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Green prototype store helps retail chain earn Wisconsin suburb's zoning approval

Building Design and Construction



Founded in 1955, Blain's Farm & Fleet has focused on a regional market comprised thus far of Illinois, Iowa and Wisconsin. The prototype store in Verona ushers in a higher-image for the retail chain.

expanded, explained Neal VanLoo, director of engineering for the retailer. VanLoo heads up a substantial engineering department within Blain's that develops a proposed project's conceptual design and specifications before a third-party project team is hired to refine and execute the project. Design Structures, a Butler Builder and general contractor with offices in Wisconsin and Oregon, was selected with Strand Associates, a Wisconsin architectural firm, to complete the retailer's design/build program.

Blain's Farm & Fleet opened a 114,500-sf store in Verona, Wis., last year where the environmentally friendly design helped to earn approval from city officials who had initially resisted any big-box store being built in the Madison residential suburb.

The new facility is the 34th retail location for the privately-owned chain that operates in Wisconsin, Iowa, and Illinois. Based in Janesville, Wis., Blain's Farm & Fleet offers high-quality automotive parts and services, fencing and other livestock supplies, tools and hardware, outdoor sporting goods, lawn and garden, clothing, and patio/recreation items.

The project implemented a number of ideas that store development executives had considered in recent years as the chain



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“Our company had contemplated upgrading the architectural image for new stores for several years and the circumstances in Verona made it the logical candidate to receive the prototype,” VanLoo said “We took it a step beyond just an upgraded façade to embody a ‘green’ building program whose individual features offered both initial cost savings and long-term operational benefits. “

Although the project was never intended to undergo the formal scoring of the LEED program promoted by the U.S. Green Building Council, the sustainable features nonetheless were inspired by the USGBC criteria. These included use of recycled materials, energy and water conservation, landscaping, reduction of the construction waste stream, as well as materials and labor forces sourced in reasonably close proximity to the project. The store blends a proven construction method that Blain’s applies to the structure, roof and walls for a store but enhanced by groundbreaking innovations for the chain, such as significantly enhanced energy conserving features derived from a new-generation skylight system.

The project was built over the winter of 2007-08 on the redeveloped site of a former nursing home on the west side of Verona. The Blain’s store absorbed 14 acres of the 29-acre property that left six remaining parcels for development of a standalone restaurant and strip center shops.



Proven construction with innovative enhancements

The Verona prototype applied Blain’s currently favored structural framing and roof systems construction, based on metal building systems supplied by [Butler Manufacturing](#). The hybrid materials solution combines an engineered structural steel system, based primarily on 50’ x 45’ bays, with the manufacturer’s [MR-24 standing-seam metal roof system](#) combined with foam-core precast concrete sandwich panels, split-face block and horizontal and vertical architectural metal panels.

Design Structures has provided commercial and industrial design-build construction services to their clients since 1987. The contractor delivered an exemplary project that could set the future standard for other Blain’s stores.

From a “green” standpoint, the steel used to fabricate the Butler systems have a 65% recycled content and would contribute points to a formal LEED certification. The structural and architectural precast walls panels offered comparable low maintenance while the dormer-like window elements above the storefront, masonry piers, metal canopy, architectural metal on the facade, and the EFIS backdrop for the store’s identity signage instilled the higher architectural character sought for the energy-efficient prototype.

“All of our buildings are super insulated, typically with 50% more wall and roof insulation than minimum code requirements,” VanLoo noted. “For the past 25 years, we’ve wanted nine inches in the ceiling and six inches in most walls. For precast concrete wall panels, we want them cast with a minimum of three inches of rigid-board.”

Butler Builders normally avoid excessive penetrations in the MR-24 roof to preserve the superb insulating properties and weathertight integrity of the standing seam metal roofing. Therefore, a Butler roof expert was called in to study the project because of the openings for the dozens of proposed skylights. Ray Heisey, PE, RSI, conducted an engineering analysis and concluded if properly installed the energy-saving contributions from the skylights rationalized their structural integration with the metal roof. He specified a specially insulated curb that uniformly maintains not only the roof’s insulation barrier but fully conceals the mounting fasteners from weather exposure.

Curb appeal has functionality

Five clerestory-like elements spaced along and above the storefront allow natural daylight to penetrate the building at a level above the store shelving. These add verticality, break up the building's predominant horizontal massing, and would have contributed towards LEED objectives, the architects explained. Even the landscaping plan could have contributed LEED points because of the recycled trees that add to the prototype store's aesthetics. In addition to a liberal use of masonry planters, pilasters and benches throughout the site, over 120 trees that existed on the site were saved and transplanted after construction, along with 35 other trees used to create a verdant acoustical barrier between a park and the store.

A bright idea

Energy-saving electrical specifications substituted highly efficient LED lighting for the outdoor signage instead of using neon. The LED lighting should deliver at least 70% energy savings. Interior lighting, normally specified from 65 to 75 footcandles by the retailer, will gain significant daylighting assistance not only from the dormer-like elements but from 161 Sun Tracker skylights supplied by Ciralight. These 4' x 4' units on 26-ft. centers will deliver about 30% of the electrical energy savings and directly complement occupancy sensors in the offices and restrooms.

Photocell-controlled lighting was used as artificial illumination for the sales floor whose fixtures are rated 20% more efficient than lighting used in the past. Even so, the building will receive so much daylighting from the skylights that the artificial lighting may not be necessary during most daylight hours. The contributed natural illumination could reach the equivalent of 800 watts of fluorescent lighting or more than a 1,000 watt metal halide lamp. VanLoo foresees electricity costs for the sales floor lighting potentially dropping to zero during the more than ten hours of concentrated daylighting from the skylights.



This rooftop view of the new Blain's store shows the skylights expected to reduce the facility's artificial lighting usage and the associated operating costs. On a comparable large warehouse building in Nevada, the natural daylighting equated to eliminating greenhouse gas emissions amounting to 618,200 pounds of atmosphere-warming carbon dioxide, 1,793 pounds of nitrogen oxides and 1,076 pounds of sulfur dioxide at the coal-fired power plant supplying that building's electricity. Blain's Farm & Fleet hopes to achieve similar economy and environmental benefits.

The recently patented skylights are within a clear, protective acrylic dome and use a solar-powered, motorized GPS rotation control system to keep a single mirror aligned with the sun's changing azimuth. The units can therefore capture sunlight from an hour after sunrise to an hour before sunset. A diffuser in conjunction with a second lens distributes the daylight over a 400 sf area of the sales floor. That equates to ten times the amount of daylighting attainable from conventional passive skylights.

The project's plumbing is another enviro-conscious feature. The store has instant water heaters, thereby eliminating the stand-by supply maintained by conventional tank-type water heaters. Blain's also invested in waterless urinals in the restrooms, a feature that will

save an estimated 40,000 gallons of water per fixture annually. The savings are so significant that the retailer may change out the existing stores elsewhere to the conserving fixtures.

Other green measures occurred during the store's construction delivery. Significant cubic yards of the demolished nursing home building and parking lot were crushed and reused as backfill and base rather than importing fresh material. This recycling initiative on the part of Design Structures eliminated the need for an estimated 300 truckloads of rubble otherwise destined for a landfill and the comparable exchange of virgin fill. That measure, too, would have earned LEED points, since the scoring process addresses not only a building's engineering but the contractor's on-site project management. Careful pre-planning during the material ordering stage by Design Structures further resulted in less wood stud and drywall scrap. The contractor went a step further by separating some 20% of the normal dumpster waste for recycling, thereby diverting tons from the landfill stream. Using local subcontractors and material sources whenever possible saved on fuel and travel devoted to the project, as well as infused dollars into

the local economy. Optimized project records even reduced paper consumption and additional fuel costs related to the distribution of drawings, specifications and other documents to those involved with the project.

The emphasis on "green" follows through in the Verona store's operations. Three, 16-foot-radii ceiling fans above the retail area circulate air and allow the thermostat settings to be raised in the summer and lowered in the winter while still maintaining a desirable comfort level for customers. Also, oil collected from oil changes will be used as an alternative fuel source to heat the automotive service bays. The store will also routinely collect cardboard, plastic and other materials for recycling.

This prototype for Blain's demonstrates that green programming can enhance proven construction methods for many large-scale retail building owners.

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