Using BIM for Wood Framed Construction Projects

A Residential Architect's Perspective

By Jim Westover, Phoebe Lam, and Jon Houck

As more architects make the switch from two-dimensional CAD to BIM, structural engineers are faced with a similar decision as to whether or not it makes sense to adopt BIM. Some structural engineers who design primarily in wood have taken longer to make the switch than those designing larger Type I, II or III projects where clients or architects require the work be done in BIM. Architects who made the early switch to BIM were drawn to it because of the enhanced 3-D visualization, more effective client presentations, and better design and drawing coordination. However, there is a significant learning curve and time investment when adopting BIM, which explains why many architects and engineers may be hesitant to make the switch.

So, how important is it for structural engineers to adopt BIM? For larger steel and concrete buildings, BIM has become essential. For residential wood framed construction, it has not been as critical but will become more so as more architects and engineers make the switch. Engineers who do adopt BIM, and take advantage of its capabilities, may have a distinct advantage over their competitors in getting work with architects who work in BIM. However, those who do switch to BIM but do not take advantage of the program with accurate modeling may not experience much of an advantage.

For many residential architects, their early models were relatively simple, so it was less important for their consultants to use BIM. However, as architects increase their knowledge and improve their models, it becomes more advantageous for them to work with consultants using BIM.

So, the question arises as to whether architects choose engineers who are working in the same BIM program over those who are still working in two-dimensional CAD. From an architect's perspective, it depends on how well the engineer takes advantage of BIM and the extent to which the engineer's use of BIM improves the project process. It is certainly advantageous if the engineer can accurately model the primary structural elements: wood posts and beams (other than standard headers), steel posts, steel beams and, in some cases, shear walls. However, it is not necessary to have every stud or rough opening modeled. In short, architects would like the engineer's model to include the major structural elements that need to be coordinated with the architecture. However, when engineers model these elements, it is critical that they are located accurately in plan and elevation. Otherwise, architects will need to spend time adjusting or re-modeling these items, in which case, the engineers may as well be working in two-dimensional CAD and the architects can model those structural elements themselves.

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For the architect/engineer team to fully take advantage of BIM, some things need to happen. Architects need to up their game by producing BIM base models that are more accurate without excessive or unnecessary detail. They must use discretion regarding what gets modeled and what gets drafted. Modeling everything in too much detail is a huge time sink and does not necessarily benefit the project. For instance, rather than modeling details, it may make more sense to cut sections in the model and then draft over them in the BIM program. It does not make sense to model each piece of flashing, every layer of waterproofing, or every nut and bolt.

Structural engineers working in BIM may request the architect provide a base model of LOD 200 (using the U.S. National BIM Standard for BIM "Level of Development" ranging from LOD 100 to LOD 500). This is still a fairly basic model, but it provides a reasonable framework for the structural engineer to begin their work while the architect adds more detail to the model. For wood-framed structures, the architect may strive to produce a finished model with an LOD between 300 and 350.

Architects also need to clearly communicate to the engineer, at the beginning of a project, which elements need to be modeled and which elements can merely be "drafted" in the plans. These requirements may vary depending on the complexity of the project. For example, typical door and window headers usually do not need to be modeled. However, if the doors or windows terminate at the underside of the exposed structure, then the size and placement of those elements become critical and it may be necessary for them to be accurately modeled. If the architect clearly communicates these requirements up front, the engineer can craft their fee proposal to include the appropriate level of modeling, with more detail provided as an additional service if required.

Engineers who make the switch to BIM will also need to take full advantage of the program by producing dimensionally accurate and appropriately detailed models. Structural elements that are modeled should be located accurately in plan and at the correct elevation so that they match the structural details and can be coordinated with the architectural plans and details. In engineering firms where non-engineers do the drafting, the design engineers will need to clearly communicate the three-dimensional information to the BIM modeler so that the model accurately reflects the engineer's intent.

As powerful as BIM is, it is still just a tool for design and documentation. It is not a replacement for excellent, creative structural design. Architects will still choose to work with engineers who provide exceptional service, produce efficient, elegant designs (regardless of the software used), and are good communicators and team players. However, as more residential architects and engineers make the move to BIM, those who stick with two-dimensional CAD may find themselves at a competitive disadvantage.▪

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