



# WHERE METAL REALLY SHINES™

## Life of Bus Garages Extended By Re-Roofing with Metal

The Raytown, Mo. School District houses some 70 buses at two 50-year-old bus barns that also provide maintenance, office and storage space for the district's Transportation Department.

Decades of exposure to the Midwest climate left areas of the curved roofs above the two garages with holes large enough to admit daylight. The steady pounding of rain and snow also rotted the roofs' wood valley gutters. In winter, the leaky roofs produced dangerous ice patches along the parking spaces putting bus drivers at risk as they walked to or

advised the district to replace the leaky bus barn roofs rather than tear down and replace the roofs and their support structure.

"We recognized from the outset that re-roofing with a light weight, standing seam metal roof offered the only logical approach, given the needed spans and barrel vault design of the existing roofs," said RTI's David Kendrick. "Moreover, we felt that a roof retrofit would not disrupt bus operations in the two buildings."

Based on RTI's recommendations, the district replaced 28,700 and 21,230 square feet of curved roofs with two low-slopped, standing-seam systems made of Galvalume-coated steel. School district officials contend the new metal roof has eliminated the problematic roof "valleys," yet requires virtually no maintenance.

### Built with war surplus trusses

The 185-foot by 150-foot by 109-foot bus shelters were built with war surplus steel bow trusses that served as the primary steel framing atop load-bearing

## CASE HISTORY



BUILDING: SCHOOL BUS BARNS

LOCATION: RAYTOWN, MO.

OWNER: RAYTOWN SCHOOL DISTRICT

ARCHITECT: RTI CONSULTANTS, INC.

CONTRACTOR: STRICKLAND CONSTRUCTION

concrete block walls. Three 35-foot-long trusses and three 50-foot-long arched trusses were aligned side by side across each building, creating two flat valley gutters at the junctures above each load-bearing wall line. Corrugated sheeting was then fastened to 2-inch by 10-inch by 12-inch wood purlins that served as the roof's secondary support.



Before Retrofit

from their buses, or drove into or out of the barns.

RTI Consultants, an independent consulting firm hired by the school district to evaluate roofing on each of its 25 buildings,

## Installed over existing roofs

The new roofs were installed over the existing roofs after “piggyback frames” were welded to the original, underlying trusses. Metal wall panels were used to enclose the exposed vertical gap between the new and old roofs.

The “piggyback framing” consists of H-section beams and columns tall enough to create the desired slope in the new roof plane. The beams and



During Retrofit

columns were attached to the trusses with custom brackets that were welded to the top chords of trusses at the valleys and crowns. Loads transfer from the new standing seam roof systems through the new piggyback framing to the trusses and then into the concrete block walls. A series of 9-inch Z-purlins spanning the distance between the piggyback frames received the new metal roof.

## Retrofitted in 30 days

While the first building was retrofitted in just 30 days, work on the second building was slowed by a discovered structural deficiency. The roof trusses in the second building had rested without any attachment on the concrete block walls. Simple gravity kept them in place. The building, therefore, received full-height H-section columns that extended from the concrete floor to the height of the new “piggyback frame” H-section beams.

## R-20 insulation added

The retrofit incorporated insulation with a vapor barrier above the unheated bus bays to guard against condensation. In addition, R-20 insulation was added directly to the old roof above the office and vehicle maintenance areas to improve energy efficiency. The new thermal barrier provided yet another benefit. By parking the buses inside, the district estimates it is saving as much as \$90,000 per year by not having to park its fleet outdoors in winter using block heaters.



## SPECIFICATIONS

PANEL TYPE: *STANDING-SEAM COATED STEEL*

SIZE: *24" X 2 3/4", 24-GAUGE*

PROFILE: *TRAPEZOIDAL RIB*

COLOR: *STANDARD GALVALUME FINISH*

“The roof renovation and insulation project brought the bus barns back to a weather-tight, serviceable state without the need for major demolition,” Kendrick said. “In effect, the district transformed a pair of 1950s vintage Army surplus buildings into truly modern facilities while reducing its energy costs.” ■



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