

Green School

California High Schools Go Green with White EPDM

*by Bill Tippins, Ph.D., MBA, EPDM marketing manager, Firestone Building Products*

The San Mateo Union High School District (SMUHSD) oversees seven public high school facilities just outside of San Francisco, Calif. In an effort to lower its \$1.1 million annual electricity bill, the district sought to install photovoltaic (PV) panels on as many of the schools as possible, thereby reducing both its carbon footprint as well as its educational operating budget.

Three of the high schools - Aragon, Mills, and Hillsdale - combine for more than 420,000 square feet of roofing surface and had been reroofed approximately four years ago with two-ply SBS torch-down modified bitumen roofing systems from Firestone Building Products. The SBS systems continue to perform well; however, portions of each building also had the original four-ply pitch and gravel built-up roofing (BUR) systems that were badly deteriorated.

After a series of investigative meetings with local architects and consultants, the school district opted to "go green" through a combination of roof re-cover and tear-off/replacement prior to installing the PV panels. The SBS modified bitumen membranes were re-covered with a new roofing system featuring a reflective, white EPDM membrane, while the old BUR systems were torn out and replaced with the white EPDM as well.

Ultimately, more than 2,500 PV panels will be installed atop all three schools.

With a building design that dates back more than 50 years, the roofs were nearly dead-flat, which resulted in ponding water in many locations, and posed challenges for installing a new roofing system. To determine the

best roofing solution, the school district worked with Quattrocchi Kwok Architects (QKA), a 50-person firm in Santa Rosa, Calif., that specializes in public school design and construction.

According to Nick Stephenson, architect for QKA, "We initially considered Elvaloy<sup>®</sup>-coated and PVC roofing systems, but we needed something that would survive the life cycle of the PV panels, handle the foot traffic of the PV installation, and also could withstand the potential for ponding water. Those factors led us to specify a fully adhered, white EPDM roofing system."

## Sustainable

Roofing system durability is a critically important factor in green roofing decisions. This is particularly true for applications where long-term building ownership is concerned, such as school districts and healthcare facilities. For a roofing material to be deemed truly "green," it is imperative to look beyond the initial design stage and consider the system's full operational life.

Single-ply EPDM roofing membranes offer a combination of low installation cost and lifetime economic value, durability, installation ease, design flexibility, and recyclability, making them an economic and sustainable choice. The white EPDM (white-on-black bi-laminate) membrane installed on the San Mateo high schools possesses the same physical traits as its black counterpart, while providing a highly reflective membrane. In this instance, QKA specified a 90-mil Firestone RubberGard™ EcoWhite™ EPDM membrane. EcoWhite EPDM has an initial solar reflectance of 0.83 and a solar reflectance index of 105, making it one of the industry's most reflective and durable white membranes. Stephenson added, "In addition to the benefits of white EPDM with respect to solar heat gain, the school district needed a high quality roof that could handle literally thousands of

penetrations required for the PV support stanchions. White EPDM was a perfect fit.”

## ReRoof Plan

As the reroofing decision unfolded, QKA worked closely with Firestone to develop specifications, plans, and details. Based on the condition of the existing roofs, approximately 85% of the combined surface was a re-cover, while a small portion involved a tear-off and replacement. BEST Contracting Services of Hayward, Calif., served as installation contractor.

To prepare each school for the PV panel installation, the new roofing system included Firestone’s 1/2” ISOGARD™ HD high-density cover board or 5/8” DensDeck Prime roof board mechanically attached through the SBS system and into the existing steel deck. ISOGARD HD, which contains a closed-cell polyiso core, was used on the majority of the project over occupied areas, while DensDeck was installed over open areas. Where possible, slope was increased to improve drainage as well. The white EPDM membrane was then fully adhered to the cover board with a water-based bonding adhesive.

BEST Contracting coordinated work crews that reached a height of 90 to 100 people to simultaneously reroof all three sites. With the EPDM membrane in place, BEST crews prepared approximately 6,000 stanchions to support the PV panels. Firestone supplied BEST with customized target patches and boots to help expedite the installation of the stanchions.

“This was by far one of the most challenges projects that we have ever undertaken,” said Thomas Ryan, roofing division manager for BEST’s Northern California. “There was a lot of interior work on fire sprinklers and ceiling tiles, but the bigger challenges involved installing the new system around about 260 skylights and coordinating the work around classroom schedules and school activities.”

For the skylights, BEST first removed the existing 6' x 6' units, framed the deck up to the existing roof height, built 2' x 2' curbs and then installed new skylights. And, to accommodate the school's schedules, BEST worked primarily from noon until 11:30 pm most days. "We had to be creative with our scheduling. Once school was in session we had to adjust our schedules so that the roof installation only occurred between noon and 5 pm. At night, we were able to get into the demolition and interior work. With an average daily crew of 70 people on three different buildings it was quite a challenge," Ryan explained.

Despite the challenging logistics, the project has proceeded very smoothly. "For QKA, it is gratifying to work on a project where the commitment to solar energy is the centerpiece," said Stephenson. "There is a willingness to see the value in the upfront costs of a quality roofing system. With the increased thermal performance of the white EPDM and the PV panel installation, the school district will benefit from a substantial reduction in energy costs."

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