Old Red Courthouse with an elaborate judge's bench; stained-glass windows; a giant, neon-red Pegasus sign salvaged from an old Mobil gas station; and a large vault containing original land deeds discovered during a recent renovation.

As part of the renovation, the museum's 33,000-square-foot slate roof system was replaced by CMR Construction and Roofing LLC, Dallas.

"I first heard about the renovation project in 2012 when the *Dallas Morning News* published an article about slates falling off the building and creating a hazard," says Steven Soule, CEO of CMR Construction and Roofing. "Later, I received a bid notice from the project's general contractor. CMR Construction and Roofing was selected as the qualified roofing contractor based on our historical roof restoration experience."

## Prep work

The Old Red Museum of Dallas County History and Culture roofing project posed several logistical and material challenges.

First, the job site was in one of the busiest parts of downtown Dallas. The on and off ramps for a nearby interstate flow directly to and from the streets on the north and south sides of the museum, so most vehicular traffic coming and going from the city passed the job site.

Additionally, the museum sits between JFK Memorial and the Grassy Knoll, so thousands of pedestrians walk by the museum daily.

Photos courtesy of CMR Construction and Roofing LLC, Dallas.

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# CMR CONSTRUCTION AND ROOFING RESTORES THE ROOF ON A DALLAS MUSEUM

BY CHRYSTINE ELLE HANUS

Sidewalk space was extremely limited, and in some cases, the building's foundation was only a few feet from the sidewalk.

The building's height posed another challenge. The lowest elevation was 76 feet from the ground. Rafters with 12:12 and 16:12 slopes also ran an additional 47 feet up to the main ridge. To stage materials and permit safe worker access at those heights required a solid work platform.

Accordingly, in late 2018, workers erected scaffolding around the entire building. BETA MAX Hoists were positioned on the building's east and west sides to raise materials and tools to the main working level. From there, workers assembled trash chutes to remove debris. The city required all sidewalks to remain open, so workers extended the scaffolding across the sidewalks and down to trailers parked in the metered parking spots adjacent to the building.

"Although these methods were slow and somewhat inefficient, it was the only way to keep the sidewalks open, limit damage to the grounds and not disrupt traffic," Soule says.

## Tear-off

In January 2019, the tear-off process began. Workers removed more than 330,000 pounds of slate, underlayment, and copper gutters and flashings. Crew members hand-carried the debris to baskets on the hoists or into a trash chute and then lowered the torn-off materials into trash hoppers. Then, the trash hoppers were transported by fork-lift to dump trailers parked on the street.

Removing the underlayment while also preventing it from blowing into traffic, pedestrians or other buildings was not an easy task.

"When the courthouse was reroofed during the 1980s, it appears that much of the old underlayment was left in place," Soule says. "After verifying the underlay-ment did not contain asbestos, our crew painstakingly removed up to five or six layers of 120-year-old organic underlay-ment that was sometimes in tiny and dusty pieces. The underlayment had to

Workers erected scaffolding around the entire building and positioned hoists on the east and west sides.

Crew members replaced more than 7,500 linear feet of customized sheathing.

**Project name:** Old Red Museum of Dallas County History and Culture
**Project location:** Dallas
**Project duration:** January-December 2019
**Roof system type:** Slate
**Roofing contractor:** CMR Construction and Roofing LLC, Dallas
**Roofing manufacturers:** Alumet® Supply, Irving, Texas; Bayou City Lumber, Houston; Boston Valley® Terra Cotta, Orchard Park, N.Y.; Carlisle® SynTec Systems, Carlisle, Pa.; Hilltop Slate, Middle Granville, N.Y.; North Country Slate, Uxbridge, Ontario; Owens Corning, Toledo, Ohio

The red slate for the project took about 22 weeks to obtain, so it was shipped in small shipments as it was produced during an eight-month period.

immediately be put into plastic bags and lowered to the ground to prevent it from blowing all over downtown Dallas as wind whipped between tall adjacent buildings."

During the tear-off phase, one worker was positioned in the attic full-time to clean up debris that fell through gaps in the boards and into the attic.

## Sheathing

After the slate and underlayment were removed, the 120-year-old sheathing had to be addressed.

"The existing boards were 2 by 7½ inches, not exactly common size," Soule explains. "Additionally, the building owner wanted the new wood to be fire-treated. So, 2½- by 8-inch boards were sourced and planed to size before being treated. Thankfully, we knew of a specialty lumber vendor to source uncommon lumber species and sizes from numerous historical roof restoration projects."

Attaching the lumber was another challenge. All the rafters in the structure were made of steel, and the 2- by 7½-inch sheathing boards were attached to the rafters by long nails that went through the sheathing boards and into the rafters.

"In other words, none of the wood sheathing actually was anchored to the rafters," Soule says. "In effect, the sheathing was clipped on. Although this process seems to have been efficient and effective while the structure was being built, it was not feasible for performing spot repairs on the deck."

CMR Construction and Roofing workers used powder-actuated fasteners to attach the new sheathing boards to the steel rafters.

"After we found pins that were long and thick enough to penetrate the steel, the attachment process went smoothly," Soule says. "Our crew replaced more than 7,500 linear feet of 2- by 7½-inch boards."

Removing the built-in gutter system also was especially challenging because it had to remain operational while workers replaced all the gutters and wood substrate with new materials.

"We paid extra attention to the weather," Soule says. "We planned and sequenced the gutter work in sections to ensure they could be demolished, built and covered with underlayment during good weather."

## Installation

After the slate, gutters and flashing were removed, the CMR Construction and Roofing team began installing new roofing components.

"We had to pay special attention to scheduling and coordination with other trades because the masonry and painting workers had to access the same areas as our workers," Soule says. "Protecting our completed work was a constant struggle."

Workers installed new copper gutters over the underlayment and riveted and soldered all joints to the existing internal drainage components. CMR Construction and Roofing craftsmen formed the gutters to fit around columns and other difficult details, including a radius gutter around the turrets.

"We decided to eliminate as many soldered joints from the radius gutter as possible, so the average distance between joints increased from 12 to 36 inches," Soule explains. "This was accomplished by cutting curved sections of copper instead of short pieces to dramatically reduce wasting copper material, reducing the number of joints and potential future failure points."

After the gutter system was renovated, workers began installing the slate. Sourcing red slate for the project was difficult.

"As the only viable source of quality red slate in the U.S., Hilltop Slate supplied the red scalloped slate and the red slate for the turrets," Soule says. "Green and black slate are relatively available from North Country Slate with a three- to four-week delivery lead time, but red slate generally takes 22 weeks or longer to obtain and is subject to weather delays. So we received the red slate in small shipments during an eight-month period. Planning the work to accommodate the slow trickle of material was difficult."

Because of a lack of space at the job site, the slate shipments were directed to CMR Construction and Roofing's yard in Fort Worth, Texas, and transferred four pallets at a time as needed. About 10 to 12 pallets always were kept on-site so workers could blend the slate from different pallets before loading it into hoist baskets. The slate was blended again as team members unloaded it from the baskets and stacked the pieces on the

main scaffolding deck. And before hand-carrying the pieces to the installation sites, workers blended the slate a third time.

"This methodical blending process was crucial to ensuring there were no 'hot spots' of colors on the roof. Because slate is a naturally occurring product, there are different shades of color visible in the slate," Soule explains. "Those shades appear in clusters unless different veins or sections of the veins are blended. Especially on such a large and tall roof visible from a great distance, it is imperative to blend the slate to make sure one section of the roof isn't darker or lighter than another."

Workers installed the green, black and red slate in patterns to match the original roof design.

"We painstakingly laid out the color bands around the entire building, including the rafters that were many times several inches out of square from end to end," Soule says. "We attached the slates with two copper nails each, which were difficult to drive into true 2-inch-thick roof sheathing."

At the turrets, team members graduated the widths of the slates from course to course. To get the slates to lay properly, workers trimmed each piece of slate four times—a technique called shouldering.

"Fortunately, we had access to a special circular saw blade that allowed us to quickly cut the slates while still leaving a chamfered edge," Soule says. "Nearly 20,000 pieces of slate needed to be installed on 8,800 square feet of turrets, and the blade allowed us to make 80,000 trimming cuts in short order while still producing the 'hand-split' edge any slate roofing purist demands. Each course of slate got narrower as the top of the turret was approached, so we trimmed slates specifically for the course in which they were to be laid."

The final pieces to be installed were the terra-cotta hip and ridge crestings.

"The first challenge during this stage of the project was getting a piece of the existing ridge crestings off the roof and to Boston Valley Terra Cotta's facility in New York," Soule explains. "After that, shop drawings were produced, reviewed and approved. Then, molds were made and product cast. The total time from shipment of the existing piece to receipt of the first new pieces was 10 months. And once they arrived, the 75-pound clay pieces that cost nearly $650 each to make had to be carefully hoisted from the ground, hand-carried to the highest points on the roof and set and secured in place. We followed the layout of the original roof precisely."

## A roof for generations

In December 2019, the CMR Construction and Roofing crew completed work on the Old Red Museum of Dallas County History and Culture. Despite countless logistical and material challenges, the team maintained the museum's historical integrity while successfully executing a complex slate roof system installation that included more than 600 linear feet of custom hips and ridges, 700 linear feet of copper valleys, 1,900 linear feet of copper flashing and 1,500 linear feet of custom copper gutters.

"The roof system replacement at the Old Red Museum of Dallas County History and Culture was a tremendous source of pride for our employees," Soule says. "It is a testament to their experience and dedication to our craft. The goal of the project was to provide a roof system that will last for 100 years. The workmanship reflected on this project as well as the quality of materials installed will help ensure that. And as our employees, family and friends pass by downtown Dallas, they will always be reminded of the year we spent restoring a roof many generations will get to see."

For demonstrating excellence on the Old Red Museum of Dallas County History and Culture, CMR Construction and Roofing was named a 2021 Gold Circle Awards finalist by the Roofing Alliance in the Outstanding Workmanship and Innovative Solutions steep-slope category.

To watch a video about the Old Red Museum of Dallas County History and Culture roofing project, go to professionalroofing.net.

**CHRYSTINE ELLE HANUS** is *Professional Roofing*'s associate editor and an NRCA director of communications.

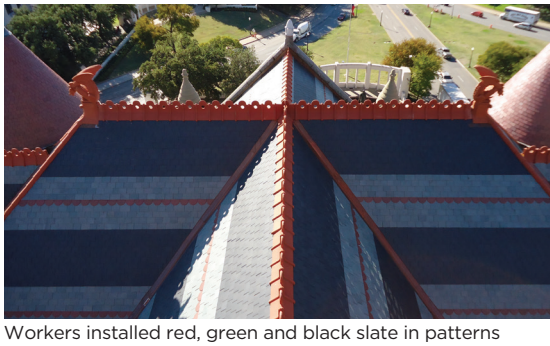
### RESTORING TEXAS COURTHOUSES

North Country Slate, Uxbridge, Ontario, provided the green and black slate for the Old Red Museum of Dallas County History and Culture's new roof system. As part of a comprehensive program launched in 1999, North Country Slate works with the Texas Historical Commission to restore historical courthouses in Texas.

There are about 220 courthouses in Texas built before 1948. Many still need roof system repairs. To match the original architectural designs, many courthouses are being re-roofed with black slate from North Country Slate. So far, North Country Slate has supplied the slate for 15 Texas courthouse renovation projects.

Craftsmen created more than 700 linear feet of copper valleys, 1,900 linear feet of copper flashings and 1,500 linear feet of custom copper gutters.

An aerial view of the museum's roof system under construction



Workers installed red, green and black slate in patterns to match the original roof design.