CHRISTOPHE JONES: Good afternoon everybody. So thank you all for coming. So just a little introduction. So this about Revit and utilizing it for the field really. So there's a couple of things that, you know, just as an objective. What I really want you all to come out of here is looking at Revit in a different way, how do you really use it for whatever trade you use it, or whatever trade you're in, whatever field you're in, trying to expand it and use it differently than how maybe the mainstream is always using it.

So just a little bit about myself. I have a pretty big variety of background. I've been assistant superintendent, I've worked the field, I've walked steel, I've done pretty much every job on the job site, operated cranes. I've been a project engineer, estimator, director, pre-construction, and I've been VDC manager. I try in every day to use Revit as a tool that pulls everything together.

If I'm doing logistics, if I'm doing estimating, if I'm doing scheduling, everything is try to go right back to Revit where Revit is-- It is a master builder tool to me. So that's the key thing that I really wanted to try to stress, is that Revit, if you really use it, you can be a master builder. It is a tool, it's not a program. If you look at it like a program you won't get everything out of it. If you look at it as a tool it's no different than a hammer, it's no different than a crane, it's how you apply it and what you want to make out of it.

So the number one thing is really using parameters. Parameters open the door for how you're going to actually use the program, what you want to get out of it. Revit is a smart program, but it also doesn't have a lot of information in it. If you look at-- most people know is steel beam-- it doesn't know how to calculate the weight of it. If you want the calculations of tons you have to add a parameter in there to make it work.

So you have to make Revit smart. So you have to out think the program, and you have to actually make it be what it is. So the more data you can put into it-- and this goes into everybody in here knows that the push is to go to 6D-- when we give a model we want to have that information inside the program, inside the model. We want the metadata available there. Every time you put it into an outsource program-- So if you go to a third-party program and you're actually putting the data in the third-party program, it's not in the original document.

So when you turn the model over it doesn't contain everything. Not every single owner is going

to own Synchro, they're not going to own Vico, they're not going to own Assemble, they may get to Navis. Navis will at least read that information. They will be able to go back and forth. So it's about how to build information into Revit that will speed up the process in other things, but that's really heavily done inside of the parameters.

So what can parameters do? They allow for very detailed information. They allow you to manipulate the program to how you want to do it. They lets you go through the programs faster. And I will show you some actual examples, and I'll pull up models that I'm actually currently working on to show you how things are.

At the side over there is a list of some of my base parameters that I use in my template every day. So they range anywhere from scheduling activities, to information about concrete columns, to just blank lines so that in schedules you can sort things and make it easier to read, make the exports available.

And I'm going to go through quick unless you all want to ask questions. I'm very free how I do things, I like to kind of go through everything and then I like to explain more on a real-world situation. It all ties together to me. The parameters tie into logistics.

This is a job in Miami that actually is being redesigned now. It is a large-scale mall. This looks like a pretty picture, everything in it is correct. The tower cranes, the mass of the tower cranes, the hoist, the steel parts and pieces, it is made to be a real model. It is not just a pretty picture. And this is built during the proposal stage. So you put in the information of what you want to get out of it.

Here's two different types of logistics plans, most would do this at a very early preliminary stage. There's not a lot of detail, there's no dimensions. The one on the other side you can see there's elements. I'm calling out a lot of items, you see the grid lines, it is a true drawing, it's exported out as a CAD file, it's overlaid. Parts and pieces of it can be put into total stations. Items are correct size, tower cranes are located, but you also don't want to get too caught up with just pretty pictures.

So there's also a big reason to build mass families. So if you look here, this is a job that I'll show you all in a little bit, it's an 82-story building in Miami. And I'm studying the location of where the cranes are going to be. I don't need to have an actual crane family, I need a mask, I need to know that I have the actual coverage. So it's by building simple families, but also you need complex families at times. You need families that can grow and change sizes, you need

to be able to just visually see things at times on a logistics side.

It also gets down to very detailed items. This is the same job, if you look I'm very detailed at a proposal stage on how I'm going to handle hoists. I know exactly where the dimensions are, the hoist is made and a certain dimension, I am looking at no problems. So this particular job-- and I don't want to get too much-- this is an exterior facade piece that needs to be put into the job prior to me going forward. So it's a pre-cast system on the outside of the building, I have to have that before I put any glass in, but I also can't stop the construction. If I put the hoist in there without putting that piece in then I have 82 floors of precast that I need to go back and put in. So you can imagine topping out a building and having 82 floors to go back to is not very economical.

So here you can see I'm trying to show the details of what I want even at a proposal stage. And I'll be open and honest, this is a job that I had the final proposal on Thursday, I'm still going back and forth with the owner, and it's down to me and one other competition. The logistics is something that's very critical on a 82-story building. If you mess up on logistics on a large-scale job you can completely blow your budget.

The other thing is going into other systems. So this is a formwork system on the same job, so I decided to use a handset form system on this job. Now, what you'll see is hundreds and hundreds of beams of formwork. All those pieces have been drawn correctly, so I've made a-- that's actually a Doka beam system-- I've made a Doka beam system family for each beam, each had the tripods down below, each of the parts and pieces that hold the system up.

So what you end up doing is, this may not be fully accurate at the proposal stage. I'm very close. I know enough about, say a formwork system to come up with a close enough design that can then go to either the concrete guy, a formwork companies to show them what I'm looking to do. I'm also getting quantities out of this, so that's on a GC side it becomes a very important tool.

So now when my concrete guy tells me how much formwork he has I can go back to him and say, well how much do you really have. And I can go back to him with a number and say, how many sheets of plywood do you really have on this job for your formwork, how many post shores do you have, how many Doka beams do you have, how are you really planning to do it. So as a GC, by doing this, a little bit of extra work on the front-end I'm able to not only check things, but I'm also able to show an owner that I know the project.

When a subcontractor comes to me I've put the effort into it, I'm not relying just on a subcontractor, and it's not to be in competition with the subcontractor, it's to give them a different view. One subcontractor is going to come up with a different formwork system than I am. What this shows is that I'm not just coming up with a system, I clearly designed a system, I thought about the system, now I can talk to my subcontractor on pros and cons. Maybe his way is better, maybe my way is better, but unless you actually show the effort as a GC, that's not the best thing to do. You want to be trying to push your subcontractors.

A subcontractor in reality should I be wanting to push against a GC and want them to challenge them. By challenging each other, that's how we actually use these programs better, but it takes a little bit of effort in modeling this. So a system like this, this one side probably took me an hour and a half to two hours to come up with the grid system that I wanted to use for the formwork. But is it time well spent?

I'm able to show an owner what the limitations of a building like this are, how am I really going to build this building. I can tell you my competition did not have things like that. Will it make the win? I hope it does but you never know, you have to put the effort in.

But when you get on to a job and you really want to look at costs, understanding what you're doing. If you're self performing you want to be able to have these parts and pieces in. If you're a subcontractor it doesn't have to be formwork, it can be drywall. You want to draw your elements in, in a way that actually gets you the information. You want it to be broken down on a floor by floor basis.

So if I have a shear wall or-- what I have is in the red there are actually the coupling beams-- I call those out differently than a regular bean because they cost more money. I also, when I export this model into Navis, I want to see that red beam. I want to see if a piece of plumbing goes through it, I want to see if a piece of HVAC goes through it, electrical. I might not be able to penetrate that beam, so once I export it, it's a very easy visual. It's not just the bean, it's a beam that's called out specifically so that I know what's going on.

This kind of it goes back into the material. So you can see on the side of the screen, this is actually the formwork on a level by level basis. And I have a piece count of everything that I want. I have a piece count of the formwork, I have a piece count of the plywood that I'm going to use. I can go further and I can put nails if I really wanted. It's all about using the parameters, and if you use the parameters at the right way you can get any information that you want. I

think that's what a lot of people forget about using it. They build a model, they push it into coordination, but they don't want to use it for quantities.

Now as an estimator-- my background being an estimator-- most people that are modeling, the estimating groups don't want to trust the models. Why? Because the models are built for coordination. The same thing on why you wouldn't really want to use an architectural model. And architectural model is being built to do drawings, the design model is used for analysis, structural analysis, and again, to do drawings. It's not really made for coordination, and that's why there is a difference between designer's model, and architect's model, and a subcontractor's model.

Subcontractors are usually going to be doing fabrication, they need to do their shop drawings off of the drawings, so theirs are even more detailed than, say a contractor. They're all one in the same though. So in a coordination sense I will typically overlay a designer's model, my model, and a subcontractor's model all for the same trade. Everybody is going to have a little different take on how to use the model, what to do, how to actually look at the job, and eventually it's going to be one of three models all merge together. You have to look at everybody's perspective, but that's how you make things powerful.

And that kind of goes into the estimating, and that's how I'm going to show you all. So I'm pretty quick on that side, I really wanted to get into the models, and how I'm actually using the models as an example. So I'm going to show you all a current project that I'm working on.

So this is that 82-story job, and you can see I have a lot of different elements in here. This is the formwork down here. And you can start seeing it, that's a lot of formwork to model up, but there's a lot of information. And you have to understand also, that every one of these floors is a little bit different. That's why there's so much different formwork systems shown right now. It's because every floor is going to have a little bit different thought process to it in how we're actually constructing.

So when it comes down to parameters for estimating, for quantities, if your superintendents want to be able to have how much cubic yards is at a certain area, what you'll see is I've added a bunch of parameters in here. I'm coding this one to level 48 so I know exactly that my parts and pieces need to go to level 48. Now if we look at scheduling, I have a scheduling activity ID which would go right back to my schedule. So the reason why I'm trying to program things in Revit is, one, I think it's a lot faster.

So I'll pull up a smaller project here. So here's a 20-story building which I have not actually coded yet. So in a third-party program, usually you're going through and you get a full exported model. It's not broken up, it depends on how you build it. I build a model with a lot of different phases. So my base template model, what I've done is I've broken it down into existing, mobilization, demolition, a [? soil mix. ?] It goes into a super structure.

So if I'm going to draw concrete I'm going to draw it in a super structure phase. If I'm going to draw drywall partitions I'm going to draw it in my interior construction phase. If I have finishes I'm going to draw that in a finished phase. The reason why is because it's a speed later on. Usually you're going to have guys that aren't modeling the same trade, you're going to have a concrete specialist, you're going to have a drywall specialist, you're going to have mechanical specialists. They don't need to be drawing in the same area. Now, you can do this with a central file, but if you're doing it with the phases from the get-go it actually opens you up to be able to sort things a little bit faster.

So in this perspective I'm looking at the concrete, but if I change it to show new I will just see what I have drawn in superstructure concrete. This would be an export to me for Navis, it would be an export to me for a program like Vico, it would be an export for me for Synchro. So I'm automatically isolating these things just so that when I get to those programs I don't have to sort through anything. I've done it in my modeling because that's how I'm modeling it, but I'm also keying it in that that's my specialist that's doing that.

I want to see the concrete structure by itself I don't want to see it necessarily with the masonry. I want the ability to go to merge them, but I also want the ability to isolate it in my base program as well.

So if I were to switch this to interior construction, this would be my main core in the building. So you can see I don't have everything put there yet. If I want these at exterior facade it's a fairly easy grab that I pull them. This is a concept level. I'm going to switch this to exterior facade and then I won't see it.

So by doing that, what I do is I really isolate the elements. Now when I want to code all the drywall let's say in Synchro, and I want only vertical. So when you get into these third-party programs like Synchro for instance for your scheduling, you want to apply a different growth for horizontal element than you do for a vertical element. So now I'm going to isolate just the walls for my export for that, same thing with columns and walls. My beams index would be put

together.

But here is all my walls for a specific level. I'm going to come over here and I can type in, maybe it was test 101. Now all those elements always have that in there. When I export this and I go into another program and I say, I want to code scheduling activity ID with something else, now an auto matching everything. So I can do this a lot faster in Revit than I can and a lot of other programs just simply because this is my design tool. While I'm drawing I can actually copy and paste these elements as I'm drawing so I'm not really taking any extra time. But if you do it by hand in these other programs it's twice as much time, so I'm using the parameters to try to help me organize information, call out items.

Another thing is, the goal for me is that this is a working model on the job site. You'll see here I have a proposed installation date and an actual installation date. What I would expect is whoever is my guy on the job site, as we're installing he's going to come into his model, he has to be in there anyway, he's going to say, well we started putting drywall up on this particular day. He's going to keep that in here. So now we're using the model not only to use it for coordination and for scheduling, we're also using to track against the original schedule. It's all about adding these additional parameters, which to me is what really makes everything happen is the parameters.

So a project like this, which is a fairly large project to do the coding of all the structure, the interiors, and a big majority of the exterior facade, which I broke the exterior facade down in about three different areas. I coded this in a Synchro program in about three hours, and I had an auto matched together and starting to run within about five minutes of pulling them together. Now of course there's a whole bunch of changing and moving things there, but that is a lot of time to go through on a hand by hand basis to go through each of these elements in a third-party program.

The same thing happens in programs for estimating, you have to key these in, you have to get the areas in. Instead, what I'm doing is I'm making the program smart or the model smart. This element I know is on level 12. If it's building A it's building, if it's a grouping of public space it's public space. In the schedules what this actually allows you to do is, if I look at, say the beams, here's the concrete beams on a beam by beam basis. You're also going to notice that I have a little bit different way to look at beams.

So a beam that a 12-- Most people will draw a 24 by 24 beam as a 24 by 24 beam. This is a

24 by 24 beam in a nine inch deck, so my formwork is going to be different in a nine inch deck, than it is going to be in a 10-inch deck, than it's going to be in an 11-inch deck. So I'm keying this information in so that I can clearly see in these schedules, in the model, how I'm actually getting this information, because I'm going to actually price an eight inch deck versus a nine inch deck differently, not by much, but there is, if you get to the subcontractor level, you have to get detailed.

The other part is, is by having these naming conventions then you're going back into the schedules of the engineers. Now I can apply the rebar weights that I want, how I want to handle certain activities. Like I said, Revit it is not super smart, it doesn't let you get in into that beam width and depth even though it allows you to put those parameters into it to make it, it doesn't let you tie into it to actually see it. Other programs third-party programs do, so what I've done is I've added extra parameters. So by doing that I have a beam width, and I have a beam depth, and I also have whatever slab thickness I'm using.

And what I've done is it's letting me get the length out of how I'm drawing it. What I'm doing is I'm calculating it, getting a formwork square footage by using additional formulas and using that information, trying to change it and manipulate it. So all the information is there, it's how well you can grab it from there.

It's also sorting it. So now when somebody wants to know how much cubic yards that we need to get on a specific floor I have a volume, and then I have a volume with waste. I might change my volume with waste as I go up, so an 82-story building my waste factor on level 20 compared to level 60 is going to be completely different. That's why I try to build all these parameters in here, but also to get the schedules.

So these schedules are sometimes difficult to use, but if you build them almost like how Excel would be you can go back and forth. If you used some of the third-party programs you can go back and forth using the programs on the outside, getting in Excel, and then pushing it back. So typically what I'll do is I will export a schedule like this as a .txt file, I'll pull it into Excel, and then I'll do my calculations for quantity survey, for what I'm going to give to a superintendent, how long I want to give it to them, I'll do that all in the outside programs, but the base of it is all done here.

I try to get the calculations done, and the reason why is if somebody goes there later on and grabs that element I want them to be able to see, here's all the information I need for that

specific column. That call them cost me x amount of square foot, that square foot of formwork costs this much dollars, so that column costs this much.

At times you will have an owner that wants to get down to having an estimate for every single unit. By doing this you can code everything for unit A, a unit B, a unit C. It takes a little bit of time, but then when that owner comes back and asks you to do those things you can do it 10 times faster than going back and trying to find it by hand.

So the other thing with logistics is really trying to understand how and where things fit. So that's where I will use a lot of these mass families that I built to see where I'm going through. So typically I will isolate these families and that will go into in Navisworks as well. And that's because I need to know what I can install, what I can't install during the sequence.

So in this specific job I'm actually looking to put tower cranes on the inside of a building, jump them up, and about every 10 floors I get to in-fill where my mass section was. That's a little bit different. What you'll see on the red and the yellow, the yellow is actually where one of the concrete companies had plans to put a tower crane, and-- sorry I say red, magenta-- the magenta is me fixing the location to actually make it work. So it's about understanding what the equipment is.

So if I know that right off the bat where my subcontractors are telling me I'm all the way in the deck, this does not work. I know that I need to be 12' 6" from the edge to the center of my crane right here, but I also want to look and see what does that do down below. And this is a pretty big model so bear with me.

So what you'll see here, is if I were to free-stand this crane all the way to the top I am always going to have a hole down to my basement level. And I'm in Miami so having a basement full of water is not a good thing, and I'm right next to the water over here, you can see the barges that I'm using as additional storage.

So the yellow is their original, this has me fixing it, and if you look on this side, now every single unit that's along this area I can't install until I top out this building. So this is me playing with the locations of the cranes, finding out where the best location is for me, how it's not going to impact my schedule. But it takes time to do this, so it is using Revit in a very construction oriented way. I move the cranes around, I see where the locations are going to be, I see what the impacts are going to be, I see what problems I could possibly have. So by having this, this is a water issue, I don't want that, necessarily.

I've dealt with having a hole in a slab and then going down to the basement and flooding it every three weeks in a Miami area. If it floods or if it starts raining I'm going to fill it up, so you have to know your location and what the problems are, but it is a waterproofing issue, it also affects how you want to construct. So on a tower crane I'd think that anybody that's using these programs should have a kind of a base knowledge of what things are that they're putting into things.

So a tower crane for instance is rented on the number of mast sections. I'd cut the mast sections down but I've changed the way the system is, now I the add extra shorring into the building, I have to change the way I'm doing things, but on the overall I'm not paying for the same set of masts. At 1,000 feet, 1,000 feet is a lot of mast sections so I'm just playing with things.

So a set of logistics plans that I put together is a little bit different. This is a more detailed logistics, I try to put dimensions in things, I try to show what I'm doing as I'm going through. This is page 12 about-- This is package one of eight packages in the logistics plan at the proposal stage. And then it's page 12. So there's quite a bit of information that I try to put in.

But the main the main thing is, is that this is part of the model. Whoever is on the job site has this model, they're going to edit it. It's not done in Bluebeam, it is truly part of the model. Having that makes Navis work better, because if you're in Navisworks and you didn't understand where your materials are coming in, how large an air handler is, and you need to see where that is in conjunction to where crane is, where the trucks are going to be, you have to have those elements in there. So it is a different take on using the program by spending a lot of extra time on things that maybe are overlooked. I'm hoping to gain a lot of time when I'm actually building.

When I'm doing estimating it's the same thing. A structure like this is a pretty big undertaking to model. If you were to do this by hand on an estimate, you'd probably be spending about two to three weeks as an estimator. By using Revit I was able to model the structure in about a week and a half. I'm also a lot more detailed, and the minute that I switch an element, because I have something, if I change the column sizes I automatically can just reprint my schedules, I don't have to go back and find out what happened.

If the owner came back and said, you know what, add three feet to every single floor, everything is interlocked, everything is also tied. If he picks a specific floor and I go to say level

30, level 30 needs to add 10 feet, or we're going to erase levels 30 through 35, I can easily go to my schedule faster than I did when I did have takeoffs by just manipulating it. All that data is in here. Every single floor has an association to it. It takes only a matter of minutes to go through this.

So when you do look at scheduling-- So from a standpoint of once I've modeled, I have it isolated where I want. This could be drywall, it could be duct work, it could be plumbing. Very easily I can grab all the elements of whatever floor that is, labeled it as level 14, building A, hide it, and I go right to the next one.

So that's how I'm coding things a little bit quicker. I'm using the model, and I'm using my parameters, and I'm using the extra phases to kind of go through very speedily going through. I'm spending time modeling it, and then I sit there and I spend one hour going through here and coding everything. Yes.

AUDIENCE: I was just wondering I was looking at the numbers for your I was --the numbers in them, are those related to the order that they are placed, or does that tie back to the location [INAUDIBLE]?

CHRISTOPHE JONES: You're talking about these?

AUDIENCE: Correct.

CHRISTOPHE JONES: The numbers just had to do with however I place them. It's-- [INTERPOSING VOICES]

CHRISTOPHE JONES: --somewhat-- my background being an estimator, if you look at this there is some CSI coding into it if you look at it. I am trying to put concrete before certain elements, so there is some CSI built into how I have it phased, but it could be done pretty much any way that you want.

Because of that phasing it really has to do with when you want to see it. The reality is, is that when I'm doing formwork or concrete work, I technically need to have all my MEP figured out at that point. I need to know where all my sleeves are. It's really for me to isolate it, but then when I do want to study it I might move these phases close, move them up. I might set it to where I'm seeing it.

Now, typically if we're doing MEP I have that in a completely different model with a completely

different set of parameters, because in MEP I'm using that for calculations. So I do have a couple of guys that work for me that can design full MEP systems. So what they will do is thier parameters, they have these parameters in them that I've shown you all, what they do is they have all their fabrication parameters in them as well.

Now as a GC it's a little bit powerful to have that in my back pocket. I can challenge my MEP subcontractors when I want. If they fall behind I can also help them build a Revit model or at least build a 3D model. Most MEP guys don't really like Revit, they use more CAD MEP, but I'm able to help them. I'm able to show them a test. On a concept level I'm modeling it to even show, does it work in the ceilings. So right off the bat I can even go in and start designing something before I have a subcontractor on board, show a full system--

And actually this particular job right here, I did just that. I actually drew up all the central risers, we drew the central loops, all the systems. We don't actually have drawings, we don't even have a design, we only have a set of five or six drawings. This is modeled in about two days. The MEP is about four days worth of work because I'm actually trying to come up with a design that actually works. But is a very powerful tool when you take it to that level.

So you don't want to just look at Revit as, I need to build a model. You don't want to just take it as, hey, the architect gave me a model, I can get everything out of it that I want because they may have drawn it a completely different way than what you need something out of it.

Structural engineers don't cut columns from floor to floor, and it's my understanding from talking to some of my buddies it is because their structural analysis won't work correctly if they do have it cut. For a contractor I need to know there is x amount for me to actually figure out formwork, same thing with drywall or an exterior facade, I need to know how many lifts I'm going to go up.

If I'm doing a unitized curtain wall system I may want to make a unitized system and just keep on copying it and placing it so I have a piece count. From there I can actually figure out how many pieces can I install per day, what's my ratio, how can I come up with a better way to actually install it. I may be able to install it very quickly but due to logistics I might not be able to bring all the materials in that I want to. So that's where I'm trying to use Revit in these parameters to really utilize it in a different way, get more information out of it, get at the same level as the subcontractor. But at the same time be able to take what the architects have given and design it, and be a bridge between the design subcontractor but also be able to challenge

both sides.

So I'll let you all ask me any questions now, I mean I've got 20 minutes. Sure.

AUDIENCE: [INAUDIBLE]

CHRISTOPHE JONES: OK, so the question is, do I have a reason to use spaces over work sets.

AUDIENCE: Right.

CHRISTOPHE JONES: It's just a preference. To me it's a preference. I've used it for a long time. I would probably say the reason why is because I'm used to more work sets being done when I'm actually doing it with a central model. Most of the times I'm running these by myself, so if I start the job, in my world I've started the job and I'll pass it out. My guys can then take it from there and they can do work sets in it, but when I start it off I really set us up with that.

The other thing is, sometimes when you're giving the models off, in a work set it ties it together. In the works as it ties together. In the phases it allows me to be a little bit more flexible and move parts and pieces where I don't have to check things out.

AUDIENCE: And it's one button.

[INTERPOSING VOICES]

CHRISTOPHE JONES: Correct. Correct. Yes.

AUDIENCE: I was curious how you modelled the formwork [INAUDIBLE]. How did you [INAUDIBLE] the systems [INAUDIBLE] current needs are [INAUDIBLE]?

CHRISTOPHE JONES: It's not parametric, it's actually me placing a floor. And I can try to get to a level.

So it is actually me coming up with a grid system where I wanted. What I would do to speed up the process really, is I know that I'm eight foot from here to here. Once I build out one full row then I'd start mirroring it and manipulate it where the edges are. So if I get to the shear wall over here I'm going to change where the edge of the beam stops. I'm going to pull shoring systems closer to it.

So it's really coming up with the first set of grid systems on this particular one, and then manipulating it. So on this particular job I wanted to use this system. On another job I might have a system of tables already built. So those tables are parametric, where I know where the limit is and the way I built say a table system is, if I go too wide, it will fail out and it will change colors, where it basically shows me that it's not a usable table system.

So if I know what the column space is, I can kind of say, well, I want to use this formwork system and I want to test out whatever I'm doing. So there are parametrics to it, I've tried to figure out how to do a system like this but on a handset system. You can do it, but then you start switching things around very quickly.

AUDIENCE: So do you have any luck [INAUDIBLE]?

CHRISTOPHE JONES: I mean I do. I have had concrete guys that have asked me, well what do you think about this, you know, could you draw this, what do you think the problems are. They've taken this and given it to guys like Doka. This base actually got off of Doka so I actually had Doka's layout plan at one time. So that's where I know where the parts and pieces are. If I were to get a subcontractor at that level and they said, hey, we need to do the systems and we don't have the capabilities, I would probably draw it up for them and go back and forth. And there'd probably be a specific reason why they need all that formwork shown in 3D as well.

AUDIENCE: We just do a lot of [INAUDIBLE] concrete work and we maintain a really good [INAUDIBLE] throughout, you know, we coordinate and do everything with him. Get out there and the formwork guy is doing something independently and we try to do a coordination effort with them similar to [INAUDIBLE] But the system seems to fall down a lot of times where [INAUDIBLE]

CHRISTOPHE JONES: You know what, everybody in here has probably worth in the field enough, and it doesn't matter how well you coordinate, unless you go out there and sit there and watch them put it in. That's the tough part. Some of the things that I do, honestly is, I will build sleeves for everybody. So when I'm in a specific job and we're doing coordination-- And if you put points and you started using this as a system with a total station for instance, if I put like say my legible decks sleeve-- So I'll probably crash out right now, but that's a huge sleeve.

The sleeve actually has points associated to it. So the more that you build into these families, it's color coded already, so the thought process-- I'm trying to make drawings that are simple for the field. If it's blue it's going to be electrical, if it's orange it's going to be HVAV or whatever

color you want. Same thing for the formwork systems, you could build something where you actually a points built into it.

So I have five points in this one, I have four on the corners and one in the center. You could have a beam every couple feet in your formwork system where you say, hey, when you're putting your formwork system out you need to shoot these beams as you're going in, and that's how you would get your control. So some of that is also building the control families within Revit and how you want to do this.

So in a system like the sleeves, I get the sleeve information and locations from each of the subcontractors. I pull their CAD file into Revit, I put it into the model. This sleeve family will actually cut into the deck, so now when I export it in to Navis I will run a system of my concrete system versus the MEP system. If I have a clash then I know that they've either moved their pipes, or they're in the completely wrong spot, or they're not following themselves. Now, by building the point system, as a company we've started putting total stations on the job as a checkpoint.

So I can go out and check sleeve locations, I can had the superintendent pull up the total station. As long as he has it programed he can say, hey, you know what, I need to check the plumbing sleeves. Every plumbing point is going to be categorized with a [? PL. ?] All my concrete points are going to be cast CICP, my electrical might be [? alec. ?] By having those different differentiators in the points it does make it a little bit bigger, It makes the models bigger, all this stuff makes the models bigger.

I crash out on laptops all the time, I really use a desktop when I'm really doing it, and then I have to go back and strip things because it is a lot of information. Every column in this job right here, if you see here, has a point already associated to it. I've built families where I have points on the outside specifically for, let's say a concrete company, because usually they want to have a set of stakes outside of the actual location. The sleeves are the same thing, but by having that all built in so your Revit model from the get-go, and even from the start--

So this is a concept set of drawings. If I can give this set of drawings or Revit model to my concrete guy right from the get-go, and I built it in a way that I know that he can actually use it and get the data out of it, he has total station points already set up so that's already reducing time for him. The sleeve locations, as I get them I can update them to him, but everything trying to be built right there, and it's coded.

If I have to go back 10 years from now and look at that model and find out where the problem was and I could pull a total station up, I can probably still go in there, grab that point and find out where was that pipe, is that pipe where it's supposed to be. This can in turn go back into like laser scannings where you're doing a laser scan and go right back on top of this. So it's a different way to maybe use it. I'm looking at it as a full blown construction. It's the first time that I'm building the job so it is a practice session.

Many times I want a superintendent to look at the models. I want him to challenge the logistics and I want him to be able to go there and maybe even move a tower crane around, let him decide where things are. By giving them that experience they know that job before they're ever even out there in the field. Yes.

AUDIENCE: [INAUDIBLE] when that happens do report back to the [INAUDIBLE] or the architect [INAUDIBLE]? How do you do that?

CHRISTOPHE JONES: Well, that would actually be if I got like a new set of drawings and I needed to update the model very quickly. So like this, that's a 24 by 36, let's say I got a new set of drawings and all of a sudden that column changed. All I'm going to do is change it to a 48 by 48. My points are associated to it so they automatically move, but I have that coded in there as a 48 by 48. If you look at the location of it, it still stays the same.

So now I go back to my schedule of columns and now I'm just going to see that it's changed there. So a lot of times it's not me changing the column size for my personal-- [INTERPOSING VOICES] Yeah, it's not me just changing it because I don't like their design. If I did find that a column wasn't working properly I might draw three different versions of it, make a set of documents, and then actually hand them that document.

Now, I will also builds other columns on top of columns for instance. That's going to go a little slow. 24 by 36. Well, I'll just pick a column here. So I will build a column on top of a column sometimes. I'll get it to the right size.

So this is actually a tolerance set of columns that I've built. This would fit on top of the regular column. In a 3D world it would be kind of transparent, that would be my tolerance. So now when I build this out I'm going to build my regular column, I'm going to place this other column right on the outside, and then I'm going to look at issues. Is a door swinging into that tolerance? Is a wall not lining up to it correctly? So I built it all in there and now I can just set

this as a set of drawings and I can say, hey, Mr. Architect, we have a tolerance issue here and this isn't bad, but maybe in certain cases it just doesn't work. Or we have a code issue due to due to the tolerances that we have in the concrete. So depending on where you are the tolerances could be an inch depending on what kind of column it is, so that's where that's where I'm kind of playing with those items. Yes sir.

AUDIENCE: You said that you have the points embedded in the columns?

CHRISTOPHE JONES: Yes.

AUDIENCE: In terms of [? Revit, ?] what are those points and how do you extract it?

CHRISTOPHE JONES: How do I extract it? So I'm using Autodesk point lay out, the points.

AUDIENCE: But what are those? The first part of the question was, what are those points? So if you open up that family, what are those entities? [INAUDIBLE].

CHRISTOPHE JONES: They're just a line. It's a GTP family. So that's the point family.

AUDIENCE: You just made it up?

CHRISTOPHE JONES: No, this actually comes through the points. I can edit these so I actually typically will pull the tops and bottoms off and I leave it just as a crosshatch, just because I've found if you have the tops, even if it's a quarter inch or 1/16 of an inch and he put a column on top of a column that will offset it. So it will actually change or your quantities. So a lot of times I will manipulate these the way that I want on how I want, and usually sometimes I'll actually only put two corners so it's always embedded on the inside of a column.

It's getting in the way, or it's clashing, and if it touches end touches, if you had two points touching it will push itself out.

AUDIENCE: We installed an add-in to the back of-- so if you go to add-ins it will say--

[INTERPOSING VOICES]

CHRISTOPHE Yeah, so what I'm using is I'm using Autodesk point layout so, it's actually the part and piece

JONES: from Autodesk. And that is an-- but it is an add-on.

AUDIENCE: So it recognizes all the-- because [INAUDIBLE], so this [INAUDIBLE].

CHRISTOPHE JONES: Correct. Yes. So it is all nested, so I have nested families, inside of nested families, inside of nested families a lot of times, but they're all--

AUDIENCE: We're basically just looking at this at the point [? spot? ?]

CHRISTOPHE JONES: Yes. The other part is that you have to, when you're building the families, you do need to have them-- they do need to always be shared. So that's the other part, you always have to build them as shared parameters. I usually try to build all my parameters as-- what is it, it slipped my mind-- they're always shared parameters and I change them for instance to types depending on what it is.

But as far as the points, that's really just the add-in, I build it into the specific family, but then I will change the naming depending on what it is. But I don't really mess with that family too much because I don't know exactly what the limits are.

AUDIENCE: [INAUDIBLE]?

CHRISTOPHE JONES: By that software, yes.

AUDIENCE: [INAUDIBLE] and I'm not sure what the difference are, do you export out to CSV? For the guys that's okay?

CHRISTOPHE JONES: So I don't use Trimble, I use a Topcon gun, sorry.

AUDIENCE: My question is, whenever you send them that export with the [INAUDIBLE] x, y, and z implementation, do they ever complain that it's in completely the wrong spot and everything's ruined? That happens so often.

CHRISTOPHE JONES: You know, I all override the locations sometimes. So what I'll try to do, is I always try to put it at like-- I usually try to put a point somewhere, but I usually will change it to like 1,000 1,000, so then what ends up happening is, that main point I have is strategically located so that all my points will always be in the positive and they'll always start above 1,000 1,000. I put it right in the middle I'll have some negative and positive xys, and it just makes it easier to sometimes

override that. And if you want to go into a world coordinates, that's where-- you want to keep the world coordinates, but you also sometimes want to override it to make it nice clean numbers for the surveyors.

AUDIENCE: So with that we often make another location?

CHRISTOPHE JONES: Yes.

AUDIENCE: Set it to 1,000, 5,000, base it off of [INAUDIBLE] coordinates, and then put a point [INAUDIBLE]?

CHRISTOPHE JONES: Yes.

AUDIENCE: --and so that when we feed it out to our guy's guns they will know where--

[INTERPOSING VOICES].

CHRISTOPHE JONES: Correct.

[INTERPOSING VOICES]

AUDIENCE: [INAUDIBLE]

CHRISTOPHE JONES: Yeah, that's exactly what I'm doing, is I try to run both coordinates so I know where the state plane is, or the world coordinate, and then I override it to also have 1,000 1,000 in a specific location. Yes sir.

AUDIENCE: [INAUDIBLE].

CHRISTOPHE JONES: I've done it before. one of my most successful [? BIM ?] jobs actually was years ago, and the architect would feed me models and we would go back and forth. So to really get the quantities on the GC side you have to have a model built a certain way, but you also want-- the designer wants to have it built-- so you really up to come up with an agreement of how you're going to build the models, what kind of parameters would be in there, because you want to end up basically sharing the models. The most the best way to do it is honestly to have a team of the architect and the contractor working together, they do a part, they send it off to

the contractor, the contractor does what he needs to do, sends it back, and it basically goes back and forth.

The most successful job I actually had was like that, but it was also over 10 years ago, so not many architects were fully using Revit, not many GCs were fully using Revit. To have a team do it you actually have to pull everybody together to actually have enough people to finish it.

AUDIENCE: [INAUDIBLE]?

CHRISTOPHE JONES: Yeah.

AUDIENCE: [INAUDIBLE]?

CHRISTOPHE JONES: Yeah, you would want to edit their families. Like if you wanted the points for instance, you would want to go into their base family or you would want to give them your column family and say, hey, use this family, it's the same family, it just has these points in it that I need. Same thing with the different beam systems, or a drywall system, or a curtain wall mullion. You would want to work with them to either put these types of points in or add the information in, or when they're drawing as well, you would actually want them to use like a-- or tell them, can you code this column in this area, can you code this wall when you're drawing it, this is a unit wall can you always coded as a unit wall so I know that it's not public space.

So you would really want to work with them. You can have the architect do it, you just want to come to the agreement right from the get-go of what you need and what you want to do.

AUDIENCE: Where would you put all of your gates and [INAUDIBLE] their model or your own model?

[INTERPOSING VOICES].

CHRISTOPHE JONES: I would probably put that in my one model at a certain point because I don't know how you're set up, but I don't-- I'm also tracking certain things. So if you look at the scheduling stuff that I'm tracking, I'm tracking where I was scheduling an activity to be done at the concept level, maybe before I even had to have a job. I'm doing it at a proposal stage so I'm actually trying to track what the actual is against even like what my thought process was before I maybe even had the job, or where it was during the original schedule.

And then I might have to add even more parameters to show, hey, we had a major design

change. Well, design changes affected it. But what I'm trying to do is build a database to also go back to look at the schedules. Are we scheduling the job right? The Revit model is just an easy way to track it for those parts and pieces. So probably not something I'd want maybe my architect to have, but that's just me.

So anything else for me? Yes.

AUDIENCE: [INAUDIBLE]?

CHRISTOPHE JONES: No. I mean I'm a big Revit-- I try to do it one time. I don't want to use a program that's going to manipulate a structure for me and then I'm going to have to still go back and remodel it, so I do spend a little extra time from the get-go. That 82-story building, it took me three hours to code 82 stories, and that was on a floor by floor basis, and a pour A pour B, and a scheduling. So I'm doing it all at one time, so I don't think it's too bad. But there's probably ways to do it even faster.

AUDIENCE: [INAUDIBLE].

CHRISTOPHE JONES: Into what, like a dynamo or something?

AUDIENCE: Right.

CHRISTOPHE JONES: I'm sure if I use that I could probably get it even faster. I haven't test I haven't tried that out yet. I call my system a poor man's system also, because I think that you should be able to utilize Revit and get everything without maybe even-- if you don't have the money. Some GCs are very small, they don't have the cash to buy a $30,000 program, an extra $5,000 program. So I've tried to build it in a way that anybody could use it because I look at Revit as the main, main tool. Well guys, thank you very much.