BEST PRACTICES COURSE – WEEK 10 – PART 1
Model in 3D Well So You Can Draw in 2D Less

Hello, this is Eric Bobrow. In this lesson, we'll look at how you can model so well in 3D that you have very little work to do in 2D to create your construction documents.

Now here we have the ground floor of the building that I often use for demonstrations. Let's take a look at the elevation that looks from above, from the north position here. You can see that the elevation looks pretty good. It's clean; it's got actually a fair amount of detail. This is a pure model, there's actually no linework that's being done. It's all from the model. Now let's take a look at some of the things that make a good, clean result and then some of the things that add the extra detail. [0:00:46]

So for example, this is one wall. You can see it goes down to the line that I'm pointing at. And if I select the lower wall you can see it goes up to that same edge. And when I deselect them, there's no line in between. ArchiCAD of course is smart enough to remove the line when two elements like this are stacked cleanly on top of each other. Now there are some rules that you need to be aware of. For example, if this wall here has a different material than the lower wall, there will be a line showing. So for example, let me change the material on this to a different color here. We might not even see it visually as a different color on screen, they both look so light. In fact in an elevation you wouldn't see any colors at all. But we will see a line where the material changes. So let me undo that. [0:01:33]

Now another possibility that would cause this type of a line would be if these gap. For example, if I zoom in on this and I change this from 9' to 9'1" that could be just a fraction of an inch. This is going to be a whole inch. But obviously we are going to see a line where there's this gap. On the other hand, sometimes we have going the other way. Let me take it down to 8'11", so it will go just a little lower. And you can see again that there's a line because these two walls now protrude through each other, they don't meet precisely. So they have to meet at exactly the same level in order for ArchiCAD to say well, you know really there shouldn't be a line in between them. [0:02:19]

Now let's take a look at some other things that can cause a problem on this. I'll go back to the upper floor here, and we'll just move the wall. So I'll go and select the wall here. Now if I were to move this way out, clear of the other wall, then of course you would know that there would be a line. But this distance could be very small. For example, if I move it only an eighth of an inch, which is 3 mm, ArchiCAD will say that although it's hard to even see the difference here, when we go back to that elevation we're going to see a line show up. So let me undo that change and go back to the view that I had. [0:03:08]

Now it doesn't have to be the entire wall. For example, this point could be perfectly precise. But if I have this other point off - I'll just select the wall again, and I'll go press carefully down on this corner and say that I want to stretch it. Now you see if I made this way off, you would understand that there would be a problem. But suppose it's barely off like this here. And suppose I have these two walls intersect. So in other words, I select these two and make them intersect. So now it looks pretty darn clean here. And if I go back here, the difference between it being purely horizontal and not quite horizontal is not necessarily easy to see. And I've seen changes or differences that are so close that really you can't tell except by measuring and seeing whether it's at exactly 90° or 0° and things like that. [0:04:06]

Now let's go back to the elevation, and we'll see of course that this line exists here. So we need to make sure that it's clean. Now sometimes when we are trying to clean this up, it's hard to know exactly where they should be. This looks pretty good. So using Virtual Trace of course it is important. So let's just bring up the Trace and Reference palette, and perhaps we'll turn on and we have a choice. We can say just lower story or below the current story, that will show. And now we can see the line here. Now if I zoom in on it, we'll see it's a little bit hard to tell what lines we're looking at. And sometimes we may want to use the option in the Trace and Reference to pull back one edge here and see what's going on. And we can see that the lines are clearly not matching. [0:05:00]

So if I select this wall, perhaps I can move it. Now sometimes it's easy enough to snap from one point to another, but sometimes ArchiCAD will actually not be able to tell what point you want to snap to. It's snapping back to itself. So I may actually pull it way up or way down for example, get it out of the way. Take it down out of the way here and then take this wall here and stretch this back. And here now you can see that the angle from the other side says 180 whereas before it was saying 179.75. So you can see the difference. So let me just make sure that this is 180 here, and perhaps then I can select these two walls and connect them. [0:05:54]

So sometimes it actually helps to move them totally out of the way and then reconnect them to make sure that it works. And if we go back to the north elevation and we look at it again, will see that that line has disappeared. So do be careful with your modeling to make sure that everything is lined up and use virtual Trace to help see what points are the top of which other points. And you may also want to turn on and off different layers to hide things; just to focus purely on say the structural walls and things like that. Okay so we'll take a look at some other things that affect this. [0:06:32]

Now when we were on this story here - and I'll turn off the Trace and Reference - the line work here, if we are in a true line weight, then the offset that something might be off by might be less than the thickness of the line. So this is a sort of thing you might not notice visually at all in any type of a printout, but ArchiCAD does require that things are snapped very cleanly to get the best results. So I do suggest working in a hairline view, particularly for this type of precision. Now let's go back to the elevation, but we'll leave it in the view where we can see the line weights. So I want to talk about what gives extra detail and delineation properly. [0:07:23]

So right now I'm going to have to say that this window or these windows look a little odd because the sills are set - they need to have a heavier line weight. And I don't think that really is appropriate. So I

can select one or more windows and go in here. And we'll make sure in the window settings - for example, if I go and look at the sill and stool settings, we'll see that the sill and stool have certain sizes, but then they also have certain pens. And pen one is a very thick pen. Let me just change it to pen 2. Now this is very different in the international version in terms of which pens. But the basic idea is that you should be able to control and change the way that these things are drawn using the settings. So you can see now the sills are looking quite a bit better. [0:08:17]

Now let's talk about some other things. The roof has some shingles or tile covering it. The walls have, in some cases, some surface covering. And here we have, in addition, the stonework down at the bottom of these walls. So how is this done? Well it's done - if I select this wall - it's done by having a certain material. So if I look under the model settings we'll see that it has a cedar shake. So that's a particular type of surface material. And that material has a hatch pattern and a material in 3D. So when we look in 3D we'll see a texture on that. Now be in order for us to see that in an elevation, we need to have the settings for the elevation turn that on. So if I right click in empty space here, we can go open up the settings for the elevation that we're looking at. [0:09:19]

If you're in ArchiCAD 10, I think you may have to actually double click on the Elevation tool or Section Elevation tool to get this setting. Basically you want to make sure that you're editing the setting for the current elevation. Now one of the things that we can look at here aside from the marker is the model display. And in the model display we need to have turned on Vectoral 3D Hatching. That's what all of this line work is being created from. If we turn that off then these will disappear. So make sure you have that turned on if you want to see this extra level of detail on the elevations, and perhaps sections as well, and interior elevations perhaps as well. [0:10:01]

Now in terms of the line weights, if we look at this, I might wonder whether these line weights for the tiles or the shingles are appropriate. In other words, they're fairly thick. They sort of stand out almost as much as the window and the framing of the wall edge. So how is that controlled? What line work is being used here? Let me use the eyedropper to pick up the settings of this wall. So that means if I were to draw a wall I would be using the same - I would be putting in a wall just like this one. One advantage of doing that is that when I go to the Options, Element Attributes, Materials, it will show me instantly the material for the wall that is the default that I've got in the toolbox. So in other words, right now instantly, it's showing me cedar shakes, remember that's the material for that wall. [0:11:01]

Now the material has different sittings in 3D; but what I'm mostly interested in is the Vectoral Hatching right now. Where you see it says that it's going to be drawing it with pen 2, it could also be doing it with the element pen. So that would have to do probably with the outline of the wall which probably would be actually way too thick. But let me just see. If I change this from pen 2, which is 0.2 mm, let me change it to let's say pen 6, which is 0.18, just slightly thinner, but it's also a little different color so it will tend to be a little bit lighter. So I'll say OK, and you can see that it changes now. And perhaps that will blend in a little bit better. So you can see how the window stands out against it better. So you can play around those things. [0:11:46]

It's basically controlled by the material and the Vectoral Hatch Settings in the material for the wall or the roof or other things like that. Now let me just change back to the hairline, and we'll proceed. So in this wall here, you can see that there's stone work. Now of course that has to do with the material that is created there. We're not creating a bunch of individual stones. But this is not a separate piece. If I select it, you can see it's actually the entire wall that was selected. Because this wall is, in this case, a profiled wall. So it's got a complex shape and if we look here at the floor plan and section, it is a particular shape here. You can see the little miniature preview of it. [0:12:39]

Now we'll be looking at how to create complex profiles and manipulate them in a later section of course. But I just wanted to point out that by having the wall have a complex profile; we're getting all sorts of additional information. In other words, we're getting the different materials between the lower part of the wall and the upper part. We are getting this whole complex shape. So instead of doing these things in 2D, we are actually just drawing it as a simple wall. But the wall has extra information to make it have more detail. Now let's take a look at some other things that add more detail in terms of modeling. If we go to the edge of the balcony here, you'll see that there's a cornice. And when I select it, you'll see that it's just a single element, and you can see how it's curved. [0:13:29]

Now again it's a beam, but it's a beam that has a profile. You can see it in the upper right here; you can see that it's a complex shape. And so if I open this up, we will see that the complex shape is what's called "cornice molding". Let me just widen this here, and I press down on it. And you can see that's the shape. So again a complex profile can give you a lot more information than if you just are doing a simple beam or wall. Now if you're in the Start edition, you're not going to be able to do that with complex profiles since they are not included, but you could create an object that had that shape and just run it along a straight line. So there is a work around, and we'll be covering that when I cover complex profiles in the later part of the course. [0:14:20]

Now there are some things that look similar but are done in a different way. In other words if I zoom in, you can see that there are some rafter tails. So the rafters for the roof stick out beyond the edge of the wall, and they have a complex shape. Let's take a look in 3D and see what we've got. So here we have a 3D view, and I'll just zoom in a little bit and change my orientation to be able to see them better. So you can see that these elements here, when I select it, it's a little bit odd. The handles don't - although the green outline shows nicely - the handles show in a different point. In fact, if I have this turned more sideways, you'll see the handle indicates it goes straight down across there. [0:15:18]

Now why is that? Let's take a look at the element itself, and we'll see that the element itself has just a very simple cut, simple horizontal and vertical cut at the end; whereas we have this very complex ornate shape. Why is that? Because the end of it has been cut with a solid element operations. So let me go to the Design menu, and we'll open up the Solid Element Operations palette. In ArchiCAD 15 it's under the Connect submenu, in earlier versions it would be just directly under the Design menu. Solid Element Operations. And I can go and perhaps just tell it that this - I'm going to use the Maintain Operations section as opposed to New Operation. And I will say that this element, I'd like to see what happens if we cancel the Solid Element Operations on the operators. [0:16:12]

In other words, this is a target and it's been operated on. And if we cancel that, what happens? You can see this was actually cut out or the end of it was cut out by another element that is on a hidden layer right now. I don't want to show you all the details of this in this introductory section about how to model well, but we'll be looking at Solid Element Operations in a later section of the course and show this particular example again. Now I'm going to undo that and show you that in ArchiCAD 15, there's this little icon here that has a square with several little tiny rectangles or icons within it. When I press down and it, you'll see it says this element has a solid element operation that it's connected to. And it's been subtracted, or it's been a target of a subtraction operation. [0:17:06]

And if I want, I can click on this little X and cancel it. So this is going to do the same thing as we just did before, only potentially you might have a number of different solid element operations you can manipulate. So that's one of the things in ArchiCAD 15 that is a little different, gives you more subtle control over this. So let's take a look at the framing, because this obviously goes into the roof. I'll use the Window palettes Quick Layers Palette to be able to very quickly say, "You know what? This element here, I'd like to look at only the elements similar to it, only elements on the same layer. So I will hide the others." So I will click on this close eyeball for others layer and you'll see instantly it now only is showing those elements that are within that layer. That is a really clever thing to do. And I'll just undo that. [0:18:05]

That's one of the nice things about the Quick Layers palette is that we can do manipulations like this and then undo them so we can just quickly see things and perhaps do some work before we undo the layer management that we're working on. So let's take a look at a section now. We've been looking at elevations. And so I'll go down to the sections and we'll open up Section B here. So in Section B, we'll see that there are some of the framing is showing up, but not all of it. So it depends on whether you want to try to do all of the framing in the roof or not. If you really don't want to try to do it perfectly, than you may want to actually turn off the layer and just do it with 2D work. And let's just see how you can do certain things in 2D quite successfully. [0:19:00]

For example, this piece that I'm highlighting right now is an object that represents framing, but when I open up its settings, we're going to see that it has no 3D appearance at all. It is only a 2D object. Now when we look at the preview of it, it's indicating just a single piece of framing lumber. But here we have a double. That's because it's been set to have a certain configuration. So you can do a variety of these single whatever size or double, you can see different options there. So this is an example of a parametric object in the U.S. ArchiCAD library. I'm not quite sure what's available in the international library on a standard basis. I do know that there are some wonderful elements that Cadimage has created in their Detail Elements add-on. [0:19:56]

So if you don't have this in your library, you might want to look at the Cadimage Detail Elements. But in any event, this is an example of just the 2D elements that have been placed on top of the model. And of course we could have some framing going across purely in 2D. Here is another example of a 2D element that has been placed in just the same way. Now, let's take a look, and I'll just zoom out. And we'll see down in this area there's something a little bit odd, because the slab here has some cutouts. Now the

reason for these cutouts are some beams that the Beam tool is being used to create the joists for the floor, and this layer is actually turned off. So this is what I would call a mistake in terms of the layer settings. So I'm going to open up the layers by hitting command Command+L or CTRL+L. [0:20:55]

Right now we're in the layer combination called Con Doc Sections. And if we look down in here we'll see in one of the layers is structural framing members. Now this is using the layer settings for MasterTemplate, but basically in a section I would think you would probably want to have framing turned on. So I'm going to go ahead, whatever the layer is named, I'm going to go ahead and turn it on and then update that layer combination here and say OK. And I'll make all the sections actually have that. So in other words, whenever I go to any of the sections, it will show. [0:21:33]

So these elements here, when I select it, these are actually beams. So these are 3D elements and they're cutting themselves out of the slab very nicely, beams will do that. You don't have to use Solid Element Operations. If a beam intersects a slab it just will cut a hole in the slab for it. You'll notice you're on the site we've got another beam that's doing - another piece that goes below the wall and covers up the junction with the stem wall and footing. If I select the stem wall and footing, you'll see that this actually - if I can I can zoom in on it - you can see that this is actually the whole shape. It includes the concrete and then the little piece of wood right at top. Here is also part of that. [0:22:28]

Now we're getting a line going across here because in this particular case, the mesh that we're seeing, the base, which could be a slab or terrain mesh, is also cutting straight across and they are both passing through it. And in fact, depending upon when each one was modified, one or the other may cover up the fill. So we might actually have not even seen the fill for this stem wall. So in order to correct that again I'll use the Solid Element Operations, I will change to a new operation. I will make this the target and I will make the stem wall here the operator, and I will subtract out and execute that. [0:23:12]

And you can see that when it updates - actually let's do this again. I will select this and make it the target, select that and make it the operator, and I'll execute this. And you can see that when it's complete it cleans that up. And of course there's one on the other side that we would also want to do here. Now this is a 3D operation. So it will affect any other section that also has the same elements. So we only have to do it essentially for as many elements as our seen, but we don't have to do it in every single view. So again I'll make this the operator and make this the mesh the target, and subtract out, and you can see how it cleans up. And when I select the mesh now you can see how the outline goes around that shape. [0:24:00]

So modeling in a more sophisticated way will give you a tremendous amount of detail like this. Now let's take a look at a different section here. In Section C we can see an interesting area. And this is one that often comes up is a question: "How do you model the intersection between where wall and slab and another wall meet?" First of all, I'm going to point out that on the side here there is a piece of the roof with the rafter tail coming out. Now we already know that this rafter tail, you see its original shape with the handles, and then it was cut out with the solid element operations. But what is this element up above? If I select it you'll see that it's a roof. So as a roof, a roof has a uniform thickness and you can in fact see the handle down here. So the roof actually comes out like we're seeing here. [00:25:02]

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But somehow it's not showing that shape, it's actually been notched out. So again it is a solid element operation. There are a number of things that have been subtracted out from it. So without getting into the details of this specific shape, I believe that there was another piece of roof that was created and is used to cut out the edge of this roof from it. So basically by creating some extra things that are put on hidden layers, you can make the elements look much more accurate in 3D as well as in a section. Now in terms of the framing here, if I go and select say, for example, these 2D elements - so they are something that we've already discussed. I'll just cut them right now and get rid of them. [0:25:55]

But you'll notice when I cut them, they still appear to be there. And why is that? Because the element here has - there's another thing that is creating this 2D information. I'm going to drag this over to the side. So just drag this foot over. And you can see, what is it? It is an object. You can see the little chair symbol. And this object is called a patch. Now we'll be dealing with patches later on in the course, but it's basically a 2D graphic that is placed on top of other elements to make them look the way you want. It sort of like a miniature detail, but appropriate for the scale; in this case, 1/4 inch or 1:50, that we might have for this section. [0:26:46]

It would probably be good enough in this case for a wall section which might be at a larger scale. So this is a 2D information and this is one approach that we can use. But let's take a look now at what's going on between these walls. Now it surprised me when I looked at this sample project. It was modeled by Scott Bulmer, who created the sample project for MasterTemplate and did a lot of the development work on the original MasterTemplate. You can see that this wall goes down to here. So it's actually going down below the floor, and the lower wall goes up to there. So instead of meeting up at the reference height of the upper wall, they're stacked a little bit differently. Now it works just fine. These will clean up in terms of the elevation. We saw that without a problem. [0:27:36]

But let's take a look at the slab here. The slab in this case is not going out to the edge, and it's not going inside to just the face of the inside face of the wall. It's going to the edge of the framing. So there are a number of different ways you can construct a model here. One would be to have this wall stacked on top of the lower wall here; another would be to have the lower wall come up to the reference height and the upper wall start there. I think I prefer that in general, because it allows the windows to have the sill height set based on the base of the wall. But you can always set the sill height of the window based on the reference height of the story instead. So it can work either way. [0:28:21]

And sometimes people will take the slab, and they will actually take the slab all the way out to the edge and make the wall underneath and the wall on top. So there will be three elements stacked. As long as the outside surface of the slab is the same material as the wall surface, it will actually look just fine. But this is a more sophisticated way of doing it, taking the slab actually into the walls. However right now, if I select this wall, you can see this wall similar to what we saw in the other section on the terrain mesh. It's sticking through here. So what I'm going to do is select both the lower and upper walls as targets, and then I'll select the slab as an operator and then subtract out. And what will happen is it will clean this up. [0:29:09]

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Now the slab is going as it should into the wall, and the upper wall, you can see its handles or its outline is notched out. And the same with the lower wall. Now if I go ahead and paste back in those 2D elements that I had before, you'll see now we've got a pretty clean result. So now we've got just three elements, the upper wall, the slab and the lower wall purely modeled. And then we've got these 2D elements just stacked in here. So I don't even necessarily have to have this. There is of course a piece of framing on the end here, and that could have been done with another 2D element as well. So this is just one option. [0:29:54]

Now the nice thing about this is that you can actually put it in other sections where we have a similar condition. In other words, wherever we have an upper and lower wall and this slab coming in, we can just copy and paste this object into place and it just cleans up the whole thing. So in some cases, that can be a simpler way to get a clean result. Now let's take a look at one other option for modeling. Probably the most sophisticated that I'm going to show you in this section of the course. This is actually modeling the walls in such a way that they have their framing already in 3D. So I'll go and open up our Interactive Legends. So these are our Kit of Favorites here, and I'll close up a couple of these palettes. So we look at the section of the kit of parts that are included with MasterTemplate called Structures and Profiled Walls. [0:30:52]

And I'll draw a marquee just around this area and we'll look at this in 3D. And so you can see that there's a bunch of stuff to look at. Let me just rotate around this, and focus in on some of these walls in this area. So what you'll notice it is that when I select a wall like this, or let's say take this wall here, that it actually is notched around. There are some slab pieces that you can see in a wire frame. They're on a layer that is turned into a wire frame. But that actually not being cut out of the wall. The wall profile, if I open up the settings of this - let's just open it up here and we look at the wall profile, you can see it has a notch in it already. So this is already included in that shape. In fact, if I zoom in on this, you'll see that it has so much detail that it even has the waterproofing on top of the wall. And the materials are set for the type of materials that you would see in this wall construction. [0:32:13]

And the grooves here, if I select a side wall where it's a little more obvious, there's actually the grooves are built into the wall definition. So we can do a tremendous amount of sophisticated work here in the modeling. In fact, you'll see down below that we've got the space for the structural slab and even some other components built in. Now this can even go further in the sense that right now we're looking at this in 3D, so the cutout or the edge of it we're seeing as a flat surface. But let's take a look on the floor plan. So I'll go back to the floor plan here. And let's put in just a little section to take a look at what this will actually draw. So I'll just draw a new little section here, and let's take a look at the section that comes up. [0:33:20]

So in this section that comes up, when I zoom in on it, we will see that it has actually got the framing as part of it. There's nothing in 2D drawn. This is a purely model section. And when I select the wall, you can see that it's got all of the framing already included. So how does one create a framing like that? Well, I'll be showing you how to do that when we look at complex profiles. But very briefly, every line that we are seeing in here, every line, for example the waterproofing, is created with a fill. So in other

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words, in the complex profile, this shape up above is a fill. And then each skin of the wall is a separate fill. It could have a hatch or poché or something else indicated. So all of those fills create lines as long as let's say the two skins here have different materials, then ArchiCAD will draw a line in between them. [0:34:22]

Much like the different materials on the elevation surface. Actually they have different fill names. Now the framing here, it looks like it's two lines creating an X, but it's actually four separate fills, or in this case 8 separate fills creating what appears to be line work. So that's just a little trick there. If you are already comfortable with creating complex profiles, you might want to experiment with that. And of course, I will go into that in detail in a later section of the course. So this concludes our lesson on how to model in 3D so well that you can draw in 2D as little as possible and still create really nice looking elevations and section drawings. This has been Eric Bobrow, thanks for watching. I look forward to seeing your comments and questions on the page down below.

[END OF AUDIO 35:21]