



## CAD — How It Has Changed the Way We Think

By Greg Schindler, P.E., S.E.

**Y**ou know, one thing that drives me absolutely nuts is when I get a drawing file from an architect and I go to look at it on screen and half the information is missing. Now, I'm not bringing this up to continue

the engineer complaining about architect debate, but rather to highlight how interesting I find the many ways that the advent of CAD has changed the process of designing a building.

When grids are missing or the background of the core doesn't show up, it is usually due to the wonders of X-Referencing. You see, unlike lines on a physical drawing, the information in an electronic file of a CAD drawing can come from several electronic places. The drawing will only look complete if you have everything pathed correctly in the computer, so it can bring in the appropriate pieces from various files. Architects are masters at "X-reffing" things to compose drawings. That usually works well within their systems, but when others need to see the drawing, it can cause real confusion and needless wasted time getting the correct image to look at. I have noticed in the last several years a distinct trend away from sharing paper drawings in favor of posting the drawing files. When this occurs, quite often the person viewing the drawing does not have all the electronic pieces of the puzzle, or know all the "CAD" technicalities to be able view the complete drawing.

Call me old fashioned, but I still think the only way to coordinate a project design is to be able to look at the entire drawing set on paper. Construction drawings are still mostly large scale documents that don't fit neatly on a computer screen like letter size items. One at least needs half-size sheets to work with. Now that drawings are passed around electronically, this means that all the consultants are responsible to plot out their own copies of everyone else's drawing set. With all the variables included in CAD files like pen settings, layers, line weights, and x-refs, it can become quite time consuming to assure that you are getting the image that the creator of the drawing intended.

One way around this, of course is to trade PDF files so that the image you send is how you want it to look. But you still need to see the entire drawing. I am constantly amazed how our architectural colleagues never seem to have a drawing set to look at. You call up to ask about a dimension and they say, "hold on while I bring up that drawing". A minute goes by until they're ready and you say

"now dimension X doesn't match dimension Y on sheet A2.5. They say, just a minute, I'll bring up that sheet too, and this goes on for awhile.

And another thing. Why is it that architectural drawings no longer have dimensions? When you ask about a dimension, the architect has to "measure it" on the CAD file. I think this is because they have grown to believe that dimensions are secondary to the image presented, and since you now can electronically measure things so you don't need to write them down. The lack of documented dimensional control is another potential cause of mistakes and mis-coordination. The architect says, just measure the dimension on the CAD file. Of-

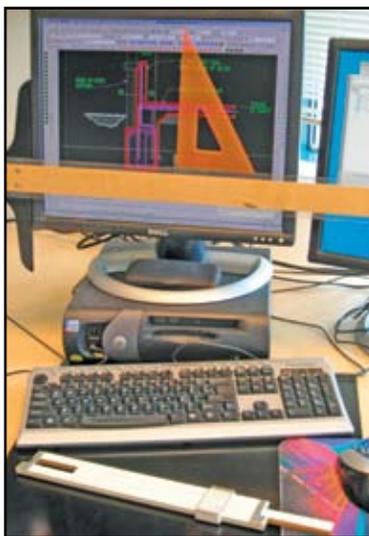
ten, I'll measure a dimension on an architectural CAD file and still be confused because what I expected to be 4 feet-6 inches measures 4 feet-5 <sup>13</sup>/<sub>16</sub> inches. So did they mean 4 feet-6 inches, or 4 feet- 5 <sup>3</sup>/<sub>4</sub> inches? Hence the reason for the phone call mentioned above. It used to be one just naturally wrote down the dimensions on the drawing, because that was the only way to know them.

For the most part, CAD has been hugely beneficial to our industry. Productivity and accuracy have increased. But, it really has changed the way designers think about, produce, use and interface with construction design information — mostly for the better, but not always. Still, the benefits of CAD far outweigh the small difficulties of the process.

We are now about to enter into another era of rapid change in the way we do our work. By most accounts, the coming introduction of BIM (building information modeling) will cause an

even larger restructuring of the design process than did the widespread use of CAD. I hope that, like CAD, this new electronic capability will be a benefit to our profession and the design industry as a whole. It is easy to lose sight of the fact that effective information exchange is an underlying requirement for our work. Regardless of what tools we use, our business, like most, comes down to communication.

For more information on BIM see Jim Jacobi's article on **page 19** in this issue. If you have developed any strategies to overcome some of the above communications issues, we'd like to hear about them. ■



*The perfect CAD station*

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