Photos courtesy of Castro Roofing of Texas LP, Dallas

A+ ROOFING

Castro Roofing of Texas passes all tests to reroof the University of Houston Science Center

by Chrystine Elle Hanus

Founded in 1927, the University of Houston's mission is to offer nationally competitive and internationally recognized opportunities for learning, discovery and engagement to a diverse population of students in a real-world setting. In 1963, the university became a state institution. In 1977, it joined the University of Houston System, a group of 10 public institutions of higher learning in the Houston area sharing common goals and governed by a board of regents.

Currently, the University of Houston is a leading public research university serving about 40,000 students annually in more than 300 undergraduate and graduate programs. Its solid funding base of $33 million for annual research expenditures and opportunities to collaborate with NASA, the Texas Medical Center and other entities make the college an attractive learning center for scientists. Faculty and students conduct research within 40 university research centers, including the University of Houston Science Center.

Damage research

In 2008, Hurricane Ike made landfall over the University of Houston Science Center. Dale Irvin, associate vice chancellor at the University of Houston, was part of an on-site team when the hurricane's eye crossed over the campus. The university's initial run-through inspection revealed minimal damage.

"We were cautiously optimistic and relieved," Irvin says. "Although the hurricane eye passed over the campus, the damage was not that significant."

However, Armko Industries Inc., Houston, the university's roof consultant, recommended infrared thermal mapping to determine if there was moisture inside the roof system, which would not be visible from physical inspection. The thermal imaging revealed such extensive moisture infiltration, a new roof system was recommended.

"Had the University of Houston not contracted for the infrared thermal mapping, we would have just made repairs," Irvin says. "And then a couple of years down the road, it would be too late to go back to the Federal Emergency Management Agency, our insurance company and the state to enable restoration."

Because of the nature and complexities of the University of Houston Science Center's roof system, Armko Industries selected Castro Roofing of Texas LP, Dallas, to perform the roof system replacement.

"With the complexity of this project, it would be detrimental for the university if the facility needed to be evacuated or shut down due to negligence of a contractor," Irvin says. "This was not the case with Castro Roofing."

Restoration commences

The University of Houston Science Center's roof system replacement began in January 2010 with Castro Roofing removing the existing 45,500 square feet of coal-tar pitch built-up roof and fiberglass insulation down to the lightweight concrete deck, including related sheet-metal flashings. In addition, 2,400 square feet of lightning protection also was removed to facilitate the disposal of the existing roofing material.

Project name: University of Houston Science Center
Project location: Houston
Project duration: January 2010-March 2010
Roof system type: TPO
Roofing contractor: Castro Roofing of Texas LP, Dallas
Product manufacturers: GAF, Wayne, N.J.; USG Corp., Chicago

Top to bottom: 14,400 linear feet of electrical conduit was raised 1 inch before removing the old roof system and repositioned with new supports following the new roof system installation; 2,400 square feet of lightning protection was removed and reinstalled along with a new walkway for safety.

Castro Roofing used mechanized equipment to cut the existing membrane into manageable sections. Workers then removed the debris to a crane staging area where the material was hoisted over a 16-foot-high perimeter screen and into trash bins. This required careful maneuvering around miles of piping and more than 180 roof penetrations without interrupting the building's occupants and research laboratory. Multiple roof levels further complicated the process.

Following tear-off, a vented base sheet then was mechanically fastened to the lightweight concrete deck, followed by 3-inch-thick EnergyGuard™ Tapered PolyIso Foam Roof Insulation. Some rooftop curbs were so close, Castro Roofing closed the gaps with insulation to make multiple curbs into one.

Next, a ⅝-inch-thick SECUROCK® gypsum-fiber roof board was adhered with hot asphalt. Three plies of GAFGLAS® FlexPly™ 6 fiberglass felt sheets then were adhered using hot asphalt, followed by an EverGuard® 60-mil-thick fleece-back TPO single-ply membrane also adhered using hot asphalt. The side and end laps were heat-welded.

A pipe was assembled to pump hot asphalt 100 feet up the building and over the perimeter screen to the roof. The pipe was insulated to keep the asphalt from cooling and clogging the pipe.

New sheet-metal flashings and wood blocking also were installed, followed by reinstallation and repositioning of the 2,400 square feet of code-required lightning protection. A new walkway was added for safety.

The working access area was limited to one location for lowering roof debris and raising materials, making the tear-off and installation processes especially challenging. Access to the loading dock also had to remain open at all times for other vendors' use while keeping the area isolated to prevent pedestrian injury.

Safety measures

Preventing accidents was at the forefront of every discussion and decision made during Castro Roofing's 22 safety meetings held throughout the 63-day construction period. Castro Roofing's foremen took the lead by administering the meetings and making recommendations regarding upcoming project tasks.

On-site toolbox talks discussing topics such as Occupational Safety and Health Administration safety standards, urban environment safety requirements, back-injury prevention and protective wear helped create an accident-free environment. As well, a third-party job-safety expert was hired to provide an additional job-specific safety plan that was implemented without fail—no accidents or injuries were reported during the project.

Extra credit

Because of the amount of active scientific testing inside the building, wind diverters are installed in the facility to carry fumes upwards and away from the building to assist with fumes dispersion. To perform the tear-off and reroof processes, Castro Roofing needed to reposition the wind diverters and perform special testing to ensure the chemical fumes levels were not harmful to workers and occupants during the project.

In addition, Castro Roofing had to raise 14,400 linear feet of electrical conduit 1 inch before removing the old roof system. The new roof system then was carefully installed underneath the conduit. Following installation, the conduit then was repositioned with new conduit supports and protection pads—all tasks were performed without power disconnection.

Honors

Castro Roofing completed the project in March 2010, two weeks ahead of schedule, and received praise for its work.

"We have been in the roofing industry as consultants since 1983 and find many contractors do not pay attention to a project the way Castro Roofing did," says Mike Perry, building envelope consultant for Armko Industries. "Castro Roofing's level of expertise and qualifications were outstanding, and I thank them for a job well-done."

For its efforts on the University of Houston Science Center, Castro Roofing was recognized as a finalist in the Outstanding Workmanship: Low-slope category during NRCA's 2012 Gold Circle Awards program.

"The most rewarding parts of the project were our client was happy and we were recognized nationally for our craftsmanship," says AJ Rodriguez, project consultant for Castro Roofing. "That and no reported accidents."

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