ROOFING REVIEW

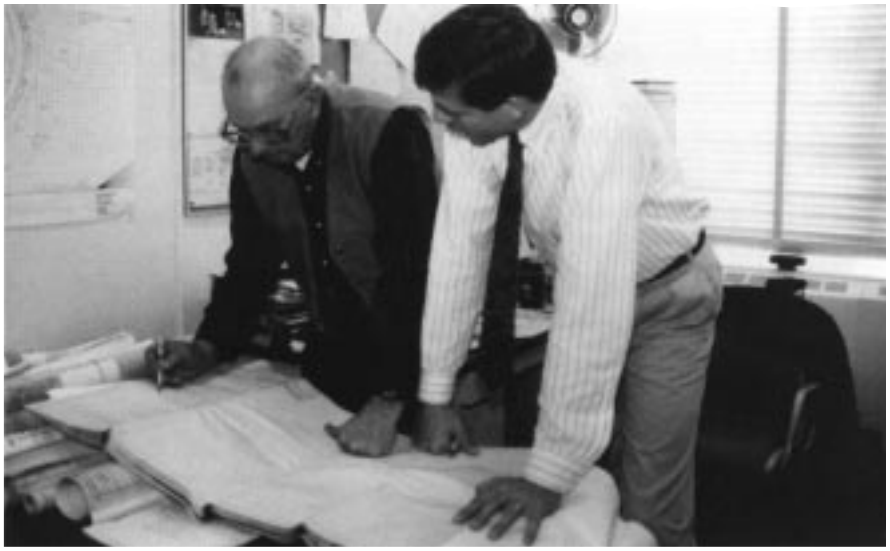
An Overview of Current LIGHTGUARD Applications

Roofing Product Gives Optimum Performance For Major U.S. Government Research Facility

Argonne National Laboratory, one of the largest energy research and development organizations in the nation with a world reputation for achievement in a variety of individual scientific and engineering disciplines, is headquartered 25 miles southwest of Chicago on 1,700 wooded acres with nearly a hundred major buildings housing the most advanced scientific and technological equipment today.

Following an analysis of all buildings, the majority constructed in the late 1940's through the early 1960's, Argonne initiated a $9 million, three-year reroofing program in the late 1980's to replace aging four-ply built-up roofs with stone ballast. According to Argonne experts, the roofs had been subjected to years of exposure to the most harmful of the natural elements — heat and cold. Additionally, nearly 75 buildings containing flat top roofs of aggregate surfacing suffered from blistering and cracking. In some cases, foot traffic resulted in leakage.

Experts knew from past experience that T. Clear Protected Membrane Roof Systems using LIGHTGUARD® Protected Membrane Roof Insulation had been used successfully in smaller Argonne roofing projects. Now that this major reroofing program would be initiated, could LIGHTGUARD be relied on again?



Construction Coordinator, Chuck Bally, and T. Clear agent, Ron Rediger, carefully review installation plans.

LIGHTGUARD The Clear Choice For Experts

According to Argonne experts, there were several issues to consider. "The roofing membranes needed to be protected against ultra-violet light and foot traffic," says Chuck Ball, construction coordinator for Argonne. "Another prime concern was the need for increased insulation." Not as important, but certainly a consideration, was the need for flexibility in the roofing system to better handle various roof penetrations and features, such as blowers and vents.

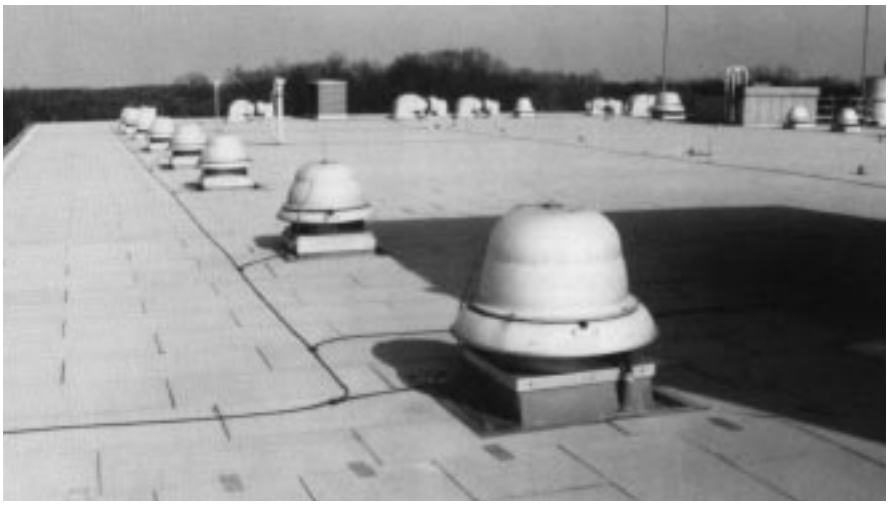
Bally and other experts, including Larry Moran, project manager, and John Perfect,

LIGHTGUARD®
Protected Membrane Roof Insulation

a construction field representative who at the time was the lead designer for the roofing project, collaborated extensively before choosing a T. Clear Protected Membrane Roof System (PMR) comprised of the roof deck and a single-ply PVC membrane with high-UV resistant membranes for areas exposed to the sun. Rather than ballast with stone, which can splinter in freezing weather and puncture the membrane, they chose LIGHTGUARD Protected Membrane Roof Insulation, which provides ballast, protection from ultra-violet light, a walking surface, and added insulation. Moran points out that after the new roofing system was installed, the R-value for the roof system, using LIGHTGUARD, increased from 16 to 25, which translated into a 50 percent increase in the roof's resistance to heat loss. Because the laboratory is equipped with a myriad of roof penetrations, LIGHTGUARD and PVC membrane helped to make the installation easier. At the completion of the project, workers had installed 1.3 million square feet of LIGHTGUARD on nearly 75 buildings.

LIGHTGUARD Protects Membrane, Saves Energy

LIGHTGUARD Protected Membrane Roof Insulation is comprised of 2-foot by 4-foot panels of 2-inch or 3-inch high-compressive strength extruded polystyrene with a 3/8-inch latex-modified concrete facing. The tight, closed-cell structure of the foam insulation panels resists all forms of water penetration and protects the waterproof membranes from heat, ultra-violet rays, wind, temperature swings, and physical abuse. The LIGHTGUARD panels, tongue and grooved on the long edges and installed in a staggered arrangement, serve as both insulation and ballast. Once installed, LIGHTGUARD panels offer an attractive appearance and a smooth, walkable surface.



LIGHTGUARD provides flexibility in handling roof features such as blowers and vents.

While stone-ballasted PMR systems weigh 11 pounds per square foot, LIGHTGUARD weighs 4.5 pounds per square foot and is ideal for installation of single-ply and built-up roofing requiring a lighter weight roofing system. Though lightweight, LIGHTGUARD panels are durable and will withstand winds of 70 miles per hour and above. Free of CFC, LIGHTGUARD is an environmentally responsible product.

System Goes On Easily

LIGHTGUARD is easy to apply. There is no need to adhere panels to the roof membrane or use fasteners that can puncture the membrane. LIGHTGUARD eliminates damage from windblown rocks from atop the roof because LIGHTGUARD acts as the ballast and does not require the use of crushed stone or gravel. There is also an opportunity to reuse the LIGHTGUARD panels in the event of membrane failure, renovation or vertical expansion. "We've taken LIGHTGUARD panels off one roof, repaired it, and put the panels back on," says Bally.

Now that major reroofing has been completed at Argonne National Laboratory, LIGHTGUARD is protecting the roofing membrane from ultra-violet light and foot traffic, insulation the roof, and providing a smooth, attractive walking surface. Argonne is so satisfied with LIGHTGUARD's performance, that it has selected the product for another project, the Advanced Photon Source, a major new facility that will provide the world's brightest x-ray beams for research in materials science, condensed matter physics, chemistry, geosciences, biology and medicine. Construction for the Advanced Photon Source is expected to be completed sometime in 1995.

LIGHTGUARD has been used by industry, government installations, schools and universities, medical facilities and textile mills in the United States since 1976, when FinPan Inc. began manufacturing the product. LIGHTGUARD is now manufactured, marketed and distributed by FinPan's subsidiary, the T. Clear Corporation.

For technical information or a list of nationwide manufacturer's agents, call T. Clear Corporation at 1-800-544-7398.

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ROOFING REVIEW

An Overview of Current LIGHTGUARD Applications

This Is The Roof That Jack Built For The New Cherokee Corp.

The roof systems on textile manufacturing facilities must solve some very specific problems and no one knows this better than Jack Standridge, engineer and Assistant Vice President of the New Cherokee Corp., just outside Knoxville, Tennessee. Except for the 6 years spent pursuing a degree in Engineering at Clemson University while employed at a power company, Jack has been working in textiles since the age of 16.

"My team and I are responsible for keeping the average fluctuation of temperature and humidity inside this plant to a minimum of + or-2°(%). Otherwise, the cotton gets too dry or too wet. Cotton, under these conditions, breaks and wraps around the rollers. As a result, the looms must be shut down and the string retied. The time lost retying strings slows down production and that means profit losses."

Another problem that Jack and his team must contend with is how to protect the large investment in technology that produces what he calls "the best quality shirting in the world." In an industry that traditionally competes on price to the penny, any damage to high-tech equipment or expenses resulting from plant shut-downs due to water damage from a failed roof are unacceptable.

L to R: Jack Standridge, Asst.VP/Engineer, The New Cherokee Corp.; Terry Clear, VP Technical Services, T. Clear Corp.; Ed Morris, Tennessee Roofing, a T. Clear authorized contractor. Standing at a juncture of an older LIGHTGUARD section and latest section.

Jack Uses Experience And LIGHTGUARD To Solve Roofing Problems

When Jack first came to The New Cherokee Corp. in 1981, he found roof problems that were typical of flat roof systems. The first thing he did was to tour other flat-roofed buildings in the area. He discovered that the problems of flat roofs were associated with expansion and contraction. At this point, Jack decided to solve these problems with a Protected Membrane Roof (PMR) such as the ones he had encountered in his past work experience at Milliken Co. Jack then hired a South Carolina roofing company to put down the first PMR section—a BUR of mop-down felts and rock ballast—in November, 1981, just ahead of a 3" snowfall. A week later, the snow had melted everywhere except over the PMR section of the roof. This convinced Jack that the sections where the PMR had been placed

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Protected Membrane Roof Insulation

A view of the latest LIGHTGUARD section with a typical maintenance cart. Showing are just a few of the many penetrations at The New Cherokee Corp.

were no longer experiencing heat loss. Jack felt he had found a possible solution to controlling the temperature and humidity in The New Cherokee Corp. plant.

However, the footpaths Jack had laid with pavers did not solve all the problems later caused by maintenance traffic. Jack says, "If you drop a motor or a wrench on a conventional BUR the membrane will be broken. The resulting leak will show up 30 or 40 feet away from the crack. This creates a time-consuming process of locating the actual spot on the roof to be repaired." So in 1984, Jack contracted Tennessee Roofing to lay the first of 250,000 square feet of LIGHTGUARD on the roof of The New Cherokee Corp. "To date, the yearly maintenance costs consists of painting the parapet wall. We have had no other problems with our LIGHTGUARD system."

LIGHTGUARD Protects Membrane, Saves Energy

LIGHTGUARD ballasted roof insulation is comprised of 2-foot by 4-foot panels of 2-inch or 3-inch high-compressive strength Styrofoam with a 3/8-inch latex-modified concrete facing. The tight, closed-cell structure of the foam insulation panels resists all forms of water penetration and protects the roofing membranes from heat, ultra-violet rays, temperature swings and freeze-thaw cycles. Ed Morris of Tennessee Roofing says, "I have removed LIGHTGUARD panels to install penetrations on jobs that have been down 8 to 10 years and the membrane looks like the day it went down."

The LIGHTGUARD panels, tongue and grooved on the long edges and installed in a staggered arrangement, serve as both insulation and ballast. Once installed, LIGHTGUARD offers an attractive appearance and a smooth, easy-to-walk-on surface.

While stone- ballasted PMR systems weigh 11 pounds per square foot, LIGHTGUARD weighs 4.5 pounds per square foot and is ideal for installation of single-ply and built-up roofing requiring a lighter weight roofing system. Though lightweight, LIGHTGUARD is durable and will withstand winds of 70 miles per hour and above. Free of CFC, LIGHTGUARD is an environmentally responsible product.

System Goes On Easily

LIGHTGUARD is easy to apply—there is no need to adhere panels to the roof membrane or use fasteners that can puncture the membrane. There is also an opportunity to reuse the LIGHTGUARD panels in the event of membrane failure, renovation or vertical expansion. LIGHTGUARD Ballasted Roof Insulation eliminates damage from wind-blown rocks from atop the roof because LIGHTGUARD does not require the use of crushed stone or gravel.

Since 1981, Jack Standridge has completed 98% of the renovation of the roof at The New Cherokee Corp. "When the final 2% is completed, I don't expect to see this roof again for another 20 years and by then I will be retired." Jack considers LIGHTGUARD the long-term solution to his roofing problems. A LIGHTGUARD Ballasted Roofing System has prevented damage to his "process" and left him more time to concentrate on production maintenance instead of roof maintenance. "It's the right way to do it. It eliminates problems for people coming along behind me. They shouldn't have to deal with something I did wrong." Ed Morris, who has overseen all of the LIGHTGUARD put down at The New Cherokee Corp., would agree. "I don't know of any problems that I have had with a LIGHTGUARD roof."

LIGHTGUARD has been used by industry, government installations, schools and universities, medical facilities and textile mills in the United States since 1976, when FinPan Inc. began manufacturing the product. LIGHTGUARD is now sold, marketed and distributed by FinPan's subsidiary, the T. Clear Corporation.

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ROOFING REVIEW

An Overview of Current LIGHTGUARD Applications

New Roofing System Critical For Renovated R. J. Reynolds Plant.

In the mid to late 1980's, the R. J. Reynolds Tobacco Co., a subsidiary of RJR Nabisco Inc., initiated a major renovation of its Winston-Salem, N.C. manufacturing facility, built in 1960 and known as Whitaker Park. A pre-renovatin analysis of the facility's existing roof indicated that the roofing membranes were nearing the end of their service lives; therefore, R. J. Reynolds included roofing system replacement in the renovation.

The original roofing system consisted of a vinyl vapor retarder, asphaltic coated perlite insulation and a five-ply organic felt built-up asphalt roof with aggregate surfacing. After nearly 25 years of service, the system suffered moderate to severe degradation of its roofing felts due to ponded water and abuse from maintenance traffic and the natural elements.

Inside the plant other problems came into play. The plant operated 24 hours a day and represented a significant portion of R.J. Reynolds' production capabilities. Shutting down the plant or sections of the plant during roof replacement was not feasible.

As such, mechanical attachment of new roof insulation to the roof deck's 2-foot by 8-foot precast concrete panels was ruled out because it was the costliest alternative, and adhering new roof insulation with hot asphalt could result in hot asphalt entering the operating plant. A ballasted roofing system was therefore given high consideration. Another factor affecting the plant internally was humidity control. Orginally, the plant was designed so that only certain areas were humidified. The renovated facility would be designed with more of the plant operation at 60 to 65 percent relative humidity, which would increase the potential for roof condensation throughout the plant. It would therefore become imperative that R.J. Reynolds maintain control of this potential condensation.

A T. Clear Protected Membrane Roof System, using LIGHTGUARD Protected Membrane Roof Insulation, protects the membrane from damage by heavy construction traffic during plant renovations.

Experts Choose LIGHT-GUARD To Solve Roofing Problems

Experts involved in the project had several key issues to consider, points out Richard A. Nuhn, P.E., a roofing/ structural engineering consultant based in Greensboro, N.C., who developed the design and job specifications for the

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Once installed, a T.Clear Protected Membrane Roof System, using Lightguard PMRI, offers a lightweight, yet durable alternative to conventional ballasted systems.

roofing project as senior engineer for R. J. Reynolds. Plant renovations called for extensive reworking of rooftop equipment and supports on the existing building of 700,000 square feet and construction of an adjacent 220,000 square-foot tobacco processing facility. This meant the new roofing system would have to protect the membrane against maintenance traffic and a substantial amount of construction traffic.

The system also needed to reduce current roof dead load and be flexible enough to handle various roof penetrations and features, such as penthoused and heating, ventilation and air conditioning equipment. Since the renovated plant would be operating with high humidities, it was imperative that the roofing system be designed to control condensation. Lastly, but not of least importance, according to Project Manager David L. Payne of R. J. Reynolds, the system needed to be cost effective.

After exploring a variety of options, Nuhn and Payne selected a T. Clear Protected Membrane Roof System (PMR), using LIGHTGUARD® Protected Membrane Roof Insulation, because it met all design criteria. The final design included the use of loose-laid tapered extruded polystyrene insulation, a loose-laid single-ply membrane and LIGHTGUARD panels.

LIGHTGUARD Protects Membrane, Saves Energy

LIGHTGUARD Protected Membrane Roof Insulation is comprised of 2-foot by 4-foot panels of 2-inch or 3-inch high-compressive strength extruded polystyrene with a 3/8-inch latex-modified concrete facing. The tight, closed-cell structure of the foam insulation panels resists all forms of water penetration and protects the waterproof membranes from heat, ultra-violet rays, wind, temperature swings, and physical abuse. The LIGHTGUARD panels, tongue and grooved on the long edges and installed in a staggered arrangement, serve as both insulation and ballast. Once installed, LIGHTGUARD panels offer an attractive appearance and a smooth, walkable surface.

While stone-ballasted PMR systems weigh 11 pounds per square foot, LIGHTGUARD weighs 4.5 pounds per square foot and is ideal for installation of single-ply and built-up roofing requiring a lighter weight roofing system. Though lightweight, LIGHTGUARD panels are durable and will withstand winds of 70 miles per hour and above. Free of CFC, LIGHTGUARD is an environmentally responsible product.

System Goes On Easily

LIGHTGUARD is easy to apply. There is no need to adhere panels to the roof membrane or use fasteners that can puncture the membrane. There is also an opportunity to reuse the LIGHTGUARD panels in the event of membrane failure, renovation or vertical expansion. T. Clear Protected Membrane Roof Systems using LIGHTGUARD eliminate damage from windblown rocks from atop the roof because LIGHTGUARD acts as the ballast and does not require the use of crushed stone or gravel.

Major renovations have been completed at Whitaker Park, and to date, engineers at R. J. Reynolds are pleased with their choice of a T. Clear PMR, using LIGHTGUARD. It protects the roof membrane from harsh weather conditions and maintenance traffic and reduces the weight of the entire roofing system. LIGHTGUARD also helps control critical interior temperature and humidity.

LIGHTGUARD has been used by industry, government installations, schools and universities, medical facilities and textile mills in the United States since 1976, when FinPan Inc. began manufacturing the product. LIGHTGUARD is now manufactured, marketed and distributed by FinPan's subsidiary, the T. Clear Corporation.

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ROOFING REVIEW

An Overview of Current LIGHTGUARD Applications

LIGHTGUARD Passes All The School Tests In New York State. With Honors.

When school administrators and architects specify roof systems for schools, they are looking to solve some very specific problems: long-term budget concerns, limited in-house maintenance staffs, damage to the water-proof membrane caused by contracted workers and vandals, and energy costs that are literally going through the roof. If those schools are in upstate New York, they must also concern themselves with the high cost of asbestos abatements and the shock to the membrane from temperatures that can range as much as 70° in a 24-hour period and reach lows of 30° to 40° below zero.

What's more, they need a roof system that can be installed quickly and easily. As roofing contractor Mike Monahan of Monahan & Loughlin, Inc., puts it, "With schools, you're working in a restricted time period. You start when school's out and you best be out of there before school comes back."

LIGHTGUARD Solves Problems

So, how do you find the right roof system for your school. If you are Philip Fortsch, Building and Transportation Superintendent for Chazy Central Rural School, you take the time to walk on as many as 20 different roofs until you find the system that can solve your problems. For Fortsch, that system was a LIGHTGUARD Protected Membrane Roof System.

L to R: T. Clear approved contractor Mike Monahan, Pres. Monahan & Loughlin, Inc.; T. Clear agent Ken Ross, Pres. Styro Moisture Protection; Randy Windell, V.P. /General Manager, T. Clear Corp.; Brian Monahan, Supervisor, Monahan & Loughlin, Inc. standing on a LIGHTGUARD Protected Membrane Roof System atop the Ausable Valley Middle High School .

A LIGHTGUARD Protected Membrane Roof System is comprised of 2-foot by 4-foot panels of 2-inch or 3-inch high-compressive strength polystyrene with a 3/8-inch latex-modified concrete facing that can be installed over any type of waterproof membrane. Mike Monahan, a T.Clear approved contractor, has installed LIGHTGUARD systems on at least 100 buildings in the last 16 years. "I've got them over Carlisle and Firestone. I've got them up there with Manville, too. There's a case where I've got LIGHTGUARD over three different membranes on the same plant and I haven't been back on any of them.

The tight, closed-cell structure of the foam insulation panels resists all forms of water penetration and protects the membranes from heat, ultra-violet rays, temperature swings and freeze-thaw cycles. Christopher B. deGrandpre, Superintendent of Schools for the N.E. Clinton School District, had seen

LIGHTGUARD®
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Top Left: (L to R) Bob Chase, Dodge-Chamberlin-Luzine -Weber; Philip Fortsch, Building/Transportation Superintendent, Chazy Central Rural School and Ed Luzine, R.A., Dodge-Chamberlin-Luzine-Weber, discuss the LIGHTGUARD Protected Membrane Roof System recently installed on the Chazy Central Rural School.

Top Right: Overlooking the small lake on the grounds of the Chazy Central Rural School.

his share of unprotected membranes. "With the old built-up roofs, it was hard to go on the roof to maintain a rooftop unit, particularly in cold weather. You'd get those bubbles in the tar membrane. Of course, if you broke that barrier you had a leak. We have extremes of temperatures here. Could be 90° one day and 30° the next day. In winter, it can be as low as 30° or 40° below zero. And winds...tremendous winds...that has a lot to do with temperature change. This system has worked out extremely well for us." And he should know. Previously, deGrandpre had a gravelled roof with a built-up membrane. "We had leaks. Lots of leaks. There were problems with expansion and contraction in joints and so forth. All that's been eliminated." That portion of the roof has been down since 1982. So, when the rest of the roof needed replacement, he insisted on a LIGHTGUARD Protected Membrane Roof System.

The LIGHTGUARD panels, tongue and grooved on the long edges and installed in a staggered arrangement, serve as both insulation and ballast. Once installed, LIGHT-GUARD offers an attractive appearance and a smooth, easy-to-walk-on surface.

Stone-ballasted PMR systems weigh 11 lbs. per sq. ft. Monahan says, "Actual field experience of what you got on that roof area, by the time you get done, is somewhere in the neighborhood of 12 to 14 pounds." LIGHTGUARD weighs 4.5 lbs. per sq. ft. and is ideal for installation over single-ply and built-up roofing requiring a lighter weight roofing system, especially on older buildings. Ed Luzine, Registered Architect, with Dodge-Chamberlin-Luzine-Weber, has been specifying LIGHTGUARD for almost 20 of his 35 years in practice. "We do a lot of school work and a lot of reconstruction work. Old buildings need new roofs. A lot of the older buildings, you can't put on a ballasted roof without using LIGHTGUARD because of the problem with the weight."

In this part of New York State, roofing con-tractors have another problem with gravel-ballasted roof systems. According to Mike Monahan, "Good round river-washed gravel... it doesn't exist. I'm looking at $40 a ton for gravel. I've got as much as $24,000 in gravel sitting on some roofs. $24,000 in stone just holding the roof membrane down. I'd rather incorporate that cost in LIGHT-GUARD, which is an insulating ballast."

LIGHTGUARD Insulates And Saves Energy

LIGHTGUARD ballasted roof panels are made with extruded polystyrene and carry an R value of 5 per inch of foam. And that translates into reduced energy costs. Just ask Bruce Sample, Building Maintenance Supervisor for N.E. Clinton Schools. "Yes, it's reduced our oil consumption, I would say almost in half."

Similar results were found at Chateauguay Central Schools. Patrick Calnon, Super-intendent of Schools, checked his reports and determined that in the first year, his energy costs dropped a third. Brian Monahan of Monahan & Loughlin, Inc., who had super-vised the installation, quickly added, "We put in 2 1/2" underlayment and the LIGHTGUARD, so we put in an R30 on this building." In the second year, after expanding the building by 20,000 sq.ft., replacing skylights and windows, oil consumption was almost half of that first year. Is Calnon satisfied with his results? "I've recommended it (LIGHT-GUARD) to a couple of other schools," he says. "People that have come and asked and have come to understand what's involved agree. It doesn't take a whole lot of explanation to convince people that, yeah, this ought to work."

As you can see for yourself, LIGHTGUARD protects the waterproof membrane from punctures caused by dropped tools, vandalism or even this broken pop bottle found on the N.E. Clinton School.

Above: A workman walks on this LIGHTGUARD Protected Membrane Roof while doing repairs to the chimney at left.

Top Right: A LIGHTGUARD Protected Membrane Roof System installed on the N.E. Clinton School. On the far end of the building, is an older LIGHTGUARD system installed 10 years ago that is still performing at the top of it's class.

Right: Christopher B. deGrandpre, Superintendent of Schools, N.E. Clinton School District.

And it does. Bill Doyle, Business Manager for Ausable Valley Schools, reports that after LIGHTGUARD was installed on the Keeseville Elementary School, oil consumption was cut in half. "They saved 36,000 gallons of oil at Keeseville. I think it came to something like .92 or .93 gallons of oil (before LIGHTGUARD) to heat one sq. ft. of building." It's no wonder that there is now a LIGHTGUARD Protected Membrane Roof System atop the Ausable Valley Middle High School and the Ausable Forks Primary School.

Left: (L to R) Mike Monahan, Pres., Monahan & Loughlin, a T.Clear approved contractor and his customer, John Gratto, Superintendent of Schools, Ausable Valley Schools stand atop the Ausable Forks Primary School.

Right: (L to R) Dave Torrance, Clerk of Works and Project Rep; Bill Doyle, Business Manager; John Gratto, Superintendent of Schools, and Joe Kahn, Principal, Ausable Forks Primary School.

LIGHTGUARD Is Easy To Install And Maintain

LIGHTGUARD is easy to apply. There is no need to adhere panels to the roof membrane or use fasteners that can puncture the membrane. In the case of older felt membranes that were manufactured using asbestos, Mike Monahan recalls a job where a fully-adhered roof was switched to a LIGHTGUARD system. "We only did flashings and overlaid LIGHTGUARD. We were able to eliminate the removal costs, landfill charges and the asbestos abatement. The school saved $180,000." There is also an opportunity to reuse the LIGHTGUARD panels in the event of membrane failure, renovation or vertical expansion.

Top Left: A brick thrown or fallen from a nearby chimney does no damage to this LIGHTGUARD Protected Membrane Roof at Chateauguay School.

Top Right: (L to R) Frank Boadway, Head of Building Maintenance for Chateauguay Central Schools walks up to join Patrick Calnon, Superintendent of Schools, Chateauguay Central Schools and Brian Monahan, Monahan & Loughlin, Inc. as they discuss the LIGHTGUARD installation that Brian supervised.

Because a LIGHTGUARD system protects the waterproof membrane, there is virtually no maintenance involved. Christopher B. deGrandpre of N.E. Clinton Schools testifies, "Because we had so many problems with the old roofing systems, we wanted a system that would be as close to maintenance-free as possible." His Building Maintenance Supervisor, Bruce Sample will tell you, "We had poor roofs and now we don't." Dave Torrance, Clerk of Works at Ausable Valley Schools, says about his previous roofs, "You had a real deletion of stone at the edges of the roof. The felt just faded away and the janitorial staff and the custodians just patched and patched and patched." No more.

Total Performance Warranties

T.Clear Corporation set the standard with the first single-source, Total Performance Warranty in the industry. LIGHTGUARD Protected Membrane Roof Systems are warranted to insure water tightness, insulating value, product integrity and wind disturbances up to 70 mph. T.Clear also offers 15- and 20-year extended warranties and warranties for high-wind areas.

T. Clear can assure you of long-term value and performance because LIGHTGUARD systems are installed only by authorized contractors and assessed at regular intervals by a nationwide network of independent advisors.

LIGHTGUARD has been used on commercial buildings, government installations, schools and universities, medical facilities and textile mills in the United States since 1976, when FinPan Inc. first began manufacturing the product. LIGHTGUARD is now sold, marketed and distributed by FinPan's subsidiary, the T. Clear Corporation.

Vandalism, limited maintenance, thermal shock, energy savings, quick and easy to install, cost-effective, long-term performance. A LIGHTGUARD Protected Membrane Roof System passes all the tests.

Architect Ed Luzine specified his first LIGHTGUARD roof in the late 70's. "We did a combination of LIGHTGUARD and EPDM on a wing of a high school where the owner said they'd be willing to try it. It's been without a leak for nearly 20 years now. We get no callbacks. It solves problems and saves energy and owners are happy not to have to worry about people up on their roof."

From contractor Mike Monahan's point of view "it's a quality installation with a proven performance record that's easy to install."

Superintendent Christopher B. deGrandpre says, "It's worked out well for us. Obviously, because we've used the system again and again."

If you'd like to know more about LIGHTGUARD, you can call the contractor for these school projects, Mike Monahan, Monahan & Loughlin, Inc. at 1-518-561-6036 or the architect, Ed Luzine, Dodge-Chamberlin-Luzine-Weber, at 1-518-463-6611.

For technical information or a list of nationwide manufacturer's agents or a list of other schools that have installed LIGHTGUARD Protected Membrane Roof Systems, just call T. Clear Corporation at 1-800-544-7398.

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ROOFING REVIEW

An Overview of Current LIGHTGUARD and HEAVYGUARD Applications

Husky Injection Molding Uses Sound Technology To Solve Roof Problems

There are some companies that focus on quality, believing that quality has its own rewards. Husky Injection Molding is one of those companies.

Quality has it's own costs, as well. For Husky Injection Molding, part of that cost is a $12.5 million investment in their Parts Distribution Center in Buffalo, New York. To ensure response time, Husky located their facility just off the end of runway 23 at the Greater Buffalo International Airport.

That left their architectural firm, Cannon Architects in Grand Island, New York, with two specific problems to solve. As Mike Mistriner, project architect for Cannon Architects, put it, "They were concerned that their folks, working on computers and on the phones there conducting business, could hear." Mistriner continued, "We're off Lake Erie and have some pretty good winds here. If you look at an FM map, we're within the 70-90 mph range, and right there next to the airport is a large, flat, open area. So, the wind...there would be a lot of blowing."

To solve those problems, Mistriner said, "We paid special attention to the curtain wall system and we started to look at the roof, and the roof was this major influx of noise. We were also looking for a 90 miles per hour wind uplift. So, we needed a product that gave us mass and weight."

Husky Injection Molding in Buffalo, New York, used a T.Clear Protected Membrane Roof System with Heavyguard® Ballasted Roof Insulation to protect their building from the noise of nearby Greater Buffalo International Airport.

Experts Choose HEAVY-GUARD To Solve Roofing Problems

Cannon Architects chose a T. Clear Protected Membrane Roof System with HEAVYGUARD® Ballasted Roof Insulation. "It satisfied two needs — an acoustical desire for mass to deaden the sound and it allowed for the weight for the wind uplift," said Mistriner.

According to T. Clear approved contractor Stuart Jenkins of Progressive Roofing, Inc., "We put down a vapor barrier on the metal deck. On top of that were two layers of 5/8", type X gypsum board for sound-proofing. Then, we had a slip sheet and on top of that was the Sarnafil PVC membrane. Then, another Sarnafil slip-sheet membrane. So, we had two layers of Sarnafil, a layer of 2" Foamular insulation, and the 2 " HEAVYGUARD panels went on top of that." Added Frank Pazzaglia of Contractor Services, Inc., independent advisor/inspector on the Husky job, "They also put down a Range 2 securement. On a building of that height it would normally have been a Range 1."

HEAVYGUARD®
Protected Membrane Roof Insulation

Workers from Progressive Roofing, Inc. are exposed to the wind and cold as they install this Heavyguard Protected Membrane Roof System.

HEAVYGUARD Protects The Membrane And Saves Energy

HEAVYGUARD Ballasted Roof Insulation panels are 2-foot by 4-foot, tongue-and-groove panels of 2-inch or 3-inch extruded polystyrene with a 15/16-inch latex-modified concrete facing. The tight, closed-cell structure of the foam insulation panels resists all forms of water penetration and protects all types of roofing membranes from heat, ultra-violet rays, temperature swings and freeze-thaw cycles.

The HEAVYGUARD panels, tongue and grooved on the long edges, serve as both insulation and ballast. Mistriner has had problems with gravel-ballasted roof systems. He says, "You don't get the right sized ballast to hold down the roof, and it tends to blow into piles or off the edge, and we really didn't want that problem. We had a glass building."

HEAVYGUARD panels have an R-value of 5 per inch of polystyrene. T. Clear agent, Brian Gleason of Styro Moisture Protection in Troy, New York, says , "With this type of insulation, it's a long-term stable R-value. When they design heating and air-conditioning systems using those numbers, they're real numbers."

Once installed, HEAVYGUARD offers an attractive appearance and a smooth surface that's easy to walk on. Jenkins says, "It looks like a giant patio."

System Goes On Easily

HEAVYGUARD is easy to apply—there is no need to adhere panels to the roof membrane or use fasteners that can puncture the membrane. There is also an opportunity to reuse the HEAVYGUARD panels in the event of membrane repair, renovation or vertical expansion.

The Husky roof was installed in February. Jenkins says, "We had some very high winds and some -20° days while we were working. The HEAVYGUARD allowed us to take advantage of getting large areas waterproofed and then fall back and utilize some iffy days weatherwise to finish your roof — days that you wouldn't be working otherwise."

Total Performance Warranties

T. Clear Corporation set the standard with the first single-source, no dollar limit, total system warranty in the industry. T. Clear Protected Membrane Roof Systems are warranted to insure water tightness, insulating value and product integrity. T. Clear also offers 15- and 20-year extended warranties and warranties for high-wind areas.

T. Clear can assure long-term value and performance because their systems are installed only by authorized contractors and assessed at regular intervals by a nationwide network of independent advisors. Says Pazzaglia, "They send us back for updates. We're looking for movement, flashings opening, metal pulling out of the fasteners and that nobody has broken the integrity of the roof. HEAVYGUARD protects the membrane. I've seen roofs that have been down for 15 to 20 years and they were in great shape."

Gleason will tell you, "It's a better roof and those architects that design for quality and long-term performance understand that." Architect Mistriner says, "The nice part about that roof is that in the end you had this beautiful walking surface. And from above — being right there at the airport — they have a great looking roof on that building. I'll be surprised if the water even gets to the membrane."

For technical information or a list of nation-wide manufacturer's agents, call T. Clear Corporation at 1-800-544-7398.

T CLEAR
Protected Membrane Roof Systems

P.O. Box 416
Hamilton, Ohio 45012

ROOFING REVIEW

An Overview of Current T. Clear Protected Membrane Roof Systems Applications

Construction Coordinator Gets Education In Roof Systems At Duke University Medical Center

Duke University Medical Center has a lot of roofs. Approximately 300, comprising 2.5 million square feet of roof surface. So far.

When Tim Pennigar, Coordinator of Medical Center Maintenance and Construction, arrived over 12 years ago, he will tell you, "We probably had one of every roofing system known to man out here. A real smorgasbord of construction from the 1920s on." When Pennigar lead a second-generation of reroofing in the mid 1980s, he got a real education in what worked and what didn't. And why.

"We jumped on the single-ply bandwagon, using it to recover existing BURs. Some of those worked, but, because so many of our roofs are used for mechanical systems and see a lot of foot traffic, the single-ply approach was not a good match." So what changed his mind?

As Pennigar puts it, "Our main hospital is a 150,000 square feet gravel-ballasted PMR (protected membrane roofing system) with four-ply BUR on a concrete deck with 2 or 3 inch Dow blue board that was built back in the 70s. I was asked to evaluate this roof to look at the possibility of putting a heliport on top of the hospital. I thought this would be a great opportunity to show the architects that these roofs were a really bad idea. But, when I removed some of the insulation in different areas, low and behold, I found that I could track the asphalt with my thumbnail. On closer examination, we found that the only problems we had had with this roof were where the base flashings were exposed to the sun and were deteriorating. But, there wasn't anything wrong with the membrane after 17 or 18 years. We started looking at PMRs a little differently after that."

Installing LIGHTGUARD® on one of the many T. Clear Protected Membrane Roof Systems at Duke University.

T. Clear PMR: The Clear Choice For Experts

In time, Pennigar settled on a T. Clear Protected Membrane Roof System (PMR) that uses a fully-adhered bituminous membrane as his system of choice. As he says, "We don't do loose-laid. We don't want to give moisture a void to travel through." Is he satisfied with the results? He continues, "If we pay particular attention to our perimeters and penetrations, we are

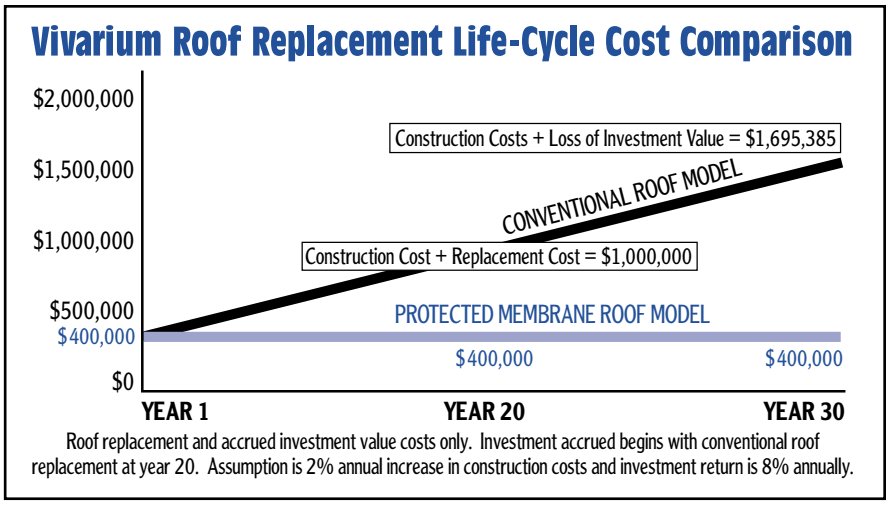
having great success with PMRs. If we've done our jobs, leaks aren't in the field of the roofing. They are at a penetration, so they are pretty easy to find. Right now, we have about 120,000 square feet of reroofing going down on 50 separate roof elevations. We are using three plies of torch-grade SBS applied to concrete or gypsum plank roof decks. We also have another 85,000 square feet of new PMR going down on new clinic construction."

At Duke University, Pennigar is using a combination of stone-ballast and LIGHTGUARD® ballasted PMRs. Pennigar explains, "Typically what we do is in areas where the roof has no equipment on them, we tend to use stone. We've found a quarry that has a stone that blends in well with our buildings. What we'll do with LIGHTGUARD is to use it on roofs that have a lot of foot traffic or abuse. The LIGHTGUARD panels are a great match."

T. Clear PMRs Protect The Membrane For Life

Pennigar will admit that his approach to roof design is based on an institutional outlook. "We do things a little differently than in commercial construction. We're here for the long haul." He adds, "My thinking was that I wanted to adapt our roofing designs to minimize roof maintenance."

In order to minimize maintenance costs on close to 2.5 million square feet of roof, Pennigar has gone exclusively to PMRs. Explains Pennigar, "In conventional roof designs, the membranes and flashings are exposed to sunlight, weather conditions, and maintenance traffic which deteriorates the roof over time. Covering roofs with T. Clear PMRs, we are able to minimize maintenance on these roofs. Based on what we've observed at our other facilities that have been here for twenty years, we think we can extend the life of a roof by at least ten years, maybe more."



Tim Pennigar's Life Cycle Cost Comparison Chart

A T. Clear PMR Can Pay For Itself

Pennigar doesn't take anybody's word as fact, but comes to his own conclusions based on research and experience. Pennigar states, "From what I've observed, most conventional roofs around here aren't going to last. 25 years is a luxury. If they are not well-maintained, it will be closer to 15 or 20 years. But, I've got PMRs here that have lasted 30 years, and I can probably get 35 or 40 out of them."

Pennigar used a 40,000 square foot roof on a vivarium at Duke Medical Center to create a life-cycle costing chart. According to Pennigar, "Because it was a dead-level metal deck, a BUR would have cost a pretty good premium because we would have had to install a tapered insulation system. With an adequate number of drains, we were able to go dead-level with a PMR and save some money."

According to Pennigar's costing model, a $400,000 PMR after 30 years will still have cost him only $400,000. But a conventional roof that would have to be replaced after 20 years would cost another $600,000 based on an annual inflation rate of 2% for construction. And another $695,385 would be lost in accrued investment over the same period based on an annual investment return of 8%. That makes the total cost of the conventional roof $1,695,385 over 30 years compared to $400,000 for the PMR. That is a yearly savings of $43,000 on the PMR without factoring in reduced maintenance costs. In less than ten years, the PMR has literally paid for itself. As Pennigar puts it, "That money looks a whole lot better in Duke's asset management account than it does sitting on the roof."

As part of his institutional thinking, Pennigar wonders what will happen to the next generation. As Pennigar says, "One of the quickest rising components in a bid now is disposal fees. In 30 years, when I get ready to tear these roofs off or do something with them again, there's no reason why I can't simply pull up the LIGHTGUARD panels and store them to the side, torch down one more ply of mod bit over the two plies that are there, put the panels back, and be done with it." We couldn't agree more.

For technical information or a list of nationwidemanufacturer's agents, call T. Clear Corporation at 1-800-544-7398.

T. CLEAR
Protected Membrane Roof Systems

3255 Symmes Road
Hamilton, Ohio 45015

Examples

Clinton County Government Center
Plattsburgh, New York
TCC #2152, 9/22/97

Department of State Building
Washington, DC
TCC #1241, 1993

RTD Bus Maintenance Garage
Denver, Colorado
TCC #1796, 8/10/95

Federal Corrections Institute
Ray Brook, New York
TCC #1855, 7/24/97

Examples

Argonne National Labs, Bldg. 10
Argonne, Illinois
TCC #1719, 8/1/94

Northwest Bank
Denver, Colorado
10/7/94 Survived a massive hail storm.

T. Clear Headquarters
Hamilton, Ohio

Examples

Skyharbor Airport Term #4 Expansion
Phoenix, Arizona
TCC #1901, 3/27/95

Aircraft Maintenance Shop
Eielson AFB, Arkansas
TCC #2107, 10/17/97

O'Hare Airport Bldg. #35, 928th Airlift
Chicago, Illinois
TCC #1890, 11/16/95

Examples

Marriott Hotel
Portland, Oregon
TCC #1747, 5/25/95

Spanish Head Inn Resort & Hotel
Lincoln City, Oregon
TCC #2026, 5/22/97

Examples

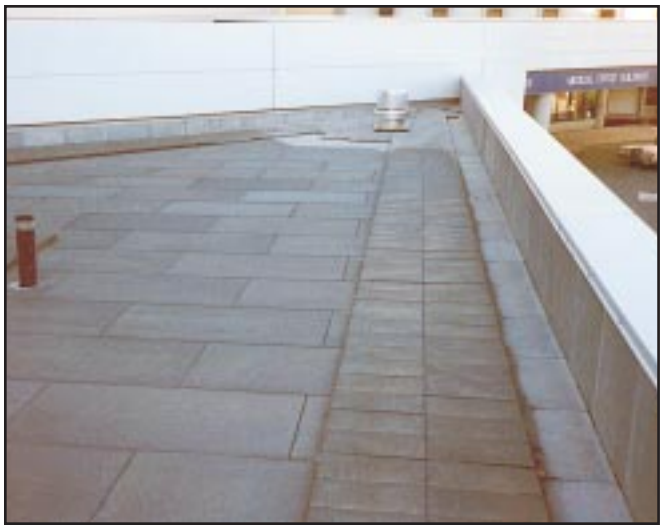
Milikin Magnolia Plant
Blacksburg, South Carolina
TCC #1989, 12/30/96

Torrington Co. Fafnir Bearing Plant
Calhoun, Georgia
TCC #1794-A, 6/20/97

R&D Lorillard Tobacco
Greensboro, North Carolina
TCC #2082, 9/26/97

Eveready Battery
St. Albans, Vermont
TCC #1865-A, 8/18/95

Examples



Providence Hospital Imaging Center
Anchorage, Alaska
TCC #1879, 11/5/96

Children's Hospital
Pittsburgh, Pennsylvania
TCC #1631, 7/20/94

Rochester Methodist Hospital
Rochester, Minnesota
TCC #2127, 8/21/97

Great Brook Valley Medical Center
Worchester, Massachusetts
TCC #1659

Examples

Detroit Zoological Park
Detroit, Michigan
TCC #1680, 8/4/94

Kemper Museum
Kansas City, Missouri
TCC #1623, 8/8/94

Native American Center
Minneapolis, Minnesota
“Flood testing during 2-year inspection.”
TCC #1852, 8/12/97

Examples

New Cherokee Corp.
Sevierville, Tennesee
TCC #1579

Star Textile Mill
Albany, New York
TCC #1168

Weyerhauser Paper Machine #1 & #2
Vallient, Oklahoma
TCC #1012, 8/26/94

Examples

Mills Middle School
Williamsville, New York
TCC #1858, 10/17/95

Andrews High School
Andrews, Texas
TCC #1971, 10/31/96

Julliard Art School
Brooklyn, New York
TCC #1418, 1/19/93

Novi High School Auditorium
Novi, Michigan
TCC #1974, 8/28/96