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Skyrocketing Costs: More Sticker Shock

**How Green is
Your Building Envelope?**

**Classroom Technology
Enhances Productivity**

**Special Supplement:
Athletic Facilities For Schools**



Photos courtesy of Svingals + Partners

Designs and materials open up some new dimensions in green architecture for schools.

Thomas G. Dolan

Part of the current lexicon in terms of school construction are “green,” “sustainable energy,” “environmentally friendly,” and so on. It’s easy to be generally aware of what phrases like this mean, while being ignorant of just where these concepts are in terms of actual development. This becomes evident in speaking to expert architects on the cutting edge of school design — Barry Svingals, EAIA, managing partner, and Jay Brotman, AIA, partner of Svingals+Partners, an architectural firm based in New Haven, CT— on the topic of building envelopes.

To start with a definition, the “envelope,” as the word implies, envelops or encloses the building. But Svingals points out that the envelope should be thought of as more than a facade, analogous to how the term is used in biology — an outer, but living, membrane. The building envelope should be seen as part of a much larger matrix that affects up performance.

A Lesson in History

Providing an insight into the state-of-the-art dynamics of current school design, Svingals made the statement, “If you go back to the buildings in the early 1900s, they got it right. The old ideas they’re now bringing back.”

How could this be? One simple reason, Svingals said, is that back then, architects had to maximize natural lighting and ventilation because the artificial options were not available.

Svingals went on to explain that after World War II, with the rapid influx of children, schools had to be built quickly. Unfortunately, they were also built cheaply, and were poorly designed. “People did not think about orientation, thermally-insulated walls, or building schools that would last,” Svingals said.

In the 1960s, efforts were made to make schools better, but a part of that movement involved taking windows out, since outside views were thought

to be distracting to students. And including fewer windows was thought to be a way to conserve energy. By the 1970s, people generally understood that the experiments of the 1960s weren’t working, but they exacerbated the situation with further experiments, such as eliminating individual classrooms and replacing them with cluster, or team, teaching, in what can best be described as large halls, explained Svingals.

The 1970s oil crisis, which accelerated the need for greater energy conservation, caused architects to build schools with even fewer windows and include technology that would control the inside environment while keeping the natural world out. The result was what became known as “sick” buildings.

During the 1980’s and 1990’s sustainable ideas began to creep in. Designers and planners began to realize that natural views, natural lighting, and fresh air were conducive to learning.

Buildings were being designed for the health of both the occupants and the surrounding environment. This process was gradual but, as Svigals said, "This trend has really accelerated. The entire industry, including suppliers, is now focused on making healthy buildings."

Learning From the Past

Another example of how we are returning to some of the past concepts about schools, Svigals said, "is that we are now encouraged to think of schools as an image or emblem of the community. They are meant to be an icon of what the community stands for." This means, Svigals continued, that the school must appear to be an integral part of the surrounding area. Sometimes, but not in every case, this is obvious.

As an example, if the neighborhood is made up of residential homes, the exterior design of the school building may consist of recognizable classroom units of, say, 24 ft. by 26 ft., as opposed to large undifferenti-

ated spaces. On the other hand, if the school borders large industrial or commercial buildings, then the exterior design may reflect the larger scale areas of the school, such as the gym, cafeteria, or common areas.

Along these same lines, said Brotman, "Older schools represent historical continuity, and this is very important to those who live in that area. So, you want to use materials that will last a long time."

Sticks and Stones

For this reason, Brotman said, the firm always recommends a masonry construction. Masonry is not only very durable but also has many other values as well. "Masonry represents



The Beecher School, in New Haven, CT, is wrapped by a 500-foot ornamental aluminum frieze.

a great thermo-mass. During hot weather, this thermo-mass turns heat back, not allowing it to pass through the exterior facade. On the other hand, during winter, when the interior is heated during the day, the masonry helps keep the heat in," he said.

Contemporary designers are now thinking about insulation in more precise ways, continued Brotman. By using computerized models, they are working with more accurate calculations than were possible in the past. One of the benefits of this technology is the prevention of moisture. In terms of the exterior walls, the masonry, as well as metal-stud wall systems, is constructed outside the water barrier. By using the

computerized models, designers can choose from a variety of types of insulation to come up with the best combination of materials for any climate. In addition, Brotman said, you can calculate how to build a wall so that the dew point, when reached, is outside the water barrier. Doing this correctly will prevent the multiple problems of mildew and mold, which have been the cause of so much building decay and childhood illness.

"An initial consideration that should precede any design is initial cost versus the long-term costs of operations and maintenance," said Brotman. "As energy costs rise, this aspect becomes more and more important. Through the computer modeling of energy performance, we can make informed decisions on the relative merits of every possible choice." The resulting savings can be considerable. The initial cost of a building may represent only 15 to 20 percent of the lifetime cost, when you factor in maintenance and operation costs, Brotman said. An initial investment of half of a percent could show up later as a five to 10 percent energy or maintenance savings.

Be Careful Where You Put It

One way to go about this is to return to the concept of primary site orientation. "To take advantage of natural light, and save energy, it is usually a good idea to site the building on an east-west axis, maximizing the north and southern exposure for the classroom," Brotman said.

On the other hand, this also doesn't mean simply letting in as much light and fresh air as possible — here is where

computer modeling adds a degree of efficiency not available in the early nineteenth century. "By using computer modeling, you can look at many different factors then create the most efficient balance," said Brotman. For example, in terms of the ideal percentage of glass included on a specific outside wall, the model may show that the wall should be at least 40 percent, but no more than 50 percent, glass to avoid letting in so much light that you need to close the blinds," said Brotman.

Through the Roof

Roof design is going through an evolution, said Brotman, adding that reflective roofs are still a good environmental option, especially in the warmer, southern states. Reflective roofs virtually bounce heat away from the building, saving on the need for air conditioning. However, in the northern climates, you want to absorb that heat.

Green roofs, or roofs covered with plants, are becoming more commonplace. The plants help insulate the building, reduce rainwater runoff, absorb oxygen, and filter out carbon dioxide. Green roofs, along with solar collectors, are the best roofs, even for southern climates, Brotman said.

"Modern school design, especially in terms of the building envelope, looks to the past and also to the future, with technology now regarded not as a means to overcome the environment, but humbling itself. The sensitivity to who we are as human beings is profoundly affecting the way we approach design," said Svigals. ■