WINDOW AND DOOR SOLUTIONS
FOR EDUCATIONAL FACILITIES

Wayland Union Middle School, Wayland, MI
Design Plus, Inc.
DESIGNING EDUCATIONAL FACILITIES: A WINDOW ON THE FUTURE

Today’s educational facility is the focal point for the entire community. It is used by all age groups – from the toddler in preschool to the senior citizen at a university extension class. This building has evolved to encompass much more than what we’ve traditionally understood the word “school” to mean.

The way windows are used in educational facilities has evolved, as well. More than simply providing natural light, a view and fresh air, a window’s function has expanded to include assuring a building’s energy efficiency, conservation, sustainability and user comfort. For example, the use of large expanses of glass in the building envelope – window walls – provides transparency and a high degree of visible light while high-performance options such as Low-E glass maintain energy efficiency.

In terms of educational facility design, the special building needs require an even more refined understanding of the design and function of windows. The multiple needs of students, teachers, administrators, maintenance personnel and facility managers – along with the community at large – must be taken into account. Flexibility is key. Schools must be able to grow and evolve with a community’s changing needs. And because they integrate the functions of academics, athletics, arts and vocational training, modern educational facilities – and their windows – must be designed for adaptability and long life.

Aesthetics and design flexibility are often the prime motivation in choosing a window. Other design criteria for selecting windows in educational buildings include:

- Energy efficiency and environmental issues
- Comfort
- Safety/security
- Maintenance
- Budget

When choosing windows, you should also consider the supplier’s ability to meet project schedules. For instance,

“We pushed sustainable design to the limit,” said Rick Petersen, project designer with OZ Architecture, Denver, about the Prairie Learning Center. To minimize energy costs, a system of south-facing clerestory windows introduces daylight to virtually every inhabited space in the building. Large roof overhangs extend beyond the clerestories to maximize daylight while minimizing solar heat gain and glare.

When it came to selecting resource-efficient windows, OZ Architecture specified Pella® aluminum-clad wood windows throughout. Petersen said, “We selected Pella because its … [clad] wood windows – which [include] Low-E insulating glass with argon and triple-glazing with integral blinds – met all of our performance requirements.”
Our highly qualified PELLA COMMERCIAL CONSULTANTS are ready to provide full technical support to help you execute your project efficiently at every stage, from schematic design to owner occupancy – on time and within budget requirements.

Pella® wood-frame or fiberglass windows typically have a lead time of less than five weeks.

And it is crucial to work with a supplier that has a history of success with educational projects. Your specified window manufacturer or supplier should provide comprehensive technical assistance, support and guidance, including:

• Initial consultation
• Budgeting assistance
• Design assistance and implementation, along with green building certification

• Custom product design
• Specifications, product mock-ups and samples
• CAD details and installation shop drawings
• Performance analysis
• Assistance with code compliance
• Field measurements
• Flexible installation options and/or on-site installation support
• Field testing
• Post-installation service, along with replacement parts

Visitors enter the Lakeside Nature Center through a single-story cast-in-place concrete wall that offers little clue to what lies beyond. Once inside, they are greeted with a view of a fully grown woodland, framed by floor-to-ceiling glazing rising up to 28 feet.

Daylight from clerestory windows reinforces the illusion of being in the woods by simulating diffused light penetrating through a forest canopy. Transferring loads from the extensively overhung roof to the cedar columns without deflecting and breaking glazing was a major design challenge – as were the large spans of glazing and multiplicity of shapes and sizes.

The Pella Commercial technical team worked with the project team to develop a structural framing system of wood-clad steel tubes to support required spans while maintaining the center’s naturalistic imagery.
ENERGY EFFICIENCY

TO MINIMIZE HEAT GAIN/LOSS, windows with a whole-window U-Factor of 0.4 or lower and a solar heat gain coefficient of 0.5 or lower are recommended for use in schools.
Window selection is critical in reducing a building's HVAC and electrical requirements. To minimize heat gain/loss, windows with a whole-window U-Factor of 0.4 or lower and a solar heat gain coefficient of 0.5 or lower are recommended for use in schools. With few exceptions, dual- or triple-glazed systems should be specified.

The things that influence a window’s U-Factor are:
- Type of glazing (clear glass vs. tints or coatings)
- Type of frame (wood, aluminum or fiberglass)
- Glazing systems (sealed insulating systems vs. triple-glazed systems)
- Between-the-glass options (blinds and shades)

In ongoing research of energy-efficient buildings, the specification of the correct glass, in addition to the use of “daylighting,” resulted in energy savings of 10% to 25%. Analysis of winter U-Factors, solar heat gain, percentage of UV transmission and percentage of visible light transmission will help determine the best-performing glazing for your project.

Glazing Options
The two main types of glazing systems specified in school buildings today – sealed insulating glass systems and triple-glazed systems – offer low U-Factors. A window’s U-Factor is made up of three components – the center of the glass, the edge of the glass, and the window sash and frame – so the U-Factor of the whole unit is more relevant than the glass-only value. Clear Low-E glass should also be considered. It transmits visible light while reflecting undesirable solar energy like heat and ultraviolet light.
Between-the-glass blinds **REDUCE SOLAR HEAT GAIN BY 43%** compared to roomside blinds.

**Between-the-Glass Options**

Between-the-glass blinds and shades in triple-glazed systems will enhance a building’s energy performance and aesthetics. These window treatments allow less solar heat gain than roomside blinds and shades – only 40% of absorbed heat is transmitted into the room compared to 100% for roomside treatments. Pella options include:

- Tilt-only blinds
- Raise-and-lower blinds
- Raise-and-lower shades

When between-the-glass blinds are closed, they offer a 43% reduction in solar heat gain when compared to closed roomside blinds. And unlike conventional roomside blinds and shades, between-the-glass options are less prone to damage, reducing maintenance and replacement costs.

**Comparison of thermal performance for glazing with blinds.**

<table>
<thead>
<tr>
<th>Glass Type</th>
<th>Solar Heat Gain Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear insulating glass with roomside blinds fully closed</td>
<td>0.51</td>
</tr>
<tr>
<td>Clear dual-glazing with between-the-glass blinds fully closed</td>
<td>0.29</td>
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**Pella Case Study**

**IslandWood (PSELC) Educational Facility**

IslandWood is an environmental learning center for young people that combines ecology, technology and the arts. The architect’s intent was to maximize the children’s exposure to the environment while simultaneously achieving the highest sustainable design goals. The building requires no active heating or cooling for eight months of the year.

Since fenestration design was key to the project’s objectives, the Pella Commercial team worked with the architects and engineers from the beginning of design development through occupancy. Pella is able to provide oversized operable windows required to achieve optimum thermal comfort without air conditioning and with minimal need for heating.

From conception through installation, Pella responds to the specific needs of your project, no matter how simple or elaborate. From providing custom solutions to meeting tight schedules, Pella will help you meet your technical and design challenges.
Sustainability/LEED® Certification. Windows can contribute to prerequisites and points in the LEED® Green Building Rating Systems, including the Energy and Atmosphere category. In addition, windows can contribute to points in sections for Materials and Resources, Indoor Environmental Quality, Innovation in Design, and Regional Priority:

- Certified wood
- Increased ventilation
- Optimized energy performance
- Controllability of systems
- Recycled materials content
- Daylight and views

As a member of the U.S. Green Building Council (USGBC), Pella encourages the use of the LEED® certification process and offers products that can contribute to LEED® points. Pella has been awarded the Forest Stewardship Council (FSC) Chain-of-Custody (CoC) Certification. **Pella® products have been used in a number of nationally recognized green projects**, including the Phillip Merrill Environmental Center (LEED® Platinum) and The Leopold Center (LEED® Platinum).
Students learn better in a comfortable environment with fewer environmental distractions. Windows in educational facilities can help increase student performance through:

- Minimized glare
- Reduced summer heat gain
- Warm interior surfaces in winter
- Equal temperature throughout the room
- Natural ventilation
- Low noise levels

Natural Light for Better Learning

Current educational theory places great value on light and color in the learning environment. Maximizing the use of natural light, or “daylighting,” not only increases a building’s energy performance; it has also been shown to lead to higher test scores and improved attendance. Conversely, eye strain is a major distraction for students and teachers, so glare must be controlled. Floor and wall materials should be selected with light reflectance in mind, along with careful sizing, selection and placement of windows and window-shading devices.

West Elementary School in Laurel, MT, had original aluminum windows that served as more of a hindrance than a help in the learning process. Noise from the playground distracted the students. Teachers struggled to control the temperature; it was always either too hot or too cold. The school has no air conditioning, and when the nonscreened single-pane windows were opened, bees flew inside. The old aluminum windows were also extremely drafty, costing the school extra money on heating bills.

The administration for West Elementary wanted low-maintenance replacement windows offering exceptional energy efficiency, durability and value. Pella® Impervia® double-hung windows were selected for the school. They’re made from Duracast® material, an engineered fiberglass composite that is more durable than aluminum, offers the thermal efficiency of wood, yet is priced competitively with vinyl.*

Since having Pella Impervia windows installed, the school has noticed a significant decrease in outside noise, as well as dramatic savings in heating costs. The school district’s administrator commented, “It’s hard to learn when the classroom isn’t comfortable. We used to get emails all the time from teachers saying the rooms were too hot or too cold. Since installing the new windows, we haven’t had a single complaint like that.”

* In testing performed in accordance with ASTM testing standards, Pella’s Duracast material has displayed superior performance in strength, ability to withstand extreme heat and cold, and resistance to dents and scratches.
Optimal daylighting, reduced glare, lower UV transmission and a lower solar heat gain coefficient may also be achieved through:

• Careful site orientation, with north-/south-facing windows and passive shade control such as overhangs and foliage screening.
• Solar-control glazing options, such as Low-E glass.
• Window shading, including between-the-glass blinds or shades.
• Integration of windows with overhead sources of natural light, such as roof monitors and skylights.

The orientation of a building and the direction its windows face are primary design considerations. North- and south-facing windows are most preferred. East-facing windows can benefit from the warming effect of early-morning sun, but use of west-facing windows should be minimized because of difficult glare conditions in the afternoon. While overhangs and foliage screens are often used to control light entry, the window itself is crucial in reducing glare.
Choosing the Right Window Frame

While modern wood-, fiberglass- and metal-frame windows offer low U-Factors, aluminum conducts heat at a greater rate than wood or fiberglass. Areas of the classroom nearest aluminum windows may be colder in winter and hotter in the summer than those in other parts of the room. In addition, aluminum windows are more likely to allow condensation that could damage interior finishes. Wood- and fiberglass-frame windows increase comfort levels for those seated closest to the windows in cold weather because the frames are warmer to the touch and the temperature at the edge of the glass remains higher than in aluminum-frame windows.

**WOOD, FIBERGLASS OR ALUMINUM**

Thermal Comfort/Resistance to Condensation. Wood is a natural insulator and insulates better than aluminum. Pella’s Duracast® fiberglass composite offers similar thermal performance to wood. Aluminum conducts heat at a greater rate than wood and fiberglass, so it may cause window areas to be uncomfortably warm or cool. Pella window’s thermal performance allows students seated next to the windows to be as comfortable as students seated elsewhere in the room, helping them to perform and concentrate better.

The thermal models shown above represent an aluminum-clad, wood-frame window; a fiberglass composite-frame window; and a thermally broken, aluminum-frame window with a polyurethane thermal break. The models are based on NFRC Winter Design Conditions of 0° F outside and 70° F inside. All windows have the same type of low-emissivity insulating glass.

The coldest point on the wood-frame window is 38° F because of the conductive aluminum spacer at the edge of the insulating glass. The warmest point is 66° F, which is nearly the same as the room temperature. The fiberglass composite window performs similarly – with 39° F at its coldest point and 62° F at the warmest. The coldest point on the aluminum-frame window is 26° F, and condensation may start to appear at 18% relative humidity. This condensation needs to be considered when detailing the materials around the window so that moisture damage to adjacent finishes like drywall returns and plastic laminate sills can be minimized.

The thermal models shown above represent an aluminum-clad, wood-frame window; a fiberglass composite-frame window; and a thermally broken, aluminum-frame window. However, in this case, the models are based on NFRC Summer Design Conditions of 90° F outside and 75° F inside. Again, the windows have the same type of low-emissivity insulating glass.

Note how the inside temperature of the frame near the glass is about the same for all windows. But as you move roomside, the frame temperature of the aluminum window gets hotter to the touch, while the frame temperatures of the aluminum-clad wood and fiberglass composite windows get cooler.

It’s also interesting to compare the differences in the exterior frame temperatures. The temperature on the exterior aluminum cladding of the wood window and the exterior of the fiberglass frame are nearly the same as the outside air temperature. The frames effectively insulate, reducing the heat transferred from the hot exterior to the cooler, air-conditioned interior. Since the outside and inside temperatures are nearly the same for the aluminum window, it’s clear that the aluminum frame is not as effective at insulating the hot exterior from the cool interior.
The Benefits of Operable Windows

The era of the windowless classroom is over. Natural ventilation is an important element in climate control, increasing comfort as well as energy efficiency. Operable windows are key. Contemporary-style, dual-glazed windows – with a large upper sash and small lower sash that is easy to open and close – are an ideal solution.

Noise Control

Noise control is also important for classroom comfort. The three primary factors that affect sound transmission through windows are:

- Glass thickness
- Size of airspace between panes
- Damping of the glass by lamination

Between-the-glass fabric shades and blinds can help reduce outside noise – like lawn mowers and traffic.

Wayland Union Middle School was designed with the primary goal of creating a highly effective learning environment. Stacked configurations of rectangular and arch-top windows allow an abundance of natural light into the interior. Stained wood interiors add warmth and character and contribute to the building’s noninstitutional atmosphere. Classroom distractions are kept to a minimum by a dual-glazed system that reduces outside noise and provides insulation for comfort on even very hot or cold days.

In order to minimize maintenance and safety concerns, the design team specified windows with Pella’s exclusive between-the-glass commercial blinds. The tilt-only window treatments have no roomside cords and are protected from dust and damage. As an added benefit, the windows expand the “tackable” wall space in the classroom for displaying student artwork and other classroom decorations. At the same time, the blinds may be opened or closed to control the flow of light – and the window sash may be opened or closed to control ventilation.
School safety is a bigger issue than ever and includes:

- Fire
- Evacuation/emergency preparedness
- Vandalism

Local building codes dictate safety requirements for educational facilities. The use of wood-, aluminum- or fiberglass-frame windows is generally approved for exterior walls in educational facilities. When renovating school buildings without sprinkler systems, codes may require installation of one window that is a legal means of egress in each classroom. In the past, wired glass was the common solution for fire-rated glazing for interior school windows. However, the International Building Code prohibits the use of wired glass because of the danger of laceration from the sharp wire if the glass is broken.

Damage by vandalism can affect a window's frame, glass or both, so cost and ease of replacement are primary considerations. Maintenance and repair are other primary considerations, as discussed in the next section.

Breathe easy. Windows with ordinary roomside blinds accumulate 10 times more of certain airborne allergens than Pella Designer Series windows with between-the-glass blinds.*

* Based on data from research conducted by the Department of Occupational and Environmental Health at The University of Iowa.

The renovation of McGinnis School in Perth Amboy, NJ, was a study in historical aesthetics combined with modern performance. “We wanted to restore this inner-city school to its original 1899 character, at least on the exterior,” said Steve Carlidge of Vitetta Group Architects. Window replacement was a priority – the existing aluminum windows from the ’60s were literally crashing down and “an absolute hazard,” according to Carlidge. When it came time to select new windows, Carlidge stressed that “we wanted to capture that turn-of-the-century feeling, but we also needed [them to be] low-maintenance.”

The architect chose custom Pella® double-hung and circlehead windows with taupe cladding – research shows this was the original window color. A custom muntin [grille] pattern was also created to evoke the 1890s era. “None of the windows were ‘out of the catalog.’ We needed somebody like Pella that could customize the job with a subframe installation,” Carlidge said. To further reduce maintenance costs, the architect specified Pella’s unique Designer Series® dual-glazed system with Slimshade® blinds. Installed between the panes of glass, the blinds are protected from dust, dirt, allergens ... and the temptations of youthful destruction.
Educational facilities are high-traffic environments where budgets are strictly controlled. Maintenance weighs heavily into life-cycle costs. When specifying windows, look for:

- Reduced breakage opportunities
- Reglazing ease
- Reparability
- Ease of cleaning

While aluminum- and wood-frame windows have been the default choice in many educational applications, there are a number of reasons to consider aluminum-clad wood-frame or fiberglass-frame windows as additional options for educational facilities. Although the incidence of glass breakage in most other building types is less than 1%, it can be higher in school buildings – especially college dormitories.

If sealed insulating glass with simulated divided lights is required to match the appearance of a historical window, it is wise to order extra “attic” stock so that the **SASH AND GLASS CAN BE REPAIRED QUICKLY** when glass is broken.
If sealed insulating glass with simulated divided lights is required to match the appearance of a historical window, it is wise to order extra "attic" stock so that the sash and glass can be repaired quickly when glass is broken.

Repair or replacement of window components is typically less expensive than window replacement. Many wood and fiberglass window components such as hardware, balances and sash can be repaired or replaced so the entire window doesn’t need to be replaced. In addition, scratches on the interior of wood or fiberglass frames can be easily sanded and refinished. Finally, it is important to note that when steel or aluminum window components fail, all too often the original supplier is no longer in business. Parts to repair the window are unobtainable, so entire window replacement is the only alternative.

Between-the-glass options ease maintenance and improve energy performance. Not only do blinds, shades and grilles between panes of glass make cleaning much easier; they eliminate the need for roomside window treatments that can be damaged through accidental or deliberate action.

PELLA® UNIT ID LABELS make repair fast and easy. Broken windows are particularly dangerous in a school environment. If your product ever needs service or repair, a unique identification number on your Pella products will give us exact information so we can efficiently and effectively repair the window – the first time.

The roomside blinds shown in the left photo collect dust and are easily damaged. In contrast, Pella’s between-the-glass blinds (shown in the right photo) reduce long-term maintenance costs and improve energy performance. Not only do Pella’s blinds, shades and grilles between panes of glass make cleaning much easier; they also eliminate the need for roomside window treatments that can be damaged through accidental or deliberate action.

Pella continues to make replacement parts for most products manufactured — some dating back to the 1950s. So you can buy replacement parts instead of replacing an entire window.
BUDGET AND COSTS
Initial construction costs must be weighed against potential annual or lifetime costs. Windows are a clear example of how a small increase in initial costs can significantly reduce a school building’s life-cycle costs. When specifying, look at and compare these window attributes:

- Longevity
- Life-cycle costs
  - Energy efficiency
  - Ease of maintenance

### Longevity

Prior to the 1920s, wood was virtually the only window frame material available. Wood-frame windows on historical buildings have lasted for centuries – a testimony to wood’s incredible durability. Today the most common reasons to replace wood-frame windows are not because of structural or material failure, but rather to:

- Replace single-glazing with more efficient dual-glazing
- Improve weatherstripping to reduce air infiltration
- Provide exterior aluminum cladding to help eliminate the need for exterior repainting

After nearly 100 years of service, the historical site-built wood window above was replaced – but not because of material failure. The painted wood exterior needed repainting. The clear single-glazing resulted in high energy costs and cold surface temperatures. And the deteriorated weatherstripping allowed excessive air infiltration.

In contrast, the modern factory-built Pella® aluminum-clad wood window above offers several advantages over the historical wood window. These benefits include a low-maintenance aluminum-clad exterior, significant reductions in energy costs as a result of high-performance Low-E dual-glazing, and a weatherstripping system that reduces air infiltration to a level that is about five times less than the original window.
Both aluminum and wood windows are available with the glazing systems shown above. Insulating glass relies on sealant and desiccant to help keep moisture out of the airspace between the panes of glass. However, eventually moisture may appear on the internal surfaces of the insulating glass, and the view through the glass is impaired. At this point, the insulating glass is irreparable and must be replaced.

There are many approaches to sealing the edges of an insulating glass unit (IGU) – most of which are single-sealant or dual-sealant systems. The longevity of the IGU is directly related to the materials and techniques used.

Pella products are backed by one of the best warranties in the business: 20 years on insulating glass, 10 years on products and two years on labor. See written warranty for complete details at pella.com/warranty.
Generally, the single-sealant system has a five-year warranty, and the dual-sealant system a 10-year warranty, with some suppliers, like Pella, offering 20-year warranties.

The initial cost of a between-the-glass blind or shade is slightly higher than using roomside blinds of similar quality – but energy efficiency is increased and life-cycle costs from cleaning and replacement are substantially lowered.

Life-Cycle Costs

R. S. Means Building Construction Cost Data shows that initial costs for wood-frame windows are equivalent or lower than for aluminum-frame windows. Fixed windows are often similar in price, while operable wood windows typically cost less than operable aluminum windows.

For multistory educational buildings, it is wise to specify windows that can be cleaned from inside the building. This reduces the labor-intensive and expensive processes required to wash windows from the exterior.

By working with a well-established, reputable manufacturer or supplier, a school’s long-term investment will be protected and life-cycle costs reduced. It is wise to select a manufacturer that offers at least a 10-year warranty on materials and workmanship and two years on labor.

Sealed insulating glass may eventually fail, so it is best to specify Pella’s insulating glass with a 20-year warranty against seal failure.

As shown in the pie chart, the life-cycle costs over the life of the building are defined in terms of:

- Initial costs
- Repair and maintenance costs
- Energy costs

For most buildings, repair and maintenance costs represent the highest percentage of life-cycle costs – 67% versus just 16% and 17% for energy costs and initial costs – and can be reduced by selecting windows with the following characteristics:

- Aluminum-clad wood windows or fiberglass windows
- Triple-glazed systems with or without between-the-glass blinds
- Long-term warranties on glass, materials and workmanship, and labor
- Unit ID labels that make repair fast and easy
- Interior wash features for multistory facilities
- Long-term availability of replacement parts – so replacing the entire window can be avoided

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Walsh University is a private college in Canton, OH. Alexis Hall was built in 1968. When it came time to replace the dormitory’s windows, the university had high expectations. First, the project demanded extremely durable and low-maintenance windows that could handle use and abuse by students, as well as complement the architectural style of the hall and other campus buildings. The windows also had to be affordable and highly energy-efficient — so students would have a comfortable living environment and the school would save on energy costs. Pella Impervia® windows — made from Duracast® material, an engineered fiberglass composite — met the school’s needs and were chosen for the project.

Installation of the dormitory’s windows proved to be a challenge. The 40-year-old, clear, anodized-aluminum windows had been caulked several times and had a brown aluminum panel at each floor line. The existing windows sat flush with precast floors, complicating the installation of new windows. To make sure the new windows were watertight, Pella developed an innovative installation solution at the spandrel locations to cover the precast slab, seal the windows and prevent joints from showing. The new dark-brown Pella Impervia windows give a consistent, modern and clean look to the building — and create a place students can be proud to call home.
The Office of Facilities Design at Rutgers University continually works to renovate campus buildings. When it came time to improve the Waksman Institute facility, the objective was to update the building with low-maintenance and energy-efficient materials — while staying true to the style of the three-story Georgian Colonial building.

The original wood windows were replaced with Pella® aluminum-clad wood windows, providing a low-maintenance, high-performance solution while blending in perfectly with the character of the original design.

To re-create the appearance of the original divided-light windows, the design team chose Pella Architect Series® windows with a custom grille pattern. The windows utilize Pella’s Integral Light Technology®, which permanently bonds grilles to the interior and exterior surfaces of insulating glass. A spacer is installed between the insulating glass panels and underneath the grilles.

White finished aluminum cladding on the exterior of the windows complements the building’s existing decorative exterior trim and sills. The result is a historically accurate appearance combined with modern energy efficiency.
Pocket Installation

When the existing frames are in good condition and only the sash need to be replaced, fully assembled Pella® aluminum-clad wood or fiberglass replacement windows are excellent options. They slide easily into many existing window pockets with no damage to existing trim, paint or plaster, eliminating the cost and inconvenience of a complete tear-out.

Pella’s standard subframe and T-subframe systems for window replacement reduce labor costs of installation of new window sash with minimal disturbance to existing construction. These systems allow installation of new units from inside the building, eliminating the need for – and expense of – exterior scaffolding.

Replacement of Wood Windows

Pella’s standard subframe system consists of aluminum components that are preassembled and installed into openings, concealing the existing wood window frame, to become a “receptor” for the new window.

Replacement of Metal Windows

Pella’s T-subframe system consists of aluminum components that are preassembled and installed into openings, concealing the existing metal window frame, to become a “receptor” for the new window.
Replacement and renovation installation systems are available for partial or complete tear-out of existing windows.

- When existing frames are in good condition and only the sash need to be replaced, fully assembled Pella aluminum-clad wood or fiberglass replacement windows are excellent options. They slide easily into many existing window pockets, usually with no damage to existing trim, paint or plaster — no complete tear-out needed.
- Standard subframe and T-subframe systems allow installation of new windows from the inside of the building. This reduces labor costs and minimizes disturbance to existing construction.
- Custom-sized windows can be built to fit virtually any existing openings when historical, aesthetic or structural considerations dictate a complete tear-out.
- Frame expanders provide an economical method of window replacement when replacing the sash only and refurbishing frames. They can be used to update exterior trim or cover existing trim in poor condition.

Innovative Solutions for Educational Facility Windows

Whether a completely new design or the refurbishing of an existing educational facility, specifying the correct windows is vitally important. It will contribute to increased energy efficiency, classroom comfort, enhanced safety and security, ease of maintenance, and low life-cycle costs.

An established, dependable manufacturer or supplier can be your partner in determining the optimum window solution — from selection of the proper glazing system, to consideration of innovative options such as between-the-glass blinds and shades, to long-term support after installation. Good window design will contribute to a learning environment that can evolve to meet the ever-changing needs of school and community.
Commercial expertise that expands possibilities and achieves your vision.
Pella Commercial Solutions has the expertise to help you realize your design vision. With in-house architectural, engineering and project management services, we provide project support from start to finish.