

PRESERVING OUR BUILT ENVIRONMENT:

Restoration of EPDM Roofs Extends Service Lives

BY TIM SULLIVAN

Saving 85 cents on the dollar always sounds good to building owners and facility managers. That is exactly what the city of Milwaukee and School District 73 in Vernon Hills, Illinois, realized when they opted to restore EPDM roofs on the Northwest Garage and Hawthorne Elementary School.

Northwest Garage

The Northwest Garage is a large vehicle storage facility that was originally roofed with EPDM in 1994. Inspection of the 73,338-square-foot roof found the membrane to be in excellent condition, but the system had some minor design deficiencies,

which included minor areas of poor detailing and wind damage. No major seam failure was found, but some minor delaminations and bridging were observed. Rather than removing and replacing the roof, it was the recommendation of the owners' Registered Roof Consultant (RRC) to restore and enhance the roof system.

EPDM is a roofing material that exhibits a high level of resistance to ultraviolet degradation, resulting in longer life and making restoration a viable option. Studies by Tim Trial¹ in 2004 confirmed the long-term performance of exposed EPDM.

According to the EPDM Roofing Association (ERA), characteristics that con-

tribute to EPDM's overall system performance include: cyclical membrane fatigue resistance; high resistance to ozone, weathering and abrasion; flexibility in low temperatures; thermal shock durability; and solvent resistance.

The garage roof restoration design called for all the lap seams to be cleaned and covered with semi-cured, self-adhering EPDM cover strips and the edges to be sealed with lap sealant. All abandoned roof curbs were removed, all existing roof curbs were reflashed, and the base flashing at the perimeter parapets was redesigned to "wrap" the wall and be covered with sheet metal copings in order to render the limestone coping joints watertight.

Other restoration measures were executed. The existing drains had been drastically sumped at three inches below the top of the roof surface, causing stretching of the membrane around the drains. The restoration involved raising the new drains for improved long-term performance. The garage parapet base flashings had been poorly executed, and the coping stone joints were badly deteriorated. The solution was to install plywood on the inboard side to reflash the wall and to install flashing over the coping to encapsulate the problem. Existing gutters above the low clerestory walls had not been properly attached, and the wind had pulled away from the existing securements. Work was completed to achieve additional securement of the gutters, as well as enhancement of the flashing on the gutter flanges. Similar measures were taken to repair wind damage observed on the high clerestory roof edges because the flashing was not clipped, and the wind had peeled it up.

Following the restoration work, the city received a 10-year warranty extension. "The idea of sustaining our facilities and reduc-



Northwest Garage in Milwaukee, WI.



The drainage system and roofing membrane were found to be in need of restoration on the roof of the City of Milwaukee Northwest Garage.

ing our costs was an idea that we fully embrace,” said Venu Gupta, facilities manager, Public Works Division for the city of Milwaukee. “We appreciated being informed of this possibility. Our building inventory is quite large and the prospect of achieving long-term service lives of our roofs is indeed a welcomed opportunity.”

Hawthorne Elementary School

In January 1983, a 65,417-square-foot ballasted EPDM system was installed on the Hawthorne Elementary School under the watchful eye of a fulltime roof consultant. Twenty-one years later, that same consultant was requested to inspect the roof and let the school board know of its condition and if replacement was required.

Conditions that were looked for were membrane disbondment at the seams, flashing lap conditions, punctures, wrinkles, shrinkage, dimensional instability of the membrane, and defective or improper repairs.



Hawthorne Elementary School, School District 73, Vernon Hills, IL.

Inspection of the roof revealed that no leaks had ever been reported but that a number of the building elements that impinge upon the roof, such as skylights and HVAC equipment, had flashing conditions that were beginning to deteriorate. The 45-mil EPDM membrane appeared to be in good condition, and a sample was taken for testing. Test results confirmed that the loose-laid, ballasted EPDM in place on the roof after 21 years of service had material characteristics that exceed the minimum requirement of membrane being manufactured today. The adhesive lap

seams were all found to be tight, with no known deficiencies. A small amount of bridging at the wall base flashing was observed. The recommendation to the school board was to restore the roof with the goal of achieving at least ten years more service life.

The restoration design at Hawthorne Elementary involved replacing all the skylights with OSHA-approved fall protection skylights, redesigning and improving the HVAC intersection with the roof, installing semi-cured, self-adhering EPDM cover strips over all lap seams, installing target patches at the roof drains, reflashing all roof curbs and base flashings, and installing a new cover strip at the gravel stop.

The total restoration cost was \$52,000, including the replacement of ten skylights. Removal of the existing roof system and installation of a new roof system was estimated at \$450,000.

“The board of education was extremely pleased with being informed as to the possibility of EPDM roof restoration, rather than just being told to replace the roof,” said Alan Hahn, district business manager. “We are excited at the potential for extending our roofs’ service lives almost indefinitely, as our entire district has EPDM roofs. Saving money while not sacrificing quality will always have a place in the educational market.”


Recent studies show that tensile strength and tear resistance data obtained for both ballasted and exposed EPDM roofs exceed the ASTM D-4637 specifications for new and heat-aged membranes after 17 - 26 years of service life. In addition, the membranes remain watertight and functional.

“Our field research indicates that EDPM



Separation of the seams of the EPDM roofing membrane were visible during inspection of the roof on the Milwaukee Northwest Garage.

roof systems are experiencing life cycles well in excess of 30 years and from a sustainability standpoint, restoration is a lower cost and a more environmentally friendly alternative to roof replacement,” ERA Board Chairman Jim Hoff explained.

Sullivan Roofing of Mount Prospect, Illinois, completed the work on the garage and the school. 

The EPDM Roofing Association (ERA) has posted newly developed restoration specifications and details on its Web site, www.epdmroofs.org, including downloadable outline specifications and numerous detail drawings. The topics addressed in the ERA guide include restoration techniques for field seams, base flashing, vent pipe flashing, roof drains, curb flashing, and gravel-stop roof edges.

¹ Trial, Tim, Ross Roberston, and Brian Gish, “EPDM Roof Membranes: Long-term Performance Revisited,” EPDM Roofing Association, 2004.

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