



Minding the Budget—A BIG Job

Planning Project Budget and Scope Throughout Design to Prevent Surprises

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Page 1

At an air show a recently restored World War 2 fighter plane was being displayed. A handout indicated that the owner gave the restoration team three instructions. The instructions were:

- 1. No budget
2. No schedule
3. No excuses

A building design team's instructions from the building owner are similar to the aircraft owner's instructions only in the "no excuses" department. A budget and a schedule (both usually tight) are the norm. So, timely accurate estimates of the building systems costs are needed to keep the project on schedule and out of the "excuse department."

At our firm, we tend to work in the following project phases with our clients:

- 1. Pre-schematic
2. Schematic
3. Design Development
4. Contract Documents
5. Bidding
6. Construction Administration

Needless to say active budget control is needed during all six phases! The most effective and relatively painless budget control activity occurs in the pre-schematic and schematic phase of the project.

IN THE BEGINNING A BUDGET AND A SCOPE ARE ESTABLISHED

If a project is in budget trouble, schedule problems and excuses are not far behind. These are two areas from which the owner does not want to hear. In fact, one of the reasons that the design team was hired is usually because a promise has been made to keep the project on budget and on schedule.

The above being said, the best way to start engineering the building's systems is to establish a budget. A scope needs to be written in order to do this. Or, sometimes the scope is determined based on a pre-set budget.

For example, assume that the project is a four story cancer hospital on an existing hospital campus. The pre-schematic budget for the facility is allowing "X" dollars per square foot for HVAC. Based on previous project experience it

is known that "X" dollar per square foot at this facility means packaged rooftop units and VAV terminals with electric reheat coils. From this, the scope of the HVAC system has been established by the pre-schematic design HVAC budget. At this point it does not make sense to actively consider other types of more expensive systems unless the HVAC budget is increased or the overall project budget is increased.

The big idea to keep in mind though is this: at the beginning of a project a budget is the first critical piece of information that is needed to establish the scope of the building systems. So, the first pre-schematic design question should be: what is the budget?

Table with HVAC ESTIMATE OF PROBABLE CONSTRUCTION COSTS IN ENGLISH UNITS. Includes sections for PROJECT INFO, SUMMARY OF COSTS, and a detailed ITEM DESCRIPTION table with columns for LABOR, MATERIAL, and ITEM COST.

WORKING WITH ESTIMATING FIRMS AND CONSTRUCTION MANAGERS

A separate estimating consultant is sometimes hired as part of the design team. This can be useful. In some cases a "construction manager" fills this role. Several items to keep in mind when there is a separate estimating firm:

- 1. There will be more meetings for the designers to attend.
2. To keep the project on the tight design schedule, additional design staff may be needed. For example, the HVAC design effort may need to have two HVAC designers. One to work on part of the design and to attend budget meetings and another to stay back at the firm working on the design.
3. The design firm will need to have their own estimates to compare to the estimating firm's efforts. Some may think that having a separate estimating firm will eliminate the need for the designer to do estimating. For a comprehensive review of the estimator's figures, the designer needs their own estimate.



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(Continued...)

Page 2

4. The design firm will need to produce more complete designs and narratives for the estimating firm to estimate from. This means the design firms work load has increased and the design schedule shortened because the estimating firm needs time to prepare their estimate. This is another reason that additional design staff may be needed when there is a separate estimating consultant on board.

5. If the project is over budget in any category all design and estimating staff will feel the adverse affects (as will other team members). Usually when this happens, long hours are needed to redesign and re-estimate. It ends up being painful for all.

6. Incomplete drawings will be sent to the estimator for pricing. The drawings are always incomplete up until the end of the contract document phase. Incomplete drawings, however, cannot result in an incomplete estimate at any time during the design process. If there is an "add" to the HVAC estimate for the elevator machine room cooling system at the completion of the CD's because this split system was "never shown" then the designer and estimator did not do their job. The existence of this system needs to be made known to the estimator through a narrative or some other means if it is not shown on the drawings. Likewise, a good estimator needs to know what questions to ask and what assumptions to make.

ESTIMATING APPROACHES USED BY DESIGNERS

From the outset, the design firm needs to understand that the estimating effort is different from a contractor preparing a bid. The design firm will have broader categories of takeoffs to speed up the estimating. It will be impossible, for example, "to count all of the pipe elbows". The design firm's estimate essentially becomes similar to a "schedule of values" for the project.

At the pre-schematic stage, cost per square foot comparisons to previous similar buildings may be all that is needed. A more detailed method and one that will follow the project throughout the design effort is the "line item take off" method. As the design progresses, the take off will be further developed. For example consider the line item take off below for the 4 story cancer hospital prepared at the pre-schematic design stage:

Table with 2 columns: Item, Amount. Rows include HVAC, Rooftop units, Ductwork, VAV terminals with electric reheat, Temperature Controls, Misc heaters, General Conditions, Allowance for undefined scope, Cost Escalation, and Grand total.

The above 9 line items report all that is needed for the estimate at this stage. There may be much backup data supporting these figures. The grand total, however, will need to be the same number at the end of CD's as reported above. So a lot of insight is needed. For example, in line 7, there should be dollars plugged in for the cooling systems for linear accelerators if the cancer hospital is to have these vaults as part of the scope.

As the design progresses the line item take off estimate will become much more detailed. For instance, the ductwork category will be broken down into supply, return, and exhaust ductwork. The expanded line items help when the design is over budget. If the ductwork, for example, is over budget, then means of reducing the cost will need to be investigated. For instance, "can a return air plenum be used in lieu of a ducted return system?" If the ductwork cost cannot be reduced then cost reduction opportunities will need to be explored in the other line items to reconcile the budget. Can the controls budget be reduced or can less expensive packaged roof top units be used?

OTHER FACTORS TO CONSIDER

The following items are other things to consider as the budget and scope are being developed:

- 1. Will the project be bid competitively? If not, this needs to be factored into the budget.
2. Have a solid understanding of local taxes duties, and utility tie-in and extension costs. These can add up.
3. A budget should have an escalation factor to account for rising costs.

CONCLUSION

At the beginning of a project establish the scope and budget for the building systems. Keep the project budget and scope synchronized throughout the design process. When the project is bid there should be no surprises.



SBM Company News

Page 3

We have added this additional page to our newsletter for current company news about Scheeser Buckley Mayfield LLC.

SBM is pleased to announce this year's promotions within the firm:

Vincent J. Feidler, P.E. – Principal

Vince is currently working on multiple health care and education projects in both the West Virginia and Kentucky areas. He is currently involved in the construction administration of a 36,000 SF Medical Office Building addition at The King's Daughters Medical Center in Ashland, Kentucky and in the design of a 140,000 S.F. Clinical Addition to the Thomas Memorial Hospital in Charleston, West Virginia. In addition to his promotion, Vince and his wife were blessed with the birth of their first child, a baby boy, on September 26.



Ronald R. Radabaugh, P.E. – Associate

Ron joined the firm in 2002 and has been involved with various projects throughout West Virginia and Ohio. His projects have been primarily health care facilities, correctional facilities, and educational. Recent projects have included Marshall University Biotechnology Center, Cabell Hospital New Patient Bed Tower, Summa Cancer Center, and The University of Akron Exchange Street Residence Hall. He is currently working on Chesapeake Energy Systems regional headquarters and The Summa Orthopedic Hospital.



Healthcare Facility Design Certification

Joshua J. Roehm, P.E. recently passed the ASHRAE Healthcare Facility Design Professional Exam, which tests the applicant in the many healthcare codes and guidelines. He is presently only one of forty ASHRAE HFDP certified people nationwide and one of two in the State of Ohio. For more information, visit ASHRAE's website at <http://www.ashrae.org/education/page/1531>.



Seeing "Green"

SBM currently has 7 LEED Accredited Professionals within the firm who can assist with your building needs for an eco-friendly environment building.

James P. Kulick, P.E.
James E. Eckman, P.E.
Michael P. Wesner, P.E.
Joshua J. Roehm, P.E.
Timothy J. Militzer, P.E.
Chad B. Montgomery, P.E.
Kirby A. Stoller, P.E.

SBM completed a LEED Certified project at the Akron Zoo: The Komodo Kingdom. Also, SBM is working on a LEED Silver building for an energy company that is in design development. SBM is serving as the LEED project manager for this project.

Project Spotlight -



St. Elizabeth

Boardman Health Center

SBM performed the mechanical, electrical, plumbing, and telecommunications engineering design for a 210,000 square ft addition to the existing Diagnostics Building at the St. Elizabeth Medical Center Boardman Campus. The building is a seven-story facility containing 128 general medical surgical and ICU beds and six surgical suites. Other areas include Central Sterile, Endoscopy, Physical Medicine and Rehabilitation, Pharmacies, Lab Areas, and a second floor Kitchen and Dining area open to an Atrium at the new Main Entry Lobby.