**RAD LAZIC:** Well, good morning everyone. I'm so pleased to be opening this conference. First class, 8:00 on Tuesday. I'm glad I had a good turnout, at least. About half of you who signed up, I got to tell you showed up. So kudos to you all. Well, we got a lot to cover, so I'm going to takeoff as they say. Wait a minute, this is not an airport class. So a little bit about me.

I've been doing this for long enough to love it and to be bored by it and to everything that comes with it. But it's a thrill to be able to empower teams and engineers, and use of technology in general. And I believe partly that's why you're here, and because you get excited about it just as well, as a lot of us do. This is kind of a breakdown of my expertise, what I've worked on, different areas.

Most exciting and most challenging ever, so far, is trying to bring BIM to infrastructure. And how many civil engineers or infrastructure related? OK, and the building and architecture? Wow, OK. So that was the idea. We have some mix there. And that's good because when you start working in BIM, if you're an architect of building designer, or you've been doing this for a while-- notice how I haven't asked anyone to silence the mobile phones and think it's like thing of the past.

Of course, most of us have it on silent and vibrate all the time. So the technology is maturing. We don't need to babysit it as much as we used to. So this is your typical architect and building engineer today in relation to BIM. You're so excited you're talking to me about BIM, and I've been using it for eight years now, right? It's not exactly the same when you're going to talk to civil engineers and infrastructure industry like that.

So what happens when you bring the two together? Obviously they come from different background, obviously they have different experience with BIM. Obviously they have different understanding and background of knowledge about what BIM is. For example, on one side, there's not a lot of care required, and management of geodetic coordinates. On the other side, you can't really work any other way, right?

So when you come to BIM, it's integration. So you have to put the two together and that's part of the challenge that we're facing out there and that's part of the theme for this class today, to kind to talk about that a lot. And the exciting thing, is all of this have given us some tools that can automate that. So we almost don't even need to think about it too much. So, so much

about that part of the expertise-- and also how you're configuring systems, how you set up your data sharing for successful team collaboration.

And then what can really make you successful in the longer term is if you have some resources for some application development. I'm not saying develop an application that will complete a job, or anything like that. But there is always those little gaps in the process that you can connect, or we say stitch up, with some macros in general application development. OK, so I'm also doing a lot of training.

Too bad, still in this industry, most of the training is done at the basic essentials level. So that gets boring very quickly to a trainer to go over the same things and the basic software functionality. So I'm going to ask you, how many of you find yourself as a early stage Civil 3D user? OK. And advanced Civil 3D user? And how many of you find yourself as a astute Revit user? OK, how many of you use both?

Fantastic. All right. So we're going to have fun today. So, if you raise your hand for all these questions, then you are beyond the basics, right? So to be able to understand, how many of you use Revit with Civil 3D together? Great, OK. So that's something that I like to put like a custom training course. And I was excited to work on a class like this, even though Autodesk are still working out some kinks here and there.

So it's been a journey for me. And so I'll try to glance over that one quickly when we get to it. So also I work with high schools, especially the college prep, and some of the universities. And it's so exciting to see how teenage kids get excited about engineering. That's phenomenal. And you're not going to get them excited by showing them the basics of Civil 3D or Revit. So what can we do? What's possible? Especially they get excited mostly about when you show them how to use software out of the box. Outside of the box, I should say. Not just what's in the box.

So part of this session today will be how do we apply some thinking and some tools completely outside their context to achieve some goal, some automation in this case? OK, what else? Yeah, I kind of work around the world. When I say Russia, that was actually Siberia for a month. 1,500, 2,000 miles east of Moscow. That was one of the most exotic places I worked.

And then we spent a lot of time in Australia New Zealand. Lived and worked there with Autodesk reseller channel. They sent us to India to launch a lot of stuff. Japan United Kingdom, Canada. Vancouver was phenomenal. And in the past 10 years, United States. So

I've been giving classes [INAUDIBLE] since 2006. And every year but the past few years. I kind of try to do it every two years.

And so that's been working well so far. So let's see, what are we talking about here today? As I said, customized content, that's your key to using the software outside the box. Also knowing how to use some features of the software that are tailored towards streamlining the work between civil and building. Which is still, I think it's fair to say, it's still in development as a technology. As a concept, it's there, but everybody's still trying to find their way. So this will be one of the attempts.

I'm not going to say it's perfect. But it's forward thinking. Maybe thinking ahead of its time. So that's basically what this software is. I don't need Navis, so I don't think I'm going to use Navisworks. OK. So here's that example that I use for this class. And this is the finished product. And I left this part of it in its initial state.

So what do we have? I'm going to tell you quickly what we're looking at here. This is an underground-- it's the twin tunnel board train tunnel where the tunnel boring machine. The company that I work for, WSP Parsons Brinkerhoff. I'm part of the geotechnical and tunneling team. But our group is specializing around BIM and VDC and we work on all sorts of projects. Exciting part is that this one was tunneling project, and it's still going on.

And we decided to use Civil 3D and Revit together for that. So obviously, you're looking at some Civil 3D components here. And you're looking at some Revit components there. And they're pretty well synchronized. So look at that station box. This is an extreme elaboration of what you're going to see today. So I want to convey concepts today. I'm not going to do the station box completely. That will take a little bit of time.

But that was done in Revit. And it's synchronized with-- well synchronized with the corridor of the Civil 3D components that you see here as tunnels. And there's a lot of questions that kind of pop up in my mind, if I looked at this the first time. For Civil 3D, users as you get corridor to do this tunnel, right? Then how did you get-- is that a corridor? Is it Revit? What's that?

And then how did you get those two to come together like that? You know, did you do snap, did you do a line, what did you do? So the challenge for designers is this thing, called the alignment of the tracks, changes on a weekly basis. We even had a case that would change the diameter of to tunnel three times. It went from standard size to a larger size back to the standard size. And of course this is all happening a couple of years before the tunnel boring

machine ever gets there. So yeah, we can change our mind about which tunnel boring machine will they transport on site.

But the question, I guess, is how much is it going to cost you to change the tunnel diameter midstream through the design process? And how many times do you change the alignment-- the horizontal or vertical alignment-- and what kind of workflow and workload that generates to actually keep it synchronized with the station? That's kind of what I want to talk to you about. So there's really-- and then of course I did mention the documentation.

But that's 30 seconds. We're really blessed that Autodesk are automating this documentation part. So if you had the model, my signature says model is worth a thousand drawings. If you have a model, you don't really worry that much about the drawings anymore. If you know how to set up the system in Civil 3D you'll be pumping out cross-sections from here in no time. Plan, profile. In Revit you'll be doing all the plans and elevations in sections and so on.

So we will take a very quick look at that. But mostly I want to focus on technology to do this. And how do you integrate it to, and how to achieve automation. Right, so I think that's what I just said. OK. So we're going to go back to that, and just leave that on screen. And I'm going to do a live demo and we'll go and talk through a number of aspects of what we have here. So first of all, for Civil 3D users, or for civil engineers, that little tunnel, the shape is created in Subassembly Composer.

How many people have used the tried Subassembly Composer? OK, great. So, the one thing I love about Subassembly Composer is I can create a subassembly to support pretty much any type of work, and any work, and achieve any type of output, and something I can reference further in my project, with Subassembly Composer because I have full control over parameters, properties, behavior. So we're going to talk about a little example here, and the requirements. And for those of you who haven't seen Subassembly Composer, it's basically-- I'm starting to add points and there, how do we draw them?

The methods for drawing those points, and assigning them some coding. For example, let's say a center line for that point, and so on. And then the geometry kind of creates around that. But the main thing about is building in logic. Defining your own input parameters. So what do I want the user to type in? And then designing the entire subassembly like an intelligent object, so that later on you could go change the tunnel diameter, and it's a one parameter that will propagate the change throughout your model and throughout your design.

So here's an example, without further ado, I'm just going to open that. So in this case, everybody knew that it's a twin tunnel. And they're going to be referenced and dependent on each other's location. And we are going to require some clearance reporting between the tunnels to maintain when we run into or through the station, they need to come together. Basically, the tracks need to come together. When they are outside the station they can divert, so they can have more space between them.

So all of this had to be built into this custom subassembly. So let me just quickly, you can see that in the input and output parameters. Most of the parameters are input in this case. But just for your notes, remember that you can also set up the output parameters. And that can become very, very handy later on in the process. I just thought I'd mentioned that. I don't have it in the model. But, so that you can then-- cause your output parameters can be used as an input parameter to another subassembly, or another corridor. Basically, another part of your project.

So you can automate even more going that way. So notice that I have outer diameter. Let's say, 25.1. So we had decided to go down to 22. So that was three feet less. And then here, 19. And it takes a little while to update. So spot that everything else is still drawing properly. I just changed the tunnel diameter from 25 to 22.

Now what does that mean to the user? Well take a look at that in the model once again. So this is, I call it analytical. This is-- in fact, I don't know if you've ever thought about this. But there is a good reason-- how is this displaying? Not very good. Great, OK. Haven't thought about asking them to check that. I don't want to touch the thing. So this block of objects here is really like a flow chart, like a logical diagram for programmers.

If anybody ever done any programming, there know. It actually is, in the background it creates a little application for Windows to run. Now, you as a user don't have to sit down and code. This is now becoming the most popular way of customizing applications. 3D Studio Max has it. Anybody heard of Dynamo? Right. So if you've used Dynamo, that's pretty much what it is, only in a different shape or form. And it's a phenomenal thing to kind of claim, that hey we did this in 2011.

That was the first first version of this that came out before all others. So, you as an engineer with maybe a day, or two, or three, if you have any affinity towards that crash course. And as an engineer, we all had to go through the computer science and programming. So you know

what the variable type is. You know what an if, then statement is. You know a multiple choice is. You know how to define and then use variable.

And so you can do this. But you can totally put your own, [INAUDIBLE]. Start from a tunnel like this. Let me give you that advice. Start from something simple. And also Autodesk, they publish files that are reusable and editable. For some of the stock subassemblies that they include with Civil 3D. So that's a great starting point. Especially those that use super relevation, or maybe there are conditional subassemblies. So you can see some logic there.

I'm going to show you one my favorite here is just to illustrate things that you can do with this. Depending on super elevation, or cant, and I want to highlight that Subassembly Composer supports to both highways with super elevation, and railways with cant. So depending on the value of that cross grade, right, this line, this little horizontal line, I should zoom in more. Can hit either that vertical line, that vertical line, or even that vertical line. So the logic behind that, to test and adjust the drawing, is similar there.

It's in the right track work. It's right here. OK. So here's how that looks. Decision, true or false. OK, see that's false. Then let's check this, something else, true or false. And then it will go multiple choice, depending on what you get from there. You're going to do three different things. And draw this in a different way. And so we're not going into what exactly it is. I already told you. But I wanted to show you that you can get as complex.

And the huge advantage of this if you're a civil engineer, and we're talking about corridors and everybody I think assumes a corridor is a highway or a roadway, or a railway, or something else. But in here it's a tunnel. And then those two are built into the subassembly. They don't have to be the rails. I'm going to show you later on, you can have this work for different types of rails.

The input parameter-- I mean, OK, so this is a subassembly. So it's a basic building block of your corridor. And I've included rails as part of the subassembly because it's fixed for this job. But it doesn't have to be like that. You can have a rail as a separate subassembly, and you have three or four different types. That's if you are a dedicated railway designer or an engineer. And so when you put this in a corridor, you add your tunnel. And all you need to do is-- that your rail is defined so that when you insert, it maintains the top of rail with your type of rail alignment tracks center line and profile.

So I'm going to show you that. We have them separate. And then also other components, they can also be treated as separate subassemblies. But in this case, it's all put into one. And there are two of those tunnels. And the input parameters are obviously the gauge, the outer and inner diameter, and then you have-- oh, I do have the rail head weight and the rail height. OK, so we can change the rail type here. But you have to know exactly those numbers, and how to change that.

So you can't even change rail type here. I don't know why I put that in. That wasn't required. But I love this stuff, but it's stuff that it's not required. And so target parameters. Oh. How do we do that? You don't even see them. So that's important. Target parameters. Notice that I have left track PGL and left track centerline, which would be somewhere here. But I don't have the right track centerline. That is because that's where my subassembly attachment point is.

So that's going to attach to the plan and profile of the right track. So this is our reference alignment. And then I do have a separate alignment and profile for this, the left track. But that's inserted and referenced as a target. So where this left tunnel is, and I'm always going down that reference alignment. It depends on another alignment and profile. So there are two. And they can be totally separate.

So why did I do it this way? When you get to the cross-sections in Civil 3D, you're going to get the clean cut, accurate cross-section showing both tunnels when you reference them all only off that alignment. So Civil 3D users and corridor users, you know how, I think you've got better. But still, I just wanted to make sure. So that's why both of them are in one single subassembly, and they end up in one single corridor.

So this is-- a lesson learned here is already when you're designing your custom subassembly, you need to take care of your custom sheets production. You need to take care of your cross-section production. And here's how you do that, by including more. One corridor object, one alignment, one set of simple lines that cut through one object. And you get a good-- and then one when you have frequency in the corridor, both of them are calculated for that frequency perpendicular to that baseline alignment.

And it will work. OK. So the left tunnel the centerline, and the tunnel centerline, and the left tunnel centerline, and the left tunnel PGL, and the tunnel PGL. So these are something entirely different from what we were talking about before. As I learn quickly into this project, into this job, the track center line doesn't necessarily align or match. The track central line,

which is here, doesn't necessarily always match the tunnel center line, what they call a spring line.

This can go left and right relative to the tracks center line. It can even go up and down, which I still don't understand why. But OK. And so that needed to have targets for both the PGL and the center line. They're both right and left. I don't put here right, because that's right here. But I do put [INAUDIBLE]. So again, these are my variable names. You can name them however it makes it easier for you to manage. What user sees is a display name. So there you need to be verbose. And you can, left tracks profile. Left tunnel alignment, left tunnel profiles.

So that's what a user will see, and that's where they need to make a decision. Which alignment and profile to attach to that point in the tunnel? So I think I bored you enough with custom subassemblies. Lets go and apply it. So I'm going to close this. And let's move to Civil 3D. So, I know this may feel a little shocking to some people, but it works as a concept. It's still in development.

So you're looking at what may sound like a crazy idea. But it's, I think it's a good idea and I think we're going to make this work pretty soon. But here's the concept. So today I just want to share concepts with you. I was honestly strongly hoping I can share more, but this is as far as we've got. So this alignment is the same alignment, or segment, of it, from that 3D view that you see. And this alignment will control a tunnel, or one of the two tunnels.

And somewhere along that alignment like here there needs to be a station. So how do I automate without doing too much customization and too much hard work? What's happening in a corridor in Civil 3D with what's happening in Revit? From that corridor. Any ideas? We have a working feature. They're add-ons to both Civil 3D and Revit. Anyone? Bridge Modeler. OK. There you go. So I'm going to use a Bridge Modelar here underground to create a slab, of base, to put my station on.

So that when I change this alignment and this corridor, the two stay synchronized. That's the concept. So how do you do that? Your bridge needs to have piers and abutments, and then you remember if you've used Bridge-- how many use Bridge Modeler? OK. Yes, we are all trying it. We're on the bleeding edge there, as you will see in a few minutes. But here is the surface. Everything is temporary here. Your bridge is temporary, you've got a temporary surface so you can force Civil 3D to create a bridge. Then you take that bridge over to Revit.

And inside of Revit, you can then reference that to do something else. But it's a temporary

surface and can only be used as a temporary reference for your future detailed station box, as we call it. So that's what we're going to do. I'm just going to draw a box even to convey that concept. So what did they do in Civil 3D? Obviously I have a couple of, let me show you, I have a couple of corridors. And from one of them I call it drop corridor.

So this is a very simple, let's see. It's a very simple generic links corridor that creates a surface like this. So I need that surface to draw. That's why I call it drop surface. I need that surface to drop about 10, 15 feet where my station should begin, and then when my station should end. And then I have my alignment that runs across. That is synchronized with that. And here it is. Now this one is very simple because at the moment, Revit wants a road to work with it.

But that could be replaced with whatever corridor you want to have. So this corridor has also three regions. There's a region where there's simply a tunnel. There's a region that tunnel continues, and there's a region in between where the tunnel will be replaced with a simple slab or a roadway deck. And then we're going to have bridge in that segment. So let me show you. So I go to Bridge Modeler, as they said. And I get to do simple bridge concrete slab.

And it recognizes that I have a roadway there with the alignment. And I have three regions. I know that the bridge region is in the middle. And then this is also references drop surface. Why do I need this rough surface? Because Bridge Modeler needs elevation, difference appear there. So to create a bridge, it's got to have some gap to bridge. And I've ad created that, I'm not going to go into that now. But I'm just going to let it do it.

OK, now I have the bridge there. And then I'm going to Revit, as you know. I'm going to start a new file, with the structural template. OK. So when we get I'm going to go to extensions. And there's Civil Structures extension. And I have this option to integrate. And before I do that, I have the option to save this file. Save this file in Revit. and I'm going to call it Tunnel Bridge Station.

And so all I need to do is click on Integration with AutoCAD Civil 3D and it recognizes the drawing file. Recognizes the corridor, the surfaces, and also the bridge that we created over there. So I'm just going to go and bring that bridge into this model. OK. So I see. And then so I'm not going into this. This is your bridge modeler and a little integration tools, and how to keep everything synchronized. And I like that because I don't have to go and set up the shared coordinates. Civil 3D and Revit, finally, they take care of all that.

OK. Now I could, but I'm not going to, that's all you see. I could, but I'm not going to go and

complete this bridge in Revit. I'm not actually very interested in it right now. Because I got all I need here. I got this is a base slab that is created. And if I, what it's asking me to do is to go back here and actually just complete that bridge structure and bridge detail which we're going to go and do in a moment. But before that, so what was this all about? So if I got back to Civil 3D.

You see how that alignments doing kind of funny things there. So what I want to do is I want to modify that alignment to bring it a little closer to the rest of the world. And so I want to rebuild that corridor. And now I want to go to the bridge concrete slab, I want to edit that bridge. And click OK. And that bridge, and you can see that this part is out of my control. So it updates it and changes the location of the bridge.

So when I come here, I go to Integration with AutoCAD Civil 3D, and it's going to bring me to the new location of that bridge. And it's going to update my content in Revit. Still clicking OK on those to confirm. And OK. OK. So, where are we? OK. So the only-- this is still developing.

You guys, I ended up with two. So I'm going to remove that one. And now, once this shift and the motion is completed, with alignment and profile, and changes in the design. Also a couple of things. A station box is always on a straight segment. And it's always on a flat grade. So those are simple cases, at least, for this to work. Because that's just a requirement for the station conditions.

So once these are-- details of the bridge will be created here. And don't forget all this is happening on underground. This is just a reference. It's a placeholder in a reference model for other things that we want to do. But here's an interesting part that I just began exploring. You can go into the Revit families that are created for bridge. And you can modify, you can customize the piers, the superstructure, the abutments, and create them like that. We do have those ring type foundations for tunnel. And you can make them look like that.

You can change their shape. So they will be used by the software as bridge elements, but they are really details for the tunnel. So from here on, there's also some specialized tools in the bridge modeler. First of all, here's where you can go to customization of bridge families. I just want to go and show you that. Just give it a moment. It was part of the reason why not a lot of us do live demos. Because it's just a bit slow. So here's the pier.

Then you can customize the barrier, the abutment. All of these-- and you can add a new type

of, obviously. So that can then be referenced in the bridge, and the bridge modeler. So that you can use-- when you click that-- OK, we're going to let them go now. When you click on that bridge concrete slab, it can use your custom families. So this bridge can look very, very different. Pretty much how you want it to look like than over here.

But the concept of being able to synchronize what you have in Revit, what you have in Civil 3D, using this technology, is something that excited me, and something that kind of guided me to embark in this story. But as you can see, we've got a few glitches in the technology that we need to still sort out. And then to make it fit perfectly. But the purpose of this lecture was to kind of get everyone to think outside the box.

Just because it says bridge, doesn't have to be used above ground. And as a bridge all the time. You also take advantage of-- my god that is terrible, this display. You can also use that as a reference for a lot of other work that you do. And Revit is kind of based a lot on reference planes, reference geometry, massing models and so on. I didn't want to go into drawing that box. But I think you get that from the Revit expertise.

So going back to my slide, want to discuss that a little bit more. It would be too easy to go and, I mean I can show you, to go and get those two tunnels. And there's a variation of the tunnel that doesn't have the top. So it really, actually I create something that looks like a platform there. And you can even reference, create a family from that. You know that, in Revit, these are 3D solids. But you can create a family from them in Revit, and then use that as a starting point.

But then you have to update it every time your alignment changes. And that's a bit more work. And then what you what you build simple on top of that-- at the beginning it's just the station box, and then we start adding, and adding, and adding, and adding, at adding inside. This is not showing any MEP components, but if MEP components are in there, and they're referencing other parts of the Revit, then they are tied to the same story as well.

OK so might as well just show you about the documentation part. So here in-- I'm just going to bring some quick assemblies to, let's call it, tunnel. Put that there. And then here is-- so your custom subassemblies-- you know you simply import subassemblies and you go find that file, they are called the PKT file. And you simply import that PKT file and it ends up on your tool palette looking something like this.

That's already as large as it gets. with that icon. So I'm just going to start with two, the twin

tunnels like that. And then we're going to put another one, that goes through the station, and that's going to look something like this. When it goes through the station. So you can see that with that geometry, it almost like creates a platform there. And so what else, OK. So let me see the #3. right. Then we're going to create a new one here.

OK. For this type. OK. So because I only have one, I'm just going to do that. So then when my corridor, that I already have in place, and I have three regions, I can obviously edit that region in the middle to stay as it is. But the region before will have that tunnel, and the region after will have that tunnel. And so now I look at that. Bring it closer. OK. Slow moving.

OK. So I think you see what's happening there between those two. Now of course all this following the track center lines. And if I zoom in enough like there you'll be able to see-- I think I have a rail in there. OK, maybe not. OK so not having that rail in the assembly, you see how I can attach that rail. Obviously, I don't have where to attach it to right now. But you can put that as a separate if you knew exactly where it went. You know, put it anywhere.

This one doesn't have a reference, but-- or you can have it built like I have with those too. So another example is right here. So I'm going to, OK that's borrowed. I want to show you this model that we use for that 3D. I'm going to go [INAUDIBLE]. OK, so here we are. So that's-- here is the model with-- We're going to go slow.

OK. So you can see some of that. So that's basically probably showing better. That placeholder, that place for the platform. The place for the station location, which is all I want to use this trick, if you like it, for that purpose. This technology to achieve something in my design process. And here is your detail of the tunnel with the rails and that egress there, as well as running those rails through-- you don't really see them do you? Through the station, and then connecting all onwards.

I don't think I need to say much to Civil 3D users about the documentation. But once you have that corridor it's as simple as running a simple lines just for that alignment. And then we can read those two at the interval, and so forth. Just going to leave that. So now my sections are ready for display. And if I go and create section views-- let's just create one to illustrate. And which sample line, let's go to that one. And create a section view and an IFC. You have that all in cross-section, OK.

And the customization part, of course. Each and every one of these styles can be customized to display however you need it to display. In Revit, the same thing applies. If I go to similar

structures, it has a customized documentation. So I'm to go and run that very quickly. For bridge, for abutments, for piers. And then you can control some of the settings. Let's go to the bridge, and then I'll do.

So Revit creates, and notice how my the number of views will expand, if it doesn't crash. I'm not interested 3D views. But I'm interested in floor plans for abutments, for piers, and so forth. With all the standard customization that you normally use the families for Boarder and Title Block and so on. All right, so I'm going to stop now and give you a chance to ask questions.

**AUDIENCE:** [INAUDIBLE] Do all the sections and profiles, the documentation comes from Civil 3D. And most other things come from Revit.

**RAD LAZIC:** Correct

**AUDIENCE:** [INAUDIBLE]

**RAD LAZIC:** So how so how do you combine them, or how do you? Which one do you do where. Is that the question?

**AUDIENCE:** [INAUDIBLE]

**RAD LAZIC:** Yes

**AUDIENCE:** [INAUDIBLE]

**RAD LAZIC:** Right. First of all, you cannot do all documentation, and it doesn't matter if it's a bridge or tunnel, in Civil 3D. Because you need some very specific plans and elevations, and sections, in Revit. But you can take Civil 3D model and put it in Revit. So you can take it from Civil 3D something I haven't shown, I don't think. But I think, I'm assuming everyone is aware of this. But they always tell me no, you'd better say this.

So when I click on this civil 3D, I get this option to extract corridor solids. So when you extract corridor solids, it creates 3D solids. You can save them in a separate file, and bring them into Revit as a family. You created a family from the solids. And from that point on, you can cut through the civil 3D part, which is the tunnel, for example, or the roadway before and after the bridge. Or before and after station. And display include that in your documentation in Revit.

So I guess what I'm recommending for your documentation is to do complete in Revit. One

thing to bear in mind though, then. In Revit, you are your reference is north, south. And you need to kind of play a little bit more, because the road or a tunnel will curve and across the sections for that need to be perpendicular. So you might need to import some additional CAD or reference some additional CAD just to create a reference if you were to create sections in Revit.

**AUDIENCE:** [INAUDIBLE]

**RAD LAZIC:** No. I would do the same thing. Grab the solids, 3D solids from civil 3-D. So Civil 3D is excellent at creating extruded models and that's two simplified models that follow certain rules. This is why we have all those targets. So anything that happens along the corridor changing the width of an element, changing the distance and the spacing, exactly following your horizontal and vertical geometry.

Your horizontal geometry can include curves such as piles. Revit doesn't know about that at all. It can include curves such as vertical curves then need to be smooth so when you bring this 3-D solid model into Revit, you get all that detail. You get all that continuation. So when you turn that into family, then you can add systems to it.

**AUDIENCE:** [INAUDIBLE]

**RAD LAZIC:** It would be. It's possible. But it'd be very hard to see with Civil 3D. It's just not designed to do things like that. Anyone else?

**AUDIENCE:** [INAUDIBLE]

**RAD LAZIC:** Yes, I didn't-- thank you. I didn't show that day, did I? So if you make a change here, this little tool is automated. So if I go and make a change to this in Revit, which is what I would recommend that you use some custom families. I think that will do, right? Yeah. So then I can go and do the integration or export Revit elements to AutoCAD Civil 3D.

Or even in this point, it's going to stop and ask me. Here it is, export bridge historic at Civil 3D. Right. But here you're limited to bridge. Let's talk about rabbet in general, right? I've done exporting AutoCAD solids from Revit. I've done building sites, which gives you more detail looking more like what you have in Revit. But it's a fixed, it's like a block in your Civil 3D. If you use Bridge, that will take care of itself. But for everything else you need to establish shared coordinate system which this class needs to talk about, because these technologies are nominated. But those will be some of the ways you can do that. Anyone else? All right. I think

we finished early. We're going to run off and get in line for the Kino. Thank you very much for attending this, appreciate it. Thank you.