The Future Is Now, or Is It?

Today's and Tomorrow's Issues for General Contractors in the Use Of Building Information Modeling

By Aaron P. Silberman

Design technology has literally leapt off the page with the development of sophisticated 3D/4D/5D building information modeling, or "BIM," programs. BIM promises to revolutionize construction, providing a powerful tool to help keep even the most complex projects on-time, on-budget and defect-free. But, as with any breakthrough, there are going to be some growing pains and, not surprisingly, the contracting process will experience more than its fair share. This article discusses the practical and legal effects of the BIM "revolution" on construction contractors.

How Is BIM Used On Construction Projects?

"3D" modeling allows project participants to view construction components in three dimensions, highlighting conflicts and inefficiencies before they impact construction. "4D" modeling extends 3D modeling techniques by incorporating the construction schedule and sequencing into the model. "5D" modeling incorporates costs from initial estimates through final construction and maintenance costs. 4D/5D BIM may ultimately be used over the entire life of a building - from conception through final construction and facilities maintenance.

How Can BIM Benefit the Contractor?

In pre-construction, BIM can provide owners with early visualization of the final building "product," giving them more realistic expectations of the design and more informed perspectives to suggest changes. BIM can also provide benefits, especially in the mechanical, electrical, plumbing, and fire (MEPF) design and coordination process, if the owner brings on contractors and coordinates their work during the design phase. 4D modeling can provide further benefits by improving constructability analysis, sequencing and scheduling. 3D modeling can allow more efficient integration of design and estimating, making them a parallel, rather than sequential, process and providing earlier ability to respond to budgeting concerns.

Potential benefits continue during construction by streamlining field conflict resolution and assessment of cost and schedule impacts from scope or schedule changes. Field verification of as-built construction and schedule progress may earlier identify defects or delays. Similarly, synchronized design, cost and schedule data from the BIM improves the ability to analyze delay and cost impacts for preparation and negotiation of delay and disruption claims.

So, What's the Problem?

Until recently, owners typically would receive construction modeling services, if at all, not because they specified use of BIM in their solicitation or contract documents but, rather, because their design professionals or, less often, contractors happened to use modeling as a tool in their work. With more and more project participants actively promoting their use of sophisticated modeling, they are likely including modeling information in their proposals, and so owners are likely considering that in evaluating proposals. To the extent they are doing so, contractors that do not use BIM may find themselves at a competitive disadvantage. In competitive public works procurement, they should also keep a careful watch to make sure public owners are evaluating proposals consistently with the criteria stated in their solicitations.

Inevitably, owners will want to ensure that they will receive the many benefits BIM can provide for their projects, so they will increasingly specify BIM as requirements in their solicitations and contract documents. 3D, 4D and 5D modeling technologies are rapidly becoming less expensive and easier to use. As this occurs, the effect of requiring BIM on contract price will go down significantly. This effect will be driven not only by reduced technology and training costs but also by greater price competition due to what will likely be a dramatic increase in the number of companies with the required modeling technology and expertise to compete. Although requiring BIM may initially reduce small business participa-
tion – at least as prime contractors – it will likely have the opposite effect over the long term as the modeling technology allows contractors to do much more project management with significantly fewer resources.

Using the project's design professionals or contractors or both for modeling requires significant coordination, may increase scope conflicts, and, due to varying technology experience among the parties, may be difficult to manage. While design professionals typically have greater modeling experience and expertise, using a design professional for modeling usually means injecting that party into a direct relationship with the general contractor and its subcontractors and suppliers, none of which owe it any contractual duties. Where the owner hires a construction manager that has sufficient expertise in BIM (few do), putting the CM in charge of the model may make the most sense; where the owner uses this approach, it should bring on the CM at the beginning of the design phase during integration into the model of design, estimating, and schedule.

How to Make BIM Work for Everyone

Define Your Responsibilities: Clearly defining each participant's BIM responsibilities at the outset is key to success. Knowing your responsibilities will allow you to price them from the start and help you to avoid conflicts later on. Effective use of BIM may require departure from some traditional relationships between project participants. Most notably, comprehensive modeling depends on timely, accurate and compatible data from specialty contractors and suppliers. To the extent that primary modeling responsibility lies with the architect or construction manager, rather than the general contractor, this will require substantially increased interaction among parties that are not in contract with each other. The prime contract should contain language clearly defining both its responsibilities and the responsibilities of its subcontractors and suppliers for the BIM and require that this language be flowed down to the appropriate subcontracts and supply agreements. Contract documents should address responsibility for input and accuracy of information in the BIM at each stage of the project. Ideally, the documents will designate a central inputting entity for consistency and clearly identify who will be responsible for fixing any errors or bugs and for any damages they cause.

Define Who Owns What: The BIM is not only a tool; it is also intellectual property. A contract that includes modeling services should address who will own what rights to that property. If you might want the right to reuse a project BIM, or any part of it (e.g., your and/or your subcontractors' contributions to it), this should be specified in your contract (and if appropriate, subcontract documents).

Define Who Gets What: Contract documents should also address whether the model is treated like design drawings, formal project deliverables, or both. The owner may treat the BIM simply as a means and method used by the contractor without requiring that it be in any particular form, contain any particular information, or be submitted to the owner. On the other hand, the owner may include in the contract detailed requirements for format, content and delivery. To ensure compatibility with existing or anticipated owner systems and capabilities, the owner may even choose to specify particular software for the BIM. Performance specifications, requiring use of a model without dictating the details, lies somewhere in between.

Don't Ignore the Boilerplate: Addition of BIM responsibilities to your scope merits a fresh look at many standard terms you may use in your contracts. Special attention should be given to indemnification, insurance and bonding provisions. For example, it is unclear whether any currently commercially available insurance policies would cover liability for modeling errors. You should also consider whether the contract disputes provisions are adequate to deal with special issues raised by the use of BIM. Are they adequately drafted and flowed down to ensure that all the parties necessary to resolve possible disputes will participate (e.g., the design professional and/or modeling contractor, the subcontractors and suppliers contributing significant data, etc.)? If there is a dispute escalation clause, are the listed owner and contractor representatives qualified to deal with disputes regarding technical modeling issues? If the project will employ a dispute review board or project neutral, are they qualified to evaluate those kinds of issues?

Define Access Rights: Your contract documents should clearly state who will have access to information in the BIM at each stage of the project and after project completion. The parties should consider whether restrictions on access or modification rights during design and construction are necessary for security purposes, as they will exclude certain project participants from the process. Contract documents should include non-disclosure provisions as needed to protect the parties' rights but should not be unduly restrictive to the detriment of using a model effectively. Access to information after project completion becomes especially important for projects with heightened security issues. Specifying in the contract documents each project participant's rights to obtain copies of the BIM at the completion of the project also may prevent disputes over those rights when issues arise over contract claims or construction defects.

Conclusion

3D modeling is everywhere, 4D is on the rise, and 5D is on its way. Use of these technologies will only increase as awareness of their benefits increases and the costs of their use go down. BIM programs pose special challenges that should be addressed as thoroughly and clearly as possible in all contract documents for projects that utilize them. The promise of BIM is exciting, but the owners and industry will have some work to do before much of that promise will be fulfilled.

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