Education Case Study: A Balanced Approach

After 70 years, Pierre S. duPont Middle School in Wilmington, DE underwent its first major renovation.

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When conducting a renovation on a historic facility, it can be a challenge to preserve the integrity of treasured elements while also creating a modern environment for occupants. Mandates from outside agencies, self imposed limits, and physical characteristics of the building often exert significant influence on what can and cannot be done.

In Wilmington, DE, the project team for the renovation of the Pierre S. (P.S.) duPont Middle School faced such a scenario and the corresponding challenges. But by establishing the education of students as the prime objective, with historic concerns as a very important, yet secondary, focus, the group was able to update the facility while retaining important elements of the building.

In 2004, when the Brandywine School District, which owns P.S. duPont, decided a major renovation was due on the school, the building was nearly 70 years old. Built by the state of Delaware and completed in 1935 for $1.9 million, the school began its service life as a high school. In the 1980s it became an elementary school, which was its function when renovation planning began. In 2005, voters approved a $44 million 20-year bond in a referendum vote to fund the project.

In discussing the project approach, John Read, construction project manager for the Brandywine School District, explains, “We watched where we spent the money and didn’t save history for the sake of saving history. We spent money on doing things that were right for educational needs.”

While isolated improvement projects (boiler conversions, electrical upgrades, and flooring replacements, for instance) had occurred, the facility had never undergone a building-wide renovation. “The district has been renovating its schools since the mid 1990s, and it was time for P.S. duPont to be done,” says Read in explaining the decision to pursue the project. “We were at a point where we couldn’t effectively control occupant comfort. Teachers had to prop open windows in the winter, because it was too hot. That affects the quality of education. Lighting quality was poor; that also affects education. When ventilation systems don’t work, that affects education. And, when it rains inside the gym, that affects education.”

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Work began on the school in the spring of 2007. To accommodate this schedule, the 750 member student body had been relocated to an adjacent district building for the 2006-07 academic year. This building, which served as a middle school until several years prior, was vacant and was regularly used as swing space for various needs.

Saving The Old

In his role as project manager, Read worked with the district to hire design and construction firms. He also began by meeting with teachers and other school staff members to gather insight into what they needed to do their jobs at the school. The resulting plan involved repairing or replacing the floors, windows and skylights, roof, furniture, and building systems (including HVAC, fire, and security). Meanwhile, the team would focus on restoring historic elements, such as the auditorium, the library, and wood flooring in classrooms and terrazzo in the lobby and other gathering spaces.

Combining old and new was a theme throughout the project. The 1,200 seat auditorium, for instance, features hand carved plaster and decorative moldings, and these elements, along with the maple hardwood floor and molded wooden seats, were restored, while technology tools, such as automated curtain operation, projection screens, and lighting were added.

The library was another restoration focus. Says Read, “The library was an absolute showpiece, but it needed to be bigger. Prior to this project, the room could hold 7,000 volumes, and we needed it to hold 17,000 volumes. But instead of taking out the limestone walls and ruining the architecture of the space, we converted two neighboring classrooms into an auxiliary library. We placed computers in those additional rooms and connected the space visually to the central library with glass panels in the walls.”

The auditorium and library are examples of what Read calls “isolated wows.” When working within a budget, not every space can be spectacular. However, Read notes, by spending money on common areas that can be appreciated by the most people, this helps improve quality of life. “In designing our schools, we think a lot about who is using the facility. For kids, learning can be tough, so we strive to create some fun areas. At P.S. duPont, we made the cafeteria fun by installing restaurant style booths. That didn’t cost much more than tables and chairs, and it added a fun element.”

In seeking to improve quality of life, the project team also took the opportunity to consolidate some departments. For instance, music classes had been located throughout the building, explains Read. “The choir and general music classes were conducted on the third floor,” he says, “while band took place in the corner of the gym on the first floor. And none were near the auditorium where performances take place. So we created an entire music wing near the auditorium to locate them together. We were able to put people where they belong.”

Reuse As A Theme

“It’s amazing that P.S. duPont is one of our oldest buildings and had the least amount of work done to it over the years,” observes Read. “The good part of that scenario was the history of the building was still there. It was preserved.”

Restoring flooring was a major piece of the project. In the lobby and other common spaces, there were terrazzo floors original to the school. These had been covered with carpet at some point, and it was determined that the carpet would be removed and the terrazzo cleaned and restored. Commenting on the cost effectiveness of doing this, Read

explains, “When replacing floors in schools built in the 1950s, we often have to remove asbestos tile and then install new flooring. That costs about $8 per square foot. Cleaning and restoring the terrazzo flooring was about $3 per square foot.”

Meanwhile, the Douglas Fir hardwood flooring in the school’s 88 classrooms was repaired and refinished. In a few classrooms, the floors needed to be replaced, and in those cases, the wood was salvaged for patches in other rooms.

The idea of reusing materials existing in the building to serve another purpose was applied throughout the renovation process. Citing another example, Read says, “We had to remove a portion of the oak cabinetry in the library. We then had a local carpenter transform it into a front counter for the main office.”

The front counter conversion was one of several instances where, Read notes, reusing the old saved them money versus buying new items. Another was the decision to convert chestnut shelves, taken from walk in closets, to trim the school’s existing blackboards. Explains Read, “The chestnut boards were 20' long, 14" wide, and 1" thick. They needed to be removed anyway, so we sent the wood to a mill shop to be made into the trim.”

Another way that wood was salvaged for reuse was to frame student lockers on the first floor. Says Read, “The lockers we purchased new for that floor are set out in the hallway—not in the wall. To purchase the metal trim that goes with the lockers would have cost $7,800. And to have them trimmed with the oak that was taken out of the building cost $9,000. So the premium to make the space look spectacular was $1,200, and we went with that option.”

Elaborating on the reuse theme of the project, Read says that those first floor lockers had been put in during the 1970s or 1980s, and they needed to be replaced. Meanwhile, lockers on the second floor, which were original to the school, were in good enough condition to only require a painting and cleaning.

“We did spend a lot of time saving the history of the building,” says Read. “But the reality is this actually saved us money in many instances.”

The project team also worked to keep the school’s 540 windows in place. Installed during the 1990s, these windows may not have been installed properly and were drafty, Read explains. “We had budgeted $3.5 million to replace the windows,” he says. “But we found a company that could repair what we had already. The aluminum and glass in the windows were in wonderful shape. We just needed to address the drafts. And by doing that, we saved $3 million.”

Bringing In The New

One area the team decided not to preserve was the red clay tile roof, which had been leaking. Says Read, “We could have spent the money to fix the roof, or we could install relatively inexpensive asphalt shingles—with a 50 year warranty. We went with the shingles. The school is listed on the National Register of Historic Places, and maintaining its original appearance was important. However, you have to walk across the street to see the roof, so the asphalt shingles presented the better option for our situation.”

While the hardwood and terrazzo flooring in the school were restored, the project called for replacing all the hallway floors. In order to determine the best type, the team installed samples of different floor materials. “We put in eight types in one of the hallways and left it there for two years,” says Read. “After that time, we looked for what had held up the best. We also looked at it from the perspective of preventing slip and falls as well as ease of maintenance.”

Ultimately, the team chose rubber flooring for its ease of maintenance. The material chosen does not require waxing, and Read notes that with the district spending approximately $90,000 per year on floor wax, this was a persuasive feature. “This did require some change in culture for our maintenance people. They want to make the floors shine. But shiny doesn’t mean clean. Shiny means shiny.”

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A Chat With John Read, construction project manager, Brandywine School District

What are your responsibilities in the Brandywine School District? How long have you worked in facility construction? I've worked for the Brandywine School District since early 2003. I manage all the construction projects for the district, including new schools and renovations. I've worked in the facility construction profession for 17 years total..

During your tenure in facility construction, what are some of the major changes you've seen? I think the big changes have been in the use of technology—building management systems, for instance. Other notable developments are concern for reducing energy consumption and the push for LEED certification. You don't have to believe in global warming necessarily, but I think a lot of the strategies contained in the LEED rating system are just the right things to do. We should be concerned about acoustics; we should be concerned about buying materials locally.

What notable changes have occurred in FM during your tenure in the profession? The electronics have become more compact and have far greater capabilities. We have near real-time condition reporting of HVAC systems around the building. Communication has also improved, and staff can be redirected quickly to needs around the facility as they develop. Overall, we have more information at our disposal.

With the P.S. duPont school renovation completed, what are you working on next? We are building the first LEED certified school in the state of Delaware. Our district received a grant from the state for this project to achieve LEED Silver, but we are going for LEED Gold. The project is an elementary school, and we are in the process of tearing down an elementary school and middle school on the site. These were poorly built in the 1960s, and there were masonry and other structural problems. We conducted an estimate of what it would take to fix and decided it was less expensive to build new. This is going to be a demonstration project for the state. We're bidding in four weeks and are hoping to be complete in August 2011.

In choosing classroom furniture, Read also conducted some testing to discover what teachers, students, and custodians preferred. While comfort and appearance were important, maintenance was also at the forefront in the decision making process.

"We didn't want to do a beautiful job on the school and then bring in furniture that would mark the floors," Read explains. "We brought in samples while operating in the temporary facility and had some of the kids look at it, along with the staff and custodians. The chairs we ended up choosing have pads on their feet, so they don't mark up the floors. This cost a little more, but it was worth it to prevent the floors being scratched."

Behind The Scenes

Since P.S. duPont had never undergone a full-scale renovation, the time was due to update and/or install building systems to meet current and future needs. This included an overhaul of the HVAC equipment, automation of lighting controls, installation of sprinklers throughout, and an upgrade of security measures.

Gas fired boilers replaced steam boilers, and air conditioning was installed in the building. In certain areas of the school—an early education center that operates in the lower level and the nurse's office—UV light filtration was placed in HVAC ducts to provide a heightened level of indoor air quality. A new BAS was installed—replacing an existing pneumatic system—to control the functions of the new equipment.

Lighting was also a prime focus, from both quality and energy consumption standpoints. "We learned that it took the custodians 30 minutes at night to turn all the lights off," says Read. "And sometimes the lights weren't being turned off. That wastes energy and money. So automation was a big part of our lighting upgrades. Now, when the security alarm is activated for the evening, the lights are turned off. It was instances like those where it was worth spending the money on automating certain things."

Lighting during hours of operation was also a focus of an energy saving approach. One strategy is daylight harvesting in the classrooms. "When you open up the shades and the room is flooded with light from outside, the lights dim inside," explains Read. "And, we only put the daylight harvesting on the building's southern exposure to save money."

According to feedback from the district's energy management person, the school is now saving $25,000 monthly on utility bills. "The electric bill has gone up, because we have added air conditioning and classroom lighting levels are higher (up from 25 footcandles to 50)," says Read. "But our savings in gas has far outweighed that."

Security system upgrades included digital surveillance cameras, motion sensors to detect propped open doors, electronic badges for employees to enter the building, and a reconfigured guest entrance.

"Every door in the school is locked at all times," says Read. "There are

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five points of entry where employees use their badge to enter. For guests, we changed the configuration of the lobby and the front office. When someone enters the main lobby, the only place they can go is the main office. To do this, we needed to remove a safe—one with 14" thick concrete walls. It wasn't easy, and it wasn't cheap, but a locked door works better than a camera. That is the policy in all of our schools."

The project was completed in June 2008, and students moved back into P.S. duPont for the 2008-09 academic year. Something Read discovered during and after the renovation is the pride that area residents and even past students have in the school. "This was an investment in the community," he says. "Through that referendum, we were using 20 year debt money to finance the project. And we wanted to make sure what we did would last 30 or more years. The decisions we made for the project were guided with that in mind."

This article was based on an interview with Read. To learn more about the Brandywine School District, visit http://brandywineschools.org/bsd.

Project Information:

Name Of Facility: Pierre S. duPont Middle School.
Location: Wilmington, DE.
Type of Project: Renovation.
Function of Facility: Education.
Owner: Brandywine School District.
In House Project Manager: John Read, construction project manager, Brandywine School District.
Square Footage (sf): 230,000, plus 8,000 sf pool building.
Construction Timetable: April 2007 to June 2008.
Budget: $44 million.
Cost Per Square Foot: $184.
Architect: ABHA Architects.
Construction Manager: Bancroft Construction.
Electrical/Mechanical Engineer and Lighting Designer: Furlow Associates, Inc.
Structural Engineer: Baker Ingram.
Landscape Architect: Landscape Architectural Services, Inc.

Product Information:

Furniture: HON; Stelter; Virco.
Flooring: nora systems, Inc. (rubber); existing wood floor; existing terrazzo.
Carpet: Mannington.
Ceilings: USG.
Paint: Sherwin-Williams.
Building Management System/Services: Andover Controls.
Security System: Advantech.
Fire Alarms: Advantech.
Lighting Products: Columbia; Finelite.
HVAC Equipment: York.
Power Supply Equipment: GE.
IT Infrastructure: 3Com.
Roofing: Firestone Building Products.
Signage: custom by Signs Now.
Skylights: Kalwall.
Window Treatments: Hunter Douglas; MechoShade.

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