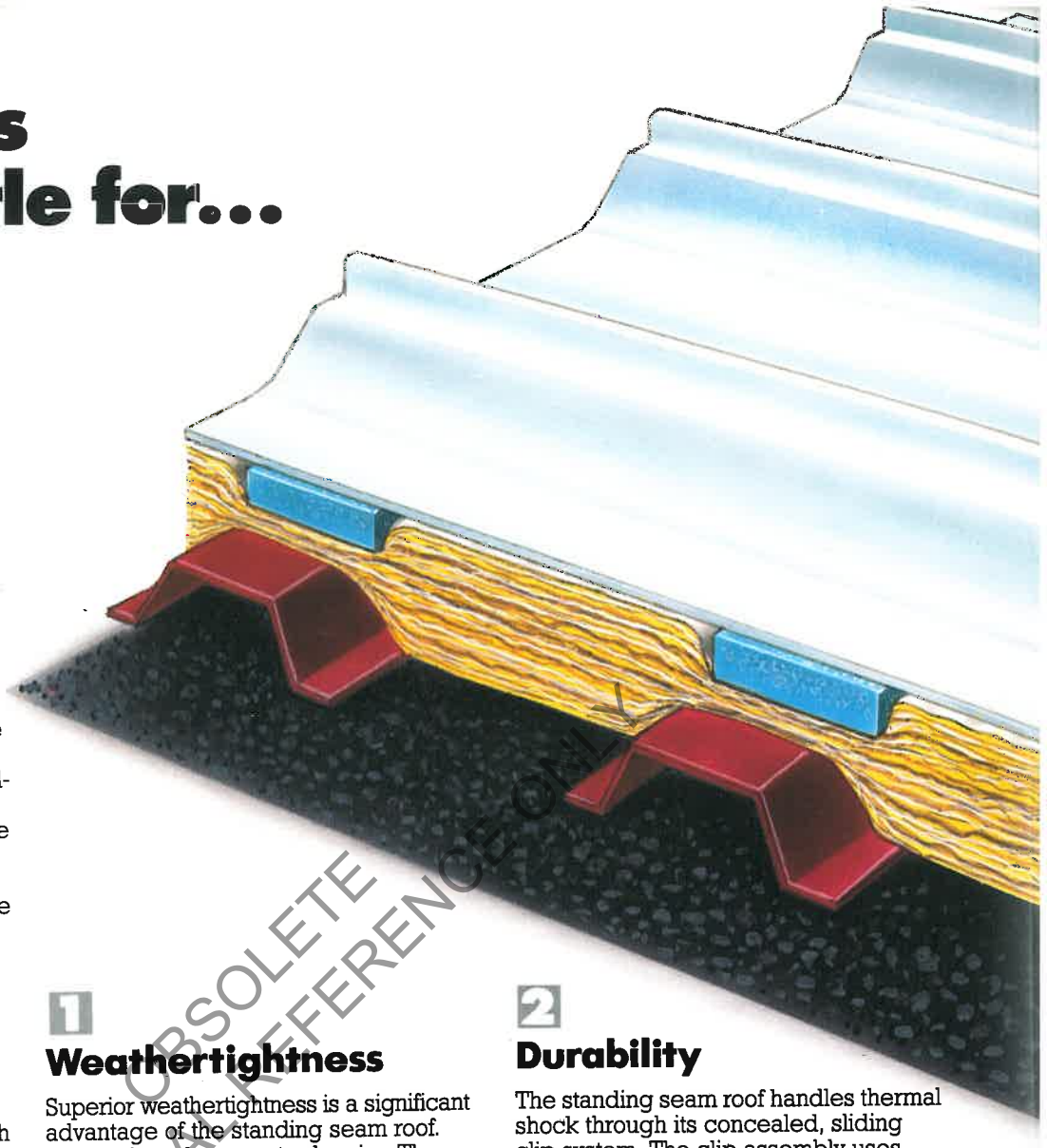
CANADIAN SHEET STEEL BUILDING INSTITUTE

STANDING SEAM METAL ROOFS:

A Four Season Solution to Roof Problems & Maintenance

Metal Roofs Prove Mettle for...



The standing seam metal roof is one of the most exciting breakthroughs in roofing technology in the last 25 years. It fulfills the building owner's need for durable, puncture-resistant protection against the weather, while working in concert with the forces of nature.

Metal roofing has an established track record in new construction where it has been used in some 50% of all low-rise commercial and industrial buildings erected in the last several years. This acceptance has carried over to the re-roofing market where the standing seam roof has been used successfully as a replacement for built-up and single ply systems. Leading applications for standing seam metal roofs in the retro-fit market are schools, factories, warehouses, distribution centers and military facilities.

The standing seam roof is made of steel, one of man's oldest and most durable building materials. And yet, the lightweight metal roof panels weigh a relatively modest 1½ pounds per square foot.

Unlike flat built-up roofs, which require frequent maintenance, the standing seam metal roof will offer 20 years and beyond of trouble-free performance with little or no maintenance time or expense.

The standing seam metal roof assures adequate drainage from rain and snow, effectively solving ponded water problems, leaks and other related troubles commonly associated with flat built-up roofs. In retro-fit projects, a sub-framing system is attached to the existing roof surface to provide a minimum 1/4:12 pitch for the new metal roof.

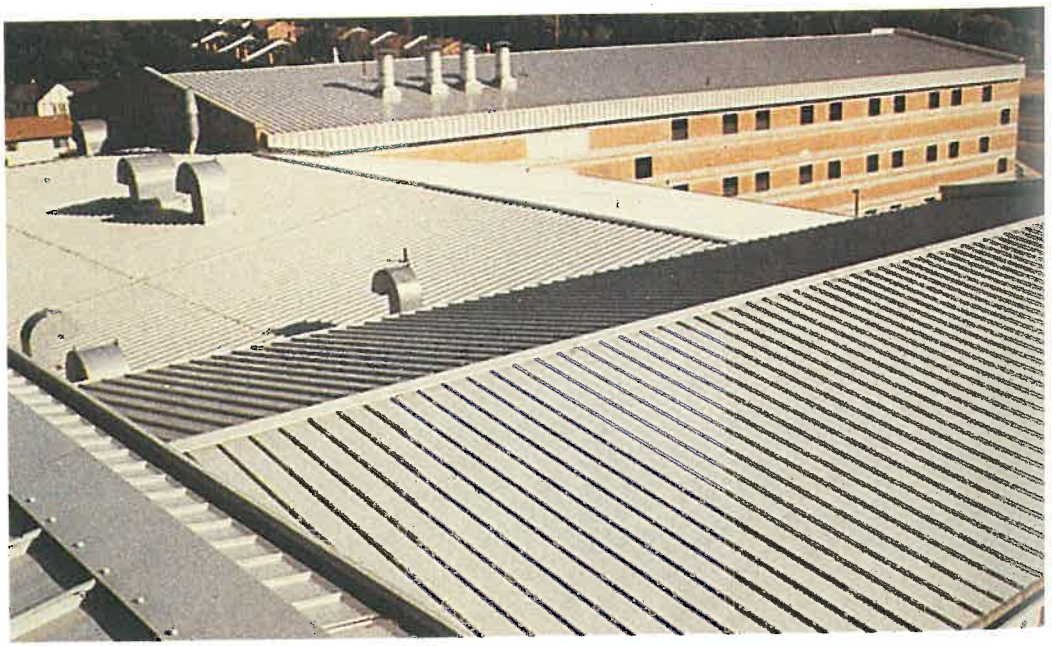
The panel fastening system is uniquely designed to handle the potentially damaging effects of thermal movement. Precisely-formed, factory-made metal panels are locked in place by clips inside a raised seam standing two to three inches above the roof surface. The clips have a moveable feature allowing the panels to expand and contract with temperature changes. The concealed clip system means fewer through roof fasteners, reducing the chances of leaks. It also makes the standing seam roof an attractive appearing system for almost any building.

1 Weathertightness

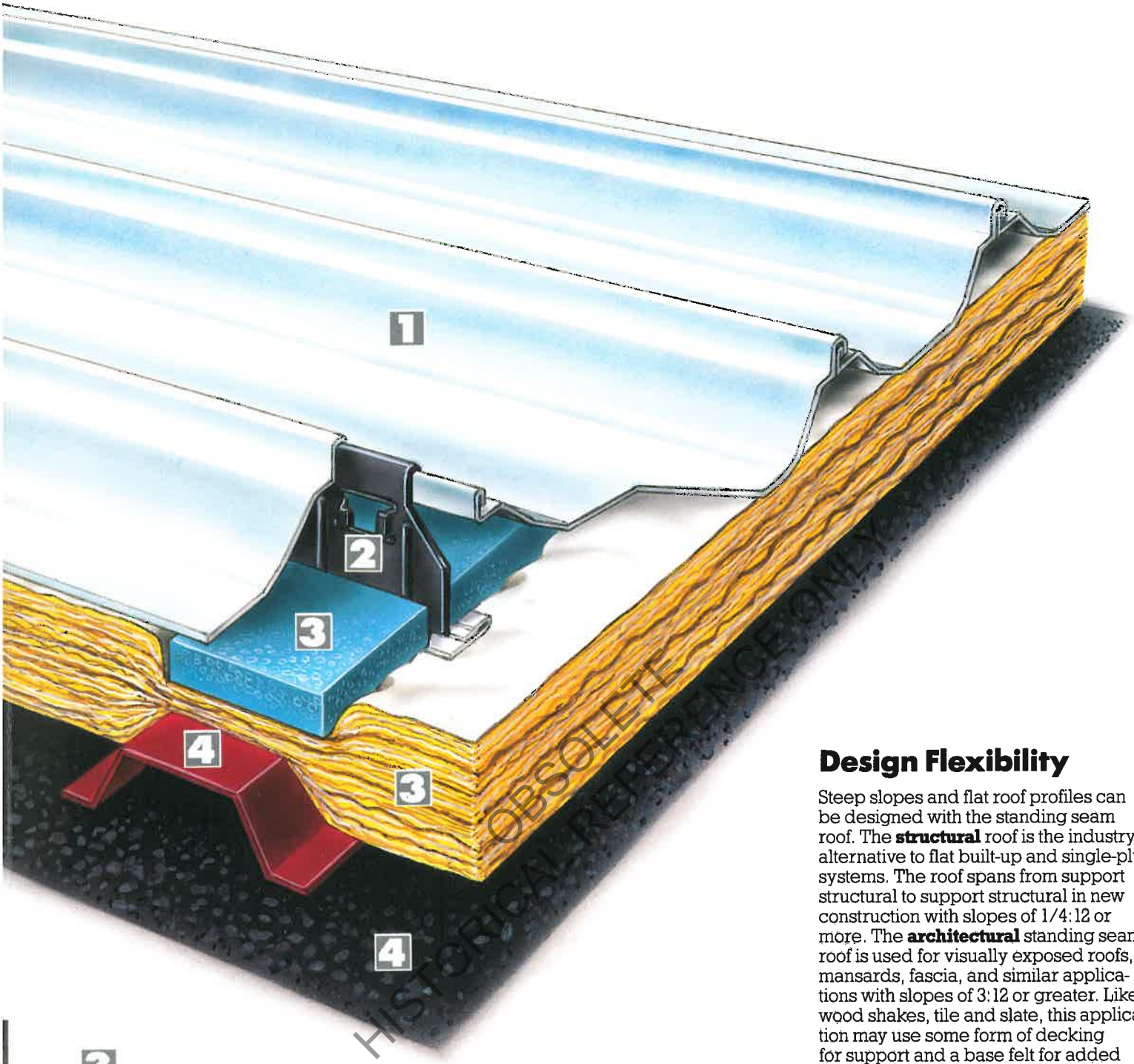
Superior weathertightness is a significant advantage of the standing seam roof. It is designed as a water barrier. The raised seam assists drainage. Organic sealants are factory-applied inside the seams. Automatic field seaming machines produce weathertight connections between the metal roof panels.

2 Durability

The standing seam roof handles thermal shock through its concealed, sliding clip system. The clip assembly uses a rigid base attached to the building's structural members. An upper part clips to the roof panel and forms into a seam during the seaming operation. The clip allows equal amounts of movement in either direction.



Jacob Hespeler School – Cambridge, Ontario



Design Flexibility

Steep slopes and flat roof profiles can be designed with the standing seam roof. The **structural** roof is the industry's alternative to flat built-up and single-ply systems. The roof spans from support structural to support structural in new construction with slopes of 1/4:12 or more. The **architectural** standing seam roof is used for visually exposed roofs, mansards, fascia, and similar applications with slopes of 3:12 or greater. Like wood shakes, tile and slate, this application may use some form of decking for support and a base felt for added protection.

3

Energy Efficiency

Fiberglass blankets are the most common insulation material in standing seam metal re-roofing projects. On some projects, un-faced fiberglass insulation is simply laid directly on the existing roof surface before installation of the new standing seam roof. For other projects, the insulation blankets are installed directly under the metal panels and stretched over the supporting structural members. Foam insulation blocks are often used to separate the panels from the purlins to prevent thermal short circuiting and condensation from forming. The roof expands and contracts independent of the insulation, giving the roof surface a "floating" action.

4

Low-Slope Solution To Flat Built-Up Roofs

In most retro-fit projects, the standing seam roof can be installed right over an existing built-up roof, eliminating costly and time-consuming tear-offs. The metal panels are attached to a steel sub-assembly to provide the necessary slope for ice and water to drain.

Colour-Co-ordination and Corrosion Resistance

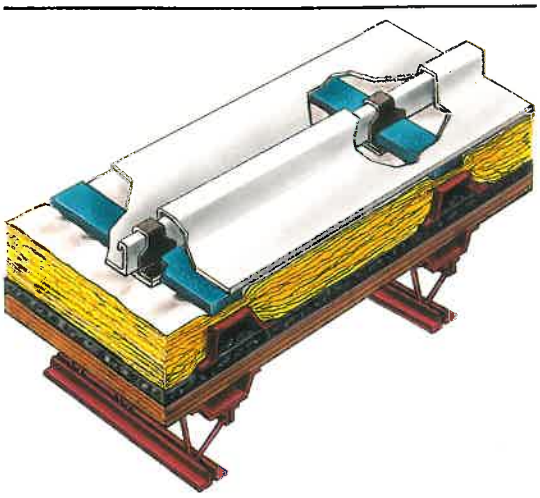
Metal roof panels resist corrosion with the help of a zinc, aluminum, or aluminum-zinc alloy metallic coating applied to the base steel. These plain finish coatings would be selected for optimum performance on low slope applications. For steeper slopes with greater aesthetic demands these products would be coated with specially pigmented organic paints which harmonize the roof with conventional brick, concrete and wood side-wall materials. Popular beige and earth-tone colours allow architects to co-ordinate the roof attractively with other design elements of the building.

Make Weather An Ally

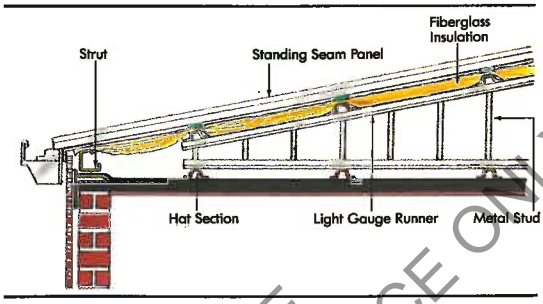
Metal roofs can be installed year-round. Heavy rain, extremely cold weather or high winds are about the only conditions that prevent metal roof installers from working. Owners won't have to close the building area being re-roofed if the work has to be done while occupants are inside. In most projects, the metal roof can be installed right over the existing roof, eliminating costly and time-consuming tear-offs. Occupants continue their normal activities, even in the immediate area being re-roofed.

Long-Term Performance

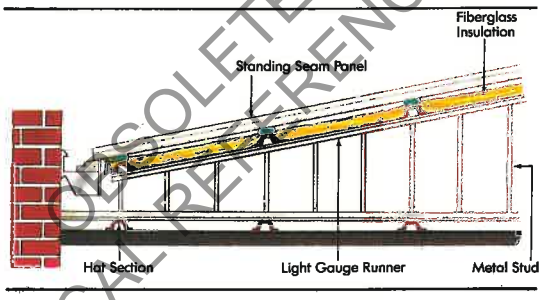
Long-term warranties are sometimes offered for metal roofs, including those with a 1/4:12 slope. The standing seam roof can qualify for the UL-90 wind-uplift rating – the highest in the industry – which can substantially reduce insurance rates in high wind areas. It must be combined with the roof manufacturer's UL-90 system, which includes the panels, concealed clips, sealants and structural supports. The standing seam metal roof can also carry a Factory Mutual Class A fire rating.



To Re-Roof A Sloped, Built-Up Roof:
To re-roof over a sloped built-up roof, a hat channel is placed perpendicular to the slope of the roof and screwed into the existing structural system. Blanket insulation can be added before the roof panels are installed to increase thermal efficiency.



To Re-Roof A Flat Built-Up Roof:
A slope must be created to assure adequate drainage when re-roofing a flat built-up roof. A light gauge steel sub-framing system creates the required slope, usually a minimum of 1/4:12. Insulation may be added on top of the existing roof or beneath the roofing panels (as shown) to improve the roof's thermal efficiency. The roof panels are then attached to the sub-framing system by concealed fastener clips. The cavity between the old roof membrane and new standing seam roof may have to be ventilated to remove all moisture from the existing built-up roof.



To Re-Roof A Flat Built-Up Roof With A Parapet Wall:
The specifier can design a framing system to get the final elevation of the new roof above the parapet wall. Another option is to design an interior gutter system (as shown) that allows for the parapet wall to conceal the new roof. Light gauge structural steel can be used as illustrated for the sub-assembly. After the framework is installed, the contractor screws a hat channel section to the rafter. The standing seam roof then attaches to the sub-structurals with concealed clips.

Reference Material

For additional information on standing seam metal roof systems, readers may write or call the following organizations:

American Iron & Steel Institute
(Association of North American steel producers)
1133 15th Street, N.W. Suite 300
Washington, D.C. 20005-2701
Harry C. Hoffman III, Program Manager
202-452-7188

Canadian Sheet Steel Building Institute
(National association of the structural sheet steel industry)
305-201 Consumers Road
Willowdale, Ontario M2J 4G8
(416) 493-8780

Roofing Communications Network
(Computerized life cycle costing & energy analysis)
1720 West End Avenue, Suite 601
Nashville, TN 37203
Anne Keenan, President
1-800-522-7663

Roofing Industry Educational Institute
(Institute of non-profit roof training seminars)
7006 S. Alton Way #B
Englewood, CO 80112-2003
Richard L. Fricklas, Director
303-770-0613

P.P.G. Plant – Owen Sound, Ontario.

Cost Effective

Standing seam metal roofs pay for themselves from the day they are installed. And, they are cost competitive.

Roofing Communications Network (RCN) developed computer models of the Huntington (Ind.) North High School and West Mifflin (Pa.) High School re-roofing projects. The schools had standing seam metal roofs installed over existing built-up systems.

RCN, a Nashville-based consulting firm specializing in computerized life cycle costing and energy analysis of roof assemblies, compared the cost of roof ownership, including the energy paybacks of the new metal roofs, with seven other types of roof systems the school officials could have used.

As the accompanying charts and graphs illustrate, the metal roofs had the lowest life cycle costs for both projects.

Huntington North officials could expect the cost of owning their 198,555 square foot roof to average $15.06 per square per year. This figure includes the initial installation of all roof components and labor, insulation, and current average costs of roof maintenance for all systems compared.

The new system at West Mifflin High School covered 109,600 square feet of roof area. The cost of roof ownership would average $16.95 per square per year for the metal, lowest life cycle cost among the eight systems.

Under the costs of maintaining these metal roofs, Huntington North and West Mifflin school officials would have to clean the gutters periodically and watch for loose debris. Roof-top units would be inspected regularly. If the schools were in an arid climate, the manufacturer would recommend that the roofs be washed down once a year to remove atmospheric debris which can make the roof surfaces appear dull.

HUNTINGTON NORTH HIGH SCHOOL
HUNTINGTON, IND.

ROOF TYPE	INITIAL COST	LIFE EXPECTANCY	LIFE CYCLE COST ($/SQ/YR)
MOD-BIT	$646,898	10 YEARS	$32.10
PVC	$469,977	8 YEARS	$30.60
EPDM-AD	$783,295	15 YEARS	$27.32
BUR-CTP	$841,597	15 YEARS	$26.08
BUR-ASP	$633,727	12 YEARS	$25.62
EPDM-MA	$673,634	15 YEARS	$22.14
EPDM-BAL	$627,314	15 YEARS	$19.58
METAL	**$742,619**	**20 YEARS**	**$15.06**

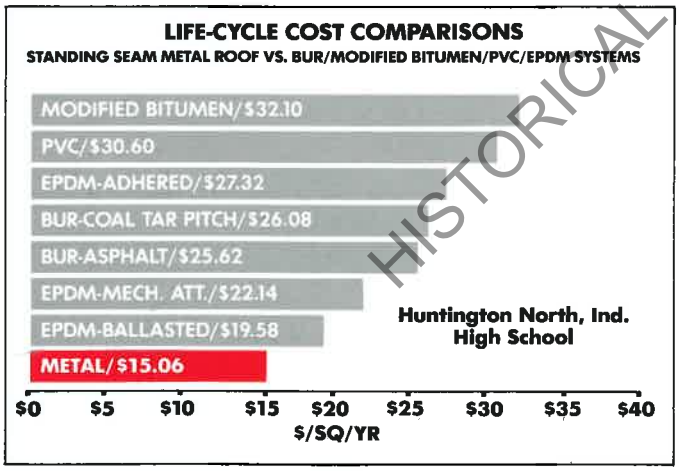
Total Roof Surface: 198,555 sq. ft. Initial cost includes roofing components, R-19 batt insulation materials and labor. Roof life cycle cost figures ($/SQ/YR) include initial installation costs, maintenance and energy savings based on present value.

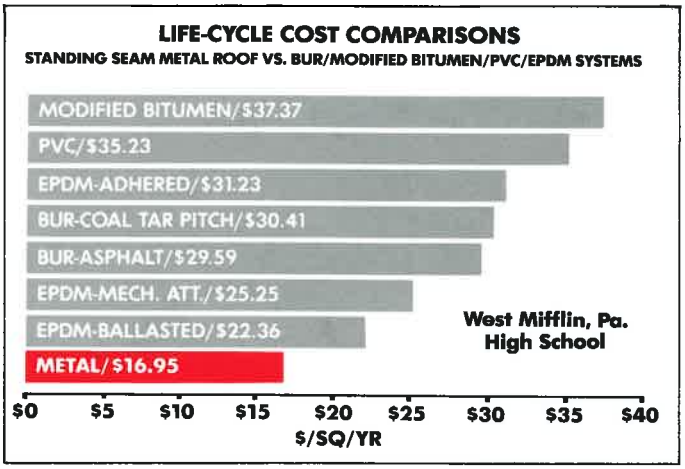
WEST MIFFLIN HIGH SCHOOL
PITTSBURGH, PA.

ROOF TYPE	INITIAL COST	LIFE EXPECTANCY	LIFE CYCLE COST ($/SQ/YR)
MOD-BIT	$434,339	10 YEARS	$37.37
PVC	$315,551	8 YEARS	$35.23
EPDM-AD	$525,918	15 YEARS	$31.23
BUR-CTP	$565,064	15 YEARS	$30.41
BUR-ASP	$425,496	12 YEARS	$29.59
EPDM-MA	$452,290	15 YEARS	$25.25
EPDM-BAL	$421,213	15 YEARS	$22.36
METAL	**$498,608**	**20 YEARS**	**$16.95**

Total Roof Surface: 109,600 sq. ft. Initial cost includes roofing components, R-19 batt insulation, materials and labor. Roof life cycle cost figures ($/SQ/YR) include initial installation costs, maintenance and energy savings based on present value.

Roof types include: The asphalt and coal tar pitch built-up systems; modified bitumen; polyvinyl chloride; and the EPDM adhered, ballasted and mechanically attached roofs. **Source: Roofing Communications Network, Nashville, Tennessee**





Halton-Region Administration Building – Oakville, Ontario

RCMP Building, British Columbia

"Class" Solutions To Roofing Problems

Case Study Number One: Huntington North High School

Huntington North (Ind.) High School re-roofed its deteriorated built-up roof with a standing seam metal roof. It was designed for a variable slope, with mechanical equipment, several penetrations and four open courtyards. A sub-assembly system consisted of built-up brackets, spanning members and Z purlins to assure adequate drainage of the new roof.

The roofing contractor used the roof manufacturer's pre-punched sub-structures to assure panel modularity. Six inches of unfaced blanket insulation and a vapor retarder were installed.

The contractor installed some 2,000 linear feet of interior gutter. The standing seam metal roof provides control of water and weathertight, low-maintenance performance.

The finished roof enhanced the building's aesthetic appearance while providing the school district with a long-term, functional roof solution. The project covered 198,555 square feet of roof surface.

Case History Number Two: West Mifflin High School

The West Mifflin (Pa.) Area High School District specified the standing seam metal roof to cover two existing flat, built-up roof areas totaling 109,600 square feet. The previous roofs had ponded water, blistered surfaces and wet insulation.

The contractor designed a sub-framing system consisting of Z purlins tied to variable height post sections fastened to base clips attached to the building bar joist. The sub-framing system created a 1/4:12 pitch to drain rain and snow.

Existing gravel was removed before the new roof was installed. Six inches of un-faced fiberglass insulation was added on top of the existing roof to boost its energy efficiency. All interior drains were removed.

The pitched roof eliminated ponding water. Because the old roof did not have to be removed, the installation work was done while school was in session.

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