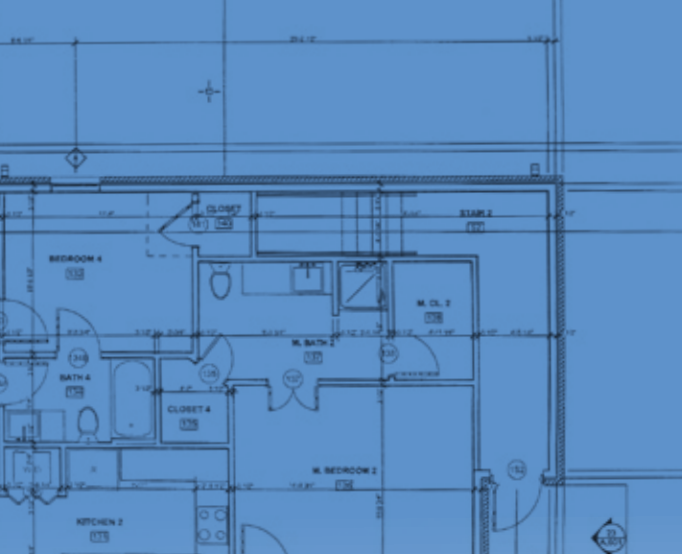


# ALL







**School facilities are notorious for hiding their true costs. A total cost of ownership approach can help you avoid surprises and make decisions that pay off years down the line.**



## THE BOTTOM LINE

- In the context of K–12 facilities, total cost of ownership provides a financial estimate of all direct and indirect costs of a building or system. It builds on longer-established ideas of life-cycle costing and preventative maintenance.
- Schools can use TCO to make better decisions about purchasing a single product, managing a portfolio of facilities or planning new construction.
- A strong partnership between the business officer and facilities leader is crucial to success.
- Endowment strategies can enable schools to save everything needed for a building's major replacements, "from cradle to grave."

By Cecily Garber

**B**uilding two new dormitories was an “easy” decision for The Brook Hill School in Tyler, Texas. All Tony Welty, director of finance and operations at the preK-12 day/boarding school, had to do was determine the buildings’ initial and future costs and then balance those against revenue — tuition income — that they would help generate.

Easy for him, at least. As a routine practice, Welty calculates the total cost of ownership (TCO) for all of Brook Hill’s buildings. TCO, a term introduced in the educational setting in 2006 by the Association of Physical Plant Administrators (APPA), builds upon basic concepts and strategies that predate it, such as life-cycle costing and preventative maintenance. It means “thinking about what it takes to maintain a facility in a holistic view, about assessing the risks and forecasting all the costs that go into the facility from cradle to grave,” explained Jed DeGroot, director of client services at Dude Solutions,

Left: Tuition revenue from increasing international enrollment will cover construction and maintenance costs of this newly constructed dorm at Brook Hill School in Tyler, Texas. Tony Welty, director of finance and operations, used historic facilities data to estimate all costs “from cradle to grave.”

Below: Student room in one of the new Brook Hill dorms.





Students outside the Huffington Library Media Center at River Oaks Baptist School in Houston.

an operations management software provider. In the case of Brook Hill's new "boarding houses" (the school's term for dorms), those costs included initial investments in design and construction, along with ongoing costs associated with HVAC, utilities, housekeeping, food, salaries for house monitors and additional transportation for new students. Brook Hill secured financing and completed construction of the dorms last August.

In the most basic terms, TCO means thinking beyond initial costs and accounting for operation, maintenance and replacement costs well into the future. "It's a process of knowing your facilities, of having a good baseline knowledge of plant and facilities equipment, and being able to use a lot of information to make sure your plant is running efficiently and you have money to keep it going," said Paul Mayhew, associate head of school for finance and operations at River Oaks Baptist School in Houston.

***If schools don't account for all ownership costs in their planning and budgeting, costs can accumulate to the point of no return. One business officer likens it to the slow clogging of arteries that can lead to a heart attack.***

The stakes are high. If schools don't account for all ownership costs in their planning and budgeting, costs can accumulate to the point of no return. One business officer likens it to the slow clogging of arteries that can lead to a heart attack. Moreover, campus appearance can have an outsized impact on prospective families' opinions of a school, and therefore its enrollment. Proper facility maintenance also impacts a school's program, safety and, in turn, reputation.

## Full Transparency

"I like to say schools have a fiscal endowment and a physical endowment," said Larry Eighmy, managing principal of The Stone House Group, a facilities consultancy. "A fiscal endowment tells you what it does. It reports really well, and there are policies about how much we can draw and distribute." In contrast, the physical endowment — the campus or plant — "is readily four times the size of the fiscal endowment, but it doesn't tell you what it needs, and oh, by the way, it always needs something."

Enter TCO to help schools handle those myriad responsibilities. TCO gives financial administrators "full transparency of an investment: how it is performing, how much additional investment may be needed throughout the life cycle and when it's best

## TCO Standards

In December 2017, the Association of Physical Plant Administrators (APPA) released "APPA 1000 — Total Cost of Ownership for Facilities Management: Part 1: Key Principles." The document, available for purchase at [appa.org](http://appa.org), outlines the costs institutions should consider regarding their facilities, including:

- Replacement of energy, utility and safety systems
- Continual maintenance of building exterior and interior, and replacement of materials
- Personnel implications
- Updates to design and functionality
- Recapitalization costs

The standards outline 13 principles, which touch on:

- Managed assets
- Asset inventory
- Global location hierarchy
- Asset classification standard
- Asset costing
- Asset inspection
- Asset performance
- Asset annual funding
- Asset comprehensive plan
- Asset decisions
- Asset information sharing
- Asset reporting
- Data management and verification

APPA certified the standards through the American National Standards Institute, a rigorous adjudication process involving extensive committee work and public comments.

Implementing the standards would be difficult without training, said APPA's Ana Thiemer. APPA is looking to develop webinars and seminars on the topic. It is also working on Part 2 of the standard, which will focus on implementation strategies and cover different sized portfolios and organizations, different levels of implementation, use cases, systems used for planning and design, and data sharing.



to reinvest in the asset,” said Ana Thiemer, co-chair of the TCO working group at APPA. “Large companies see strategies like TCO as part of their competitive edge, so they’re not willing to share what they know,” said Dana “Deke” Smith, the other co-chair. Luckily, schools are more generous in sharing their TCO approaches. According to APPA, no school has yet to fully adopt TCO as the organization defines it (see sidebar), but many schools are implementing key ideas, primarily in energy use and technology, and evangelists say any organization of any size can implement it with success.

***“If investments are made without considering the long-term implications, you’ll spend a lot more on operating them than you would otherwise.”***

—Bill Keslar  
Building Solutions

TCO can be used to consider the financial implications of a specific product, single structure or whole portfolio of structures. It can be used to guide budgets, purchase products, plan new facilities, assess existing facilities or retire an asset. Schools may find it easiest to begin implementing TCO in three areas, said Thiemer:

- Purchasing new assets
- Handling existing assets (decisions about investing in or disposing of them)
- Forward-thinking financial reporting, considering up to 50 years in the future

## Common Applications

One common problem TCO addresses is short-term thinking in bidding, which often leads to choosing the lowest-cost option by default. The ramifications of these kinds of decisions add up. Initial costs are on average only 20 to 30 percent of an asset’s total cost over its lifetime, explained Bill Keslar, president and CEO of Building Solutions, a facilities consultancy. “A vast majority of the remaining costs will be a result of how well you spend that first 20 percent,” he said. “If investments are made without considering the long-term implications, you’ll spend a lot more on operating them than you would otherwise.”

At Phoenix Country Day School, Brandon Perry, director of facilities and

transportation services, used TCO to convince leadership that what seemed like the cheapest janitorial service, which the school had hired in the past, was not the cheapest when including costs other than those in the initial contract. Consulting the complaint record, Perry showed that the school received only four complaints about unkempt facilities the year it hired a company that was at surface value more expensive. With the “cheaper” company, the school had several complaints a week and jobs had to be done multiple times. In addition to hard costs adding up, the soft cost of complaints from students, families and other stakeholders took a toll.

“The quickest solution is not always the best,” said Perry. “You’ve got to sit down and crunch all the numbers. Show people that over the next 10 years [one asset] will cost this much and the alternatives cost this much.” At the same time, pick your battles. “You can’t be spinning your wheels every single time you do a purchase,” he said.

TCO can also help schools better manage current assets. Sometimes an asset can be retired earlier than its estimated useful life, while saving the school money.

Welty applied this thinking when deciding how to handle Brook Hill’s aging tractor. The 280-acre campus is a big draw for students and families, making maintenance equipment crucial. Purchasing a new tractor would cost \$35,000, whereas making repairs to the old one would cost \$3,500–\$5,000. Last year, the team opted to repair it, hoping to get an additional six months to a year

of use, and sure enough “it worked almost exactly for a year,” said Welty. But repairs beyond that “would be throwing good money after bad.” The school now must decide whether to purchase or lease, use cash or borrow to acquire a new tractor.

Arguably the most pernicious place to neglect TCO is in constructing a new facility. Here especially is where “very few have the initiative to truly look at the total cost,” said Kevin Folsom, director of campus operations at Trinity Christian Academy in Addison, Texas, and former APPA board officer. Fundraising fatigue sets in, stakeholders want construction within a certain time frame, and leadership assumes that the school will find a way to manage costs beyond initial construction when the time comes. “Psychologically, people do not want to look past the initial cost of a facility and come to grips with how much it will really cost them over its life,” affirmed Smith.

***“Psychologically, people do not want to look past the initial cost of a facility and come to grips with how much it will really cost them over its life.”***

—Dana “Deke” Smith  
APPA

Generally, schools “want to pay in cash [for repairs], and in order to have that cash on hand at the right time, you have to take into account the lifecycle of a facility,”

The lower school building for grades pre-K-4 at Trinity Christian Academy in Addison, Texas.





## Key Performance Indicators for Facilities Maintenance

"Make sure leadership uses the same language across common areas," advised Dude Solutions' Jed DeGroote. He recommends business officers and facilities directors track three KPIs together.

- **Current replacement value (CRV)** — the cost per square foot to replace a building if it were demolished and replaced.
- **Facility condition index (FCI)** — deferred maintenance divided by CRV. For example, a building with a \$10 million CRV and \$3 million of deferred maintenance would have an FCI of 30 percent. Lower is better. Twenty to 30 percent is usually acceptable for independent schools, depending on history and identity. A 150-year-old school may deem its historic buildings essential to its mission and support higher FCIs, for example. Private sector figures tend to be lower, and many public schools are north of 60 percent.
- **Planned maintenance vs. reactive maintenance ratio** — 50 percent is a very strong ratio, according to DeGroote. He finds schools are usually either in the 30 to 50 percent range or at less than 5 percent, which is cause for concern.

Folsom said. There are average lifecycles and replacement costs for all major components, such as roofing, HVAC, life safety systems, waterproofing for vertical walls, plumbing, electrical and mechanical systems, even aesthetic components. APPA urges schools to ask designers and engineers about maintenance and replacement costs in the planning phase of new buildings, and DeGroote has seen more schools ask architecture and engineering firms to build preventative maintenance programs into their designs.

Folsom encourages leaders to consider the revenue a facility may generate. "If you don't build in a way to increase revenue [to cover ongoing costs] you will have a problem." When he was at another school, for example, its leaders wanted to put up a new building that he knew they couldn't

afford beyond initial construction. He suggested adding a 10th floor of apartments to the originally planned nine-story building, thus bringing in additional revenue. That revenue went into an endowment to fund future replacement costs.

"If we approve a building recognizing that we have, for example, a 50-year pattern of expenditures, we can then make a decision with our eyes wide open," said Theodore Weidner, associate professor of construction and engineering management at Purdue University, who was involved in writing the APPA TCO standards. One example: Weidner consulted on the construction of a new basketball practice facility at the University of Nebraska. Administrators wanted an all-glass, west-facing wall. Weidner pointed out the glass itself might be affordable, but the solar heat gain it would produce would make the building hot and uncomfortable during the summer and significantly drive up utility costs. He acknowledged the aesthetic appeal of glass, but challenged the design team to consider the costs of construction and maintenance associated with a pure masonry wall. The comparison led to a compromise of using a more expensive piece of glass that would cut back on the solar gain and save money in the long run. It was "the best value solution for programmatic goals," he said.

## Getting It Done

So how can independent schools track and analyze all the information that goes into TCO? A close partnership between the business officer and facilities director is key. "The business officer is probably not going to have a grasp of all aspects of the day-to-day implications of investments in facilities," said Keslar. Working with a highly skilled facilities manager "makes TCO analysis easier," he said.

➤ *For more on hiring facilities management, see "Gorgeous Campus Seeks Renaissance Caretakers: Recruiting Facilities Talent" (July/August 2017) on NetAssets.org.*

Bringing facilities managers into high-level conversations, whether about planning for a new building or maintaining current ones, also helps. "Listen to the people forced to keep things running with band aids and bubblegum," urged Smith. "They often know you're dumping money into something when it'd be much smarter to replace it," he said.

Together, these parties need to carefully manage and analyze facilities data, which can be harder than merely collecting data. "People have the data," Smith said. "The question is what are they doing with it to make decisions?"

➤ *For tips on conducting an in-house facilities audit to gather key facilities data, see Strategies on page 8.*

Bryan Denney, CFO at Trinity Episcopal School in Austin, Texas, is lucky to have both a strong partner in facilities management and relatively new facilities. The oldest building was constructed in 2000, and the school's facilities director has been there for nearly that entire time. Together they built a large spreadsheet that captures their knowledge of plant metrics. A simple work order program helps them track tickets, run metrics and identify trends. "It's brain power and good old-fashioned Excel," Denney said. But strong institutional knowledge can also be risky. Denney acknowledges the need to document the facility director's wisdom more formally so it does not get lost.

➤ *For more on succession planning, see "Anticipating Retirements, Gleaning Institutional Knowledge: One School's Approach" (Jan/Feb 2017) on NetAssets.org.*

Every month, Welty sits down with two others, the director of Brook Hill's business office and the buildings and grounds coordinator, to analyze data on maintenance and utility costs, information he then uses to forecast budget needs. "We're always looking for trends," he said. A jump in a utility bill might indicate a leak somewhere, for example. "Getting the right people around the table is crucial," he further explained. "You need two types of people, left brain and right brain, number crunchers and creative thinkers who will ask questions no one is asking."

Outsourcing and technology can also help, especially if the school lacks highly skilled tradespeople. Working on an older campus, Mayhew has less internal knowledge about River Oaks' facilities, so he contracts Building Solutions to conduct facilities assessments every few years and to help estimate costs. The school also uses SchoolDude's computerized maintenance management software, with an integrated work order module, to track capital items and useful life.

## Beyond Numbers

Importantly, hard costs are not the only thing to consider in TCO. “Focus on making facility decisions, rather than expenditure decisions,” said Weidner. When determining which items to replace, Mayhew, for example, considers their potential impact on program. The school network and phone system are so crucial that extending their use beyond their estimated useful life is too big a risk, because a sudden failure would wreak havoc on school-wide operations. Likewise, refrigeration is key for the lunch program, and air conditioning is essential in Texas. On the other hand, if the parking lot asphalt is in good condition at the end of its estimated useful life, there is little risk in delaying resurfacing until problems begin to appear.

Trinity Episcopal is thinking this way as it weighs the costs and benefits of a transportation program. Denney and his team have taken into account not only the hard costs of purchasing vehicles, fuel, maintenance, staffing, insurance and scheduling, but also soft outcomes, such as having the school’s name on the buses as they drive around town. He also thinks parents and potential donors will be excited to see the school’s logo on their own buses. In fact, the program will be the focus of this year’s fundraising gala.

Sometimes it’s worth going outside the business office for these perceptions. Getting feedback from leaders of academic and extracurricular programs, for example, can have two benefits, according to Harvey Kaiser, a consultant and authority on subjects related to TCO. These individuals will likely see different impacts and outcomes than the business office. They’ll also learn more about the school’s financial and pragmatic realities.

## Finding the Money

Ideally, schools should fund an endowment dedicated to a facility’s renewal from the time of its construction. Trinity Episcopal, with all newer construction, has done just that and now has \$700,000 in its PPRSM (provision for plant replacement, renewal and special maintenance) fund. Denney knows, however, that a year will come up when maybe half of that money must be spent. “We have to think about it continually,” he said.

Such a fund “must be very closely protected,” advised Folsom, because “every institution will hit a time of crisis, and you

will have to make adjustments.” The fund should “have a good charter and be a board-protected fund that cannot be used without proper amortization and consulting the facilities manager or a consultant.” Even if a school doesn’t use funds as planned, “it is extremely important to educate leadership” on TCO, said Folsom. “Use your models to show why costs are going up, why things fail and why it’s normal, not abnormal.”

A general rule of thumb for schools is to maintain a PPRSM budget that is 2–3 percent of the plant’s current replacement value (CRV). In a 2008 article for APPA, Kevin Folsom shared another basic formula for calculating how much a school needs to set aside each year in order to have funds to make major building replacements:

*First, update a facility’s CRV annually by adding 3 percent for inflation to calculate the average next year’s CRV.*

*Then calculate estimated annual savings needed to reinvest in the facility. Planning on a 6-percent return on long-term reinvesting and full renewal at the end of a 50-year building lifecycle, set aside 2.5 CRV annually.*

*Finally, consider how the school will secure the 2.5 percent to save. Never add a facility to an institution’s inventory unless it is linked to a revenue source. This can be done with retail sales, tenant rent, tuition or interest-earning endowment.*

➤ [Find a link to Folsom’s article on NetAssets.org.](#)

Even with the release of Part I of APPA’s standards, TCO is a work in progress, and every school that implements it will do so differently. It’s both science and art. “We’re looking for institutions to become learning organizations, to learn from the information you have so you don’t make the same mistakes,” said E. Lander Medlin, APPA’s executive vice president. The more schools that adopt TCO, the more likely that software companies will develop better products to account for all facility costs. APPA is currently in talks to push developers in that direction. In another 10 years, fully fledged TCO may be that much easier. **N**



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The business officer and facilities director at Trinity Episcopal School in Austin collaborate to collect and analyze facilities data, enabling the school to build a PPRSM reserve that covers predictable maintenance costs.