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Complete Cost Control

Assessing construction budgets for efficiencies

By Dave Slomsky



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Economic conditions are giving health facilities professionals a headache. Fluctuating bond interest rates and the tightening of long-term credit may cause some projects to be scaled back, delayed or even canceled. These

factors, coupled with the steady inflation of materials and labor costs over the next several years, mean that it's now more critical than ever to keep a tight rein on costs to prevent health care construction budgets from spiraling out of control.

From January 2004 to May 2008, the product price index for inputs to construction jumped 39 percent, more than double the rise in the consumer price index, according to Clemson University's Department of Construction Science and Management.

According to the U.S. Bureau of Labor Statistics, the price index for construction materials was up 10.4 percent in 2008, more than double the consumer price index of 5 percent.

What can health facilities professionals do to find more cost efficiencies in construction budgets? What are some ways to budget accurately and maintain control of costs?

Following are some ways to assess construction budgets for maximum cost efficiencies.

Cost containment approaches

Architectural considerations, such as the design of the building's exterior and choice of skin, can yield cost efficiencies especially if identified early in the process. During the preconstruction phase, it's important to assess design issues as they relate to constructability. Constructing a building ahead of time using virtual technology and tying the schedule and costs to the model will yield cost savings as well as coordination efficiencies. It can also reduce on-site changes and change orders and shorten building schedules.

Current lending practices, supplier agreements and financing all impact the cost management/risk side of the equation. For health facilities professionals, it's critical to finance a project correctly.

Since 2004, the Associated General Contractors has provided inflationary changes on trade lines. Budgeting with these increases in mind is especially important on projects with 18- to 24-month or longer time frames. Once construction begins, the project manager essentially becomes the project's business manager in charge of controlling and monitoring costs. But it is the entire project team's responsibility to manage costs. Using cost reports, typically monitored and updated on a monthly basis, assists this process.

Timing also plays a role in keeping costs down.

Structural steel mills work on limited cycles throughout the year. If orders are not timed correctly, deliveries can be delayed for weeks or even months. Ordering materials early and stockpiling them may help contain costs. This may require contractors to base orders on documents less than 100 percent complete. But one thing is clear: The longer projects are put on hold, the more inflation will drive up costs.



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Historical data is valuable in assessing whether an estimate is on track. Every job is unique, so it's important to keep in mind that the current project may not fit the parameters of a previous one. Doing takeoffs on all materials to be used on the job and assigning a cost to each item provides valuable cost data. Cost estimating is detail-oriented and arduous. At the end of the process, estimators have to ask themselves, "Does this make sense?"

Independent cost estimators can be valuable. They should not intimidate the construction management team if the team has faith in its own estimating accuracy, the level of detail used and its familiarity with the project. If estimate differences do arise and reconciling is necessary, all the takeoffs done during the preconstruction phase can typically verify the costs within very close proximity to the independent cost estimator's.

This process can be affirming for the building owner and the health care facilities professional.

Additional ways to save

Preconstruction planning, design planning and sound financial and risk management can also help health facility project teams control costs and reduce exposure to ascending prices.

Playing an ever-increasing role in anticipating and controlling construction costs, preconstruction planning is critical by virtue of its accuracy in estimating. Specialists in mechanical/electrical/plumbing (MEP), site, structural and architectural disciplines are all crucial to accurate estimating. MEP engineers are particularly important because their systems can be among the most difficult to estimate and often comprise a large portion of project costs, particularly in health care.

Having an in-house MEP team deliver detailed estimates is key to accurate cost estimating. Teamwork and collaboration among the owner, designer and the construction manager is also extremely important in preconstruction planning. When

all of the team members understand the project scope and the logistics involved, it improves overall communications and contributes to accurate estimating.

Value engineering also plays an important role in controlling costs. Although true value engineering involves changes that don't technically alter the design, budget considerations often require choosing alternative systems or materials that deliver the same or similar impact but with better economies of scale.



Cost efficiencies can also be realized in the design development stage. One example is at Baystate Medical Center, a large health facility in Western Massachusetts.

The hospital recently broke ground on a multiphase master building project. Phase I involves a \$185 million, 630,000-square-foot building to replace existing patient beds, add eight operating rooms and build a shell to accommodate planned building initiatives.

The preconstruction team, working shoulder to shoulder with designers, redesigned the original three-finger exterior scheme into an L-shaped layout. The new exterior requires less skin and saved \$10 million in material costs while also providing more efficient use of space, including 25,000 square feet of shell space for future use.

Technology in action

Innovative use of advanced technology and other techniques also are helping health care facilities professionals realize greater cost and construction efficiencies in their renovation or new construction projects.

One such approach is building information modeling (BIM). For instance, at MIT's Koch Institute for Integrative Cancer Research, which broke ground in March 2008, schematic two-dimensional (2-D) drawings were turned into three-dimensional (3-D) drawings using BIM at the design development stage.

The preconstruction team then started MEP coordination and coordination of the curtain wall. The 3-D drawings identified a number of “hits”—places where structural elements were in conflict and would impinge on construction—such as a wall bisecting a duct. Doing this early in the process produced a much more cohesive set of final construction documents and will likely result in significant cost savings in change orders and reduced MEP coordination time.

BIM is considered to be virtual or model-driven construction and involves constructing a building ahead of time in a virtual world and linking the schedule and costs to the model. BIM ties together plans, elevations, sections, perspectives, reports, costs, quantities and schedules.

A change to one updates the others.

Using BIM effectively can result in direct cost savings in subcontractors' coordination costs, for example, and is a very good tool for high-risk projects or those with challenging schedules. Among other benefits of BIM are the following:

- Helps identify challenges and conflicts well in advance;
- Enables better coordination and sequencing of the project (all done in one virtual room versus piecemeal);
- Improves site logistics and communications;
- Allows 3-D model to be integrated with schedules and costs; and
- Eliminates “sneaky” drawing changes.

At the Shapiro Cardiovascular Center, a 350,000-square-foot advanced cardiovascular center at Boston's Brigham and Women's Hospital, engineers used BIM, creating 3-D drawings from a 2-D source and NavisWorks from Autodesk Inc., San Rafael, Calif., to do MEP coordination for all of the facility's



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mechanical systems in the preconstruction phase and in the design and estimation of

those systems. It was also used with the design team to review plans, evaluate constructability and monitor costs throughout the project.

This BIM approach to installing ductwork; piping for process work, sanitary and drainage; medical gases; sound attenuation; and other complex hospital building requirements streamlined the coordination process and kept everyone up-to-date on project parameters.

The project's leaders estimate that using BIM reduced mechanical conflicts by 85 percent, which translated to a reduction of 30 days in MEP coordination time. It also reduced the hospital's exposure to change order costs by \$250,000 to \$1 million.

Beyond BIM

Technology can also foster good communications and teamwork during preconstruction, which can also eliminate errors that lead to increased costs. Such was the case during construction of the new Biologic Laboratories for the University of Massachusetts Medical School.



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COURTESY OF AERIAL PHOTOGRAPHY

While the preconstruction team was reviewing the schematic design estimate, the designers and the owner were surprised at how much terrazzo was called for in the estimate. Using On-Screen Takeoff, a software tool from The Woodlands, Texas-based On

Center Software that provides a colored set of documents showing material and quantities, the estimator printed his flooring takeoffs and showed where he was assuming it was supposed to go.

Because the design drawings did not really show the extent of the terrazzo, the estimator had made an assumption. The designers were able to quickly look at the drawings and clarify where the material would actually go, thus correcting the estimate and reducing costs.

At the Center for Life Sciences in Boston, a 1 million-square-foot, 28-story biomedical science research center, advanced technology allowed for accurate estimating of MEP systems and fabrication of 75 percent of those systems off-site, saving hundreds of thousands of dollars in on-site construction costs. Having the right construction management tools, including Timberline project/cost-tracking software from Sage Software, Irvine, Calif., and mobile access technology for safety checks, helped keep this large-scale project on track.

Likewise, SharePoint, a Web-based software program from Microsoft Corp., Redmond, Wash., is making it easier to collaboratively develop process flows during construction. The software helps integrate data into a cohesive package linking everything together. A custom-developed version of SharePoint can give all



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project team members real-time access to the information they need, including requests for proposals, scheduling, procurements, purchasing and fabrication.

Having project information accessible in an integrated way helps manage and organize information flow and fosters collaboration. Such an interactive approach is taking project management to new levels of sophistication.

Additionally, Bluebeam PDF Revu from Bluebeam Software, Pasadena, Calif., can streamline the shop drawing process and reduce paper consumption. One engineering firm reduced paper usage enough to achieve an 80 percent savings on printing and courier expenses. On a \$200 million construction project, Bluebeam can save between \$100,000 and \$200,000.

Meeting capital needs

In the current economic environment, it becomes even more important to ensure the accuracy of cost estimates on construction projects.

But inflation and turmoil in the credit markets don't have to prevent health care

facilities from taking on badly needed renovations or new construction projects.

With thorough project planning and the right checks and balances in place to monitor and control construction costs, health facilities can move forward to meet their capital needs in the future.

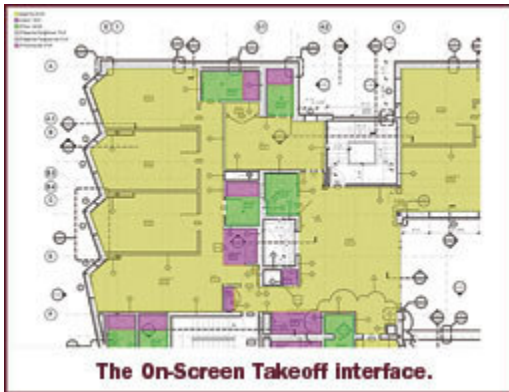


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Sidebar - Costing with conceptual estimates

Conceptual estimating, a model-based approach to determining costs early in the design process, is an effective tool for obtaining estimates for project feasibility studies and budgeting. Conceptual estimates are calculated using a highly interactive, collaborative team approach involving the owner, designer and the construction manager (CM).

The key to cost modeling is having a good historical database of costs for various types and sizes of projects. Having an interactive team of the owner, designer and CM allows everyone to better understand the scope of the project.



The traditional estimating process, though often successful, involves copious data inputs, which are painstaking and time-intensive. Conceptual cost modeling allows for multiple inputs in real time and helps owners and team members make decisions by pinpointing specific costs. It is a critical tool for “what if” analysis during the design phase.

The benefits of conceptual estimating are numerous. The process is highly collaborative, and timing of budgets can be controlled to avoid impacting the design process. The streamlined approach enables the architect to design with a specific budget goal in mind while testing different options along the way.

And, if done correctly, it can help to avoid costly redesign.

Cost-estimating software such as On-Screen Takeoff by On Center Software, The Woodlands, Texas, allows team members to review estimates and obtain feedback quickly. This keeps the project moving because the designers don't have to wait for initial costs.

The cost estimator has a comprehensive understanding of the costs of labor, materials and equipment, and the means and methods of both design and construction. The estimator should fully understand facility programming and formulation of an owner's overall project budget, including hard and soft costs. Conceptual estimating is a critical tool for successful project budgeting and will play

an increasingly important role in preconstruction planning in the future.

Sidebar - Web Resources

The following provides contact information on vendor products discussed in the article as well as relevant trade associations:

Vendors

Bluebeam PDF Revu software from Bluebeam Software, Pasadena, Calif., allows users to redline and edit PDF files, calculate takeoffs, save custom tool sets, compare revisions and track comments automatically. www.bluebeam.com

NavisWorks software from Autodesk Inc., San Rafael, Calif., enables team members to reliably share, combine, review and perfect detailed 3-D design models. www.navisworks.com

On-Screen Takeoff is a software program from On Center Software, The Woodlands, Texas, that facilitates accurate estimating by automating calculations, thus reducing missed items or miscalculations. www.oncenter.com

SharePoint is an integrated suite of server capabilities from Microsoft Corp., Redmond, Wash., that provides content management and enterprise searches, accelerating shared business processes and facilitating information sharing. www.microsoft.com/sharepoint

Timberline is a project/cost-tracking software program from Sage Software, Irvine, Calif., that provides cross-functional capabilities to integrate project details for single-source control. www.sagecre.com

Additional Sources

American Society of Professional Estimators serves construction estimators by providing education and opportunity for professional development. www.aspenational.org

The Association for the Advancement of Cost Engineering International provides resources to professionals in cost and management areas to enhance their performance and professional development. www.aacei.org

This article first appeared in the January 2009 issue of HFM Magazine.

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